

INDIAN COTTON COMMITTEE

MINUTES OF EVIDENCE

TAKEN BEFORE THE

INDIAN COTTON COMMITTEE

VOLUME II

AGRICULTURAL

PART II

MINUTES OF EVIDENCE FROM BOMBAY, MADRAS, BENGAL, BIHAR AND ORISSA,
IMPERIAL OFFICERS, CENTRAL INDIA, BARODA, HYDERABAD AND MYSORE.



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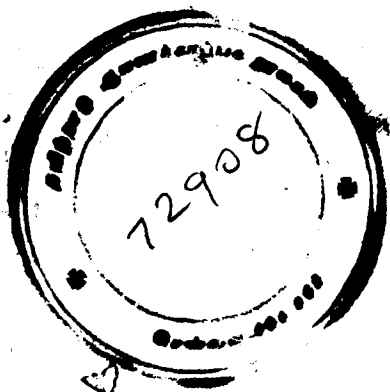
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NOTE.

It is regretted that it has been impossible to publish the evidence given before the Indian Cotton Committee earlier owing to the transfer of the Secretary to other duties in August, 1918. For convenience of reference, the evidence has been classified under the three heads, Agricultural, Irrigation and Commercial. Volumes I and II contain the Agricultural Evidence, Volume III the Irrigation Evidence and Volumes IV and V the Commercial Evidence. The evidence of a witness will, therefore, be found in one or other of these volumes according to its predominating character. The references in black type in the written statements are to the questions issued by the Committee which are printed at the commencement of each volume. Thus "(30) Local trade customs" shows that the paragraph is a reply to question 30. A glossary of the more common vernacular terms used in the evidence is appended.

F. NOYCE,
Secretary,
Indian Cotton Committee.

BOMBAY ;
October 1st, 1919. }



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Glossary of the more common vernacular terms used in the evidence.

Amin	.	.	.	.	.	.	Subordinate official of the Irrigation Department.
Arat	.	.	.	.	.	.	Commission.
Aratya	.	.	.	.	.	.	Commission agent.
Arhar	.	.	.	.	.	.	Pigeon pea (<i>Cajanus indicus</i>).
Bajra	.	.	.	.	.	.	Bulrush millet (<i>Pennisetum typhoideum</i>).
Bania	.	.	.	.	.	.	Village shop-keeper and money-lender.
Barani	.	.	.	.	.	.	Land dependent on rainfall.
Bhata	.	.	.	.	.	.	Lateritic soil in the Central Provinces.
Bhindi	.	.	.	.	.	.	Lady's finger (<i>Hibiscus esculentus</i>), a vegetable.
Bhusa	.	.	.	.	.	.	Crushed straw.
Bigha	.	.	.	.	.	.	A land measure, usually about three-eighths of an acre.
Bora	.	.	.	.	.	.	Bag of unpressed cotton of varying weight, generally five maunds.
Chari	.	.	.	.	.	.	Great millet (<i>Sorghum vulgare</i>) grown as a fodder crop.
Chaudhri	.	.	.	.	.	.	A headman.
Dalal	.	.	.	.	.	.	Broker.
Deshi	.	.	.	.	.	.	Indigenous.
Docra	.	.	.	.	.	.	Bag of unpressed cotton of varying weight, generally five maunds.
Ghats	.	.	.	.	.	.	Hills.
Gwar, gwara	.	.	.	.	.	.	Field vetch (<i>Cyamopsis psoralioides</i>), a fodder crop.
Hari	.	.	.	.	.	.	Cultivating tenant in Sind.
Inam	.	.	.	.	.	.	Land held on favourable terms or free of land revenue.
Juar	.	.	.	.	.	.	Great millet (<i>Sorghum vulgare</i>).
Kamdar	.	.	.	.	.	.	Fieldman : subordinate in the Agricultural Department.
Kan	.	.	.	.	.	.	Weight of lint obtained from unit weight of unginned cotton.
Kanungo	.	.	.	.	.	.	Subordinate revenue official in charge of a group of villages, known as Revenue Inspector in Madras and Circle Inspector in Bombay.
Kapas	.	.	.	.	.	.	Unginned cotton.
Karbi	.	.	.	.	.	.	Dry juar fodder.
Karnam	.	.	.	.	.	.	Village accountant.
Kharif	.	.	.	.	.	.	The autumn harvest.
Khurpa	.	.	.	.	.	.	Hand hoe similar in shape to a trowel.
Killa	.	.	.	.	.	.	Square of land usually equal to 1½ acre in area.
Kodo, kodon	.	.	.	.	.	.	A millet (<i>Paspalum scrobiculatum</i>).
Kumbu	.	.	.	.	.	.	Bulrush millet (<i>Pennisetum typhoideum</i>).
Kunbi	.	.	.	.	.	.	A cultivator.
Kutki	.	.	.	.	.	.	A pulse (<i>Dolichos biflorus</i>).
Lakh	.	.	.	.	.	.	One hundred thousand.
Mahajan	.	.	.	.	.	.	Money-lender.
Makki	.	.	.	.	.	.	Maize (<i>Zea mays</i>).
Malguzar	.	.	.	.	.	.	Landholder in the Central Provinces.
Mandi	.	.	.	.	.	.	Market.
Methi	.	.	.	.	.	.	Fenugreek (<i>Trigonella foenum-græcum</i>).
Moth	.	.	.	.	.	.	A pulse (<i>Phaseolus aconitifolius</i>).
Mukhtiarkar	.	.	.	.	.	.	Revenue officer in charge of a taluka (q.v.) in Sind.
Mung	.	.	.	.	.	.	A pulse (<i>Phaseolus mungo</i>).
Patel	.	.	.	.	.	.	Village headman.
Patwari	.	.	.	.	.	.	Village accountant.
Phutties	.	.	.	.	.	.	Unginned cotton : Kapas.
Rabi	.	.	.	.	.	.	The spring harvest.
Rui	.	.	.	.	.	.	Lint.
Sahukar	.	.	.	.	.	.	Money-lender.
Sailab, Sailabi	.	.	.	.	.	.	Land irrigated by floods or percolation from a river.
San	.	.	.	.	.	.	Hemp (<i>Crotalaria juncea</i>).
Senji	.	.	.	.	.	.	A fodder crop (<i>Melilotus parviflora</i>).
Shaftal	.	.	.	.	.	.	A fodder crop (<i>Trifolium resupinatum</i>).
Tahsil	.	.	.	.	.	.	Revenue sub-division of a district.

Tahsildar	Officer in charge of a <i>tahsil</i> , <i>taluk</i> or <i>taluka</i> (q.v.).
Taluk, taluka	Revenue sub-division of a district.
Til	Sesamum (<i>Sesamum indicum</i>).
Toria	An oil seed (<i>Brassica campestris</i>).
Tur	Pigeon pea (<i>Cajanus indicus</i>).
Urad	A pulse (<i>Phaseolus mungo</i>).
Varagu	Bulrush millet (<i>Pennisetum typhoideum</i>).
Zaildar	A rural notable appointed by Government. The head of a Zail or Circle of villages.
Zamindar	A landowner ; in the provinces visited by the Cotton Committee generally a peasant proprietor.

VOLUME II.

Agricultural.

PART II.

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VOLUME II—Agricultural.

PART II.

Questions issued by the Committee.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short-staple cotton.

1. In what cotton growing districts have you been stationed and for what period in each? Have you been in actual touch with cotton cultivators?
2. What varieties of *deshi* short staple cotton are grown in the districts with which you are acquainted?
3. What is the average size of holdings in which cotton is grown and what proportion of the holding is under cotton?
4. What are the average yields and profits per acre?
5. What rotations are followed and what manures, if any, are applied?
6. How does the return to the cultivator of the different varieties of *deshi* short staple cotton compare with the return from (a) *deshi* long staple cotton, (b) other *deshi* crops, (c) exotic cottons?
7. Does the area under *deshi* short staple cotton fluctuate at all largely in the districts with which you are acquainted, and if so, is there any special reason for this? Is there any possibility of an increase under *deshi* short staple cotton and, if so, what are the factors which would limit that increase?
8. To what uses is the seed put? Is any seed selection practised and, if so, on what principles? Is seed selected for sowing specially hand ginned?
9. Please add any remarks you consider may be helpful to the Committee on the general economic state of the cotton growing districts with which you are acquainted.

N.B.—Please see note at end of Section (c) below.

(b) "Deshi" long-staple cotton.

10. In what cotton growing districts have you been stationed and for what period in each? Have you been in actual touch with cotton cultivators?
11. What varieties of *deshi* long staple cotton are grown in the districts with which you are acquainted?
12. What is the average size of holdings in which cotton is grown and what proportion of the holding is under cotton?
13. What are the average yields and profits per acre of different varieties of *deshi* long-staple cotton, of which you have had experience? How do these compare with those of (a) *deshi* short staple cotton, (b) other *deshi* crops, (c) exotic cotton?
14. What rotations are followed and what manures, if any, are applied?
15. What in your opinion, are the special conditions which would affect any increase in the area under *deshi* long-staple cotton in the districts with which you are acquainted, e.g., length of ginning season, irrigation available, climatic considerations, competition with food crops, limitation owing to necessity of observing rotations, labour supply, etc.?
16. Do you consider that, in the cotton growing tracts with which you are acquainted, the right varieties of *deshi* long staple cotton are being pushed in the right districts or whether still superior types could be introduced?
17. What measures would you recommend to prevent the mixing of *deshi* long staple cotton with (i) *deshi* short staple cotton, (ii) exotic cotton (a) in the field, (b) in the factory?
18. To what uses is the seed put? Is any seed selection practised and, if so, on what principles? Is seed selected for sowing specially hand ginned?
19. Please add any remarks you consider may be helpful to the Committee on the economic state of the cotton growing districts with which you are acquainted.

N.B.—Please see note at end of Section (c) below.

(c) Exotic cotton.

20. In what cotton growing districts have you been stationed and for what period in each? Have you been in actual touch with cotton cultivators?

21. What varieties of exotic cotton are grown in the districts with which you are acquainted ?
22. What is the average size of holdings in which cotton is grown and what proportion of the holding is under cotton ?
23. What are the average yields and profits per acre of the different varieties of exotic cotton of which you have experience ? How do these compare with those of (a) *deshi* short staple cotton, and (b) *deshi* long staple cotton, (c) other *deshi* crops ?
24. What rotations are followed and what manures, if any, are applied ?
25. What, in your opinion, are the special conditions which would affect any increase in the area under exotic cotton in the districts with which you are acquainted, e.g., length of ginning season, irrigation available, climatic considerations, competition with food crops, limitation owing to necessity of observing rotations, labour supply, etc. ?
26. Do you consider that, in the cotton growing tracts with which you are acquainted, the right varieties of exotic cotton are being pushed in the right districts or whether still superior types could be introduced ?
27. What measures would you recommend to prevent the mixing of exotic cotton with (i) *deshi* short staple cotton, (ii) *deshi* long staple cotton (a) in the field, (b) in the factory ?
28. What is your opinion as to the desirability of importing seed direct from America or Egypt as required as against relying on selected seed grown in India.
29. Please add any remarks you consider may be helpful to the Committee on the economic state of the cotton growing districts with which you are acquainted ?

N.B.—The Committee would be obliged if you would give them your views as to the best organization for handling cotton in your province. Under this head you might consider research in connexion with improvement of the plant, establishment of seed farms for the production of improved seeds, district staff necessary and the regulation of buying agencies and ginning factories.

II.—COMMERCIAL ASPECT.

30. Give, as fully as possible, an account of local trade customs with which you are acquainted in regard to the marketing of the cotton crop, in particular as regards any systems of agency, advances, future buying or contracts.
31. What are the commercial names of the various grades of cotton with which you are acquainted and from what areas do they come ? Do you regard them as suitable and, if not, what alterations would you suggest ? Can you suggest any means by which the commercial names could be standardized, i.e., of securing that the same name should be used for the same cotton from what ever locality it comes ?
32. What do you consider is the best form of buying agency ?

III.—STATISTICAL.

33. Do you consider that the cotton forecast, as at present published, is sufficiently accurate as far as your province is concerned ? If not, can you suggest any way in which it could be improved ?
34. Can you suggest any methods by which the statistical information published by the Government in regard to cotton other than the forecasts, e.g., the cotton press return, could be made of greater use to the cotton trade ?
35. What are your views in regard to the daily publication of Liverpool and Bombay cotton prices at up-country markets ?

IV.—MANUFACTURE.

(a) Ginning and Pressing.

36. What class of gins and presses do you use and how many have you in your factory ?
37. What is the size of the bale produced by your factory ?
38. What is your opinion as to the relative merits of saw and roller gins ?
39. Have saw gins been successful with Indian cotton and, if not, what is the objection to them ?
40. Have you experienced any difficulty in obtaining factory labour ?
41. Do you find the condition in which raw cotton reaches your factory in any way objectionable and, if so, what remedies would you suggest ?
42. Assuming that it were found possible to replace any large quantity of short staple cotton by long staple cotton, would any substantial alteration in your machinery be necessary ?

N.B.—The Committee would be obliged by any information you can give them in regard to the general question of long *versus* short staple cotton and also in regard to any experience you have had in handling any new staple cotton.

(b) Spinning and Weaving.

43. What counts are spun in your factory and what is your principal market ?
44. Do you find the condition in which cotton reaches your factory in any way objectionable and, if so, what remedies you suggest ?
45. What, in your opinion, would be the effect on the cotton market generally if any large proportion of the short staple cotton at present grown in India were replaced by long staple cotton ?

N.B.—The Committee would be obliged by any information you can give them in regard to the general question of long *versus* short staple cotton and also in regard to any experience you have had in handling new staple cotton.

V.—GENERAL.

46. Does your experience indicate that buyers in the past have been prepared to encourage the growth of improved cottons by offering a premium for them ?
47. Do you consider that the water rates charged have any effect on the cultivator's preference for a particular crop ?
48. Do you consider that any changes are called for in the schedule of water rates at present in force ?
49. Do you consider that the tenure on which land is held in the tracts of which you have experience in any way affects the extension of cultivation of cotton ?

VI.—IRRIGATION.

(For Punjab and North-West Frontier Province witnesses only.)

50. Please state what experience you have had of irrigation in general and in particular of irrigation under canals. Have you any experience of canal irrigation assessment work ?
 51. Has it been your experience that cultivators prefer wheat to cotton as an irrigated crop ? If so, what is the reason for the preference ?
 52. (a) What is the critical period in regard to the water-supply in the canals of which you have experience ? How would this be affected if there were an increase in the irrigated area under cotton between April and October ?
 - (b) When is cotton watered and what is the volume of water required per acre at each watering ?
 - (c) Please furnish statistics for the channels of which you have had experience showing—
 - (i) the average flow of the channels month by month throughout the year.
 - (ii) the average monthly area of each crop irrigated under the channels. It will be sufficient if the average for the last three years is given.
- The maximum carrying capacity of the channels should also be stated.
53. (a) Are there any periods during which the supply in the rivers would be sufficient for a large expansion of the area under cotton to utilize which the canals could properly be enlarged with due regard to financial considerations ? If so, please give figures for the canals of which you have experience ?
 - (b) How would such an enlargement of the canals effect the area under wheat ?
 54. (a) To what extent could the duty of water on the canals of which you have experience be improved by equalising the distribution of the supply between the upper and lower outlets on the distributaries ?

N.B.—In the Punjab this process is technically known as the "remodelling of outlets."

- (b) To what extent could modules be used to effect this purpose ?
 - (c) If the distribution were equalized, what additional irrigated area would accrue ? What crops would be grown on this additional area ?
 55. Does the supply in the rivers increase gradually in spring and decrease gradually in autumn or are both the increase and decrease sudden ? In either case what is the effect on the cultivator's preference for a particular crop ? Please furnish, if possible, a diagram with statistics illustrating your reply for the canals of which you have experience.
 56. (a) In cases in which canals carry a supply for irrigation during the summer months only, would it be possible for the sowings and final waterings of cotton to be carried out by irrigation from wells ? Do you know any tracts in which such a combination of irrigation from wells and canals would be feasible in the case of American cotton ?
- N.B.*—American cotton requires watering as follows :—
- (i) First watering between March 25th and May 5th.
 - (ii) Three waterings between the time when the flowers begin to appear which is between July 20th and August 10th and the end of September.
 - (iii) A fifth and final watering in October.
- (b) To what extent do wells exist in the areas commanded by the canals of which you have experience and what steps are required to extend the irrigation under them in those areas ?
 - (c) Have you any experience of tube-wells and do you consider that their use would be valuable in this connexion ?
 - (d) Do you consider that it would be possible sufficiently to improve the canal system by the construction of weirs or in other ways so as to obviate the use of wells ?
 - (e) Can you give an idea of the cost of such an improvement in the canals and the time it would take to carry out as compared with the cost of the construction of the requisite number of wells and time it would take ?

57. In case it were found possible to increase the size of canals and consequently the irrigated area under cotton, what addition to gross revenue at present rates for water would you expect ? Please illustrate your reply from the statistics furnished in answer to other questions.

58. Can you give a rough estimate of the average area of each crop grown on a holding of 100 acres ? How are these areas affected by the water supply and by the necessity for growing a fodder crop and of preserving suitable rotations of crop ? Would any proposal you have put forward bring about an alteration in these areas ?

59. Have you any experience in regard to the lining of canals ? Do you consider it a practicable measure ?

60. Can you give a rough estimate of the probable cost of lining canals in terms of acreage irrigated ? How does this compare with the acreage rates of costs of the canals in their present condition ?

61. If it should prove desirable to enlarge a canal, would this be carried out in conjunction with lining ? How would you propose to provide for the existing irrigation whilst the work of enlargement and lining was being carried out ?

62. What effect would the lining of canals have on seepage problems and the rise in the subsoil water table ? To what extent would the expenditure involved be justified on these grounds ?

63. To what extent would the lining of canals improve the supply (a) in the summer months, (b) in the winter months ? Would the expenditure involved be justified by the improvement, if any, effected under this head ?

64. Do you consider that the water rates charged have any effect on the cultivator's preference for a particular crop ? Do you consider that any changes are called for in the schedule of water rates ?

VI.—IRRIGATION.

(For witness from Provinces other than the Punjab and North-West Frontier Province.)

65. Please state what experience you have had of irrigation in general and particular of irrigation under canals. Have you any experience of canal irrigation assessment work ?
66. When is cotton watered and what is the volume of water required per acre at each watering ?

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67. Has it been your experience that cultivators prefer wheat to cotton as an irrigated crop? If so what is the reason for the preference?

68. Does the supply in the rivers increase gradually in spring and decrease gradually in autumn or are both the increase and the decrease sudden? In either case what is the effect on the cultivator's preference for a particular crop? Please furnish, if possible, a diagram with statistics illustrating your reply from the canals of which you have experience?

69. (a) To what extent do wells exist in the areas commanded by the canals of which you have experience and what steps are required to extend the irrigation under them in those areas?

(b) Have you any experience of tube wells and do you consider that their use would be valuable in this connexion?

70. Do you consider the existing water rates charged for cotton suitable? If you can give statistics to explain your answer, please do so.

71. Can you give a rough estimate of the average area of each crop grown on a holding of 100 acres? How are these areas affected by the water supply, the necessity for growing a fodder crop and of preserving suitable rotations of crops. Would any proposals you have put forward bring about an alteration in these areas?

72. Do you consider that sufficient water is available for a considerable increase in the area of cotton and, if so, why is a larger area not irrigated?

73. Is it your experience that cultivators prefer *deshi* cotton to American cotton? If so, can you explain their reasons for the preference?

74. Is it your experience that the canal regulations create any difficulties in regard to the irrigation of American cotton?

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Mr. R. B. EWBANK, I.C.S., Registrar, Co-operative Societies, Bombay Presidency.

EXAMINED AT BOMBAY, JANUARY 26TH, 1918.

Written statement.

1549. *Preamble*.—There are three points in the process of producing and disposing of cotton in the Bombay Presidency at which co-operative methods have been applied with some success:—

1. The production and distribution of improved cotton seed.
2. Financing agriculturists engaged in growing cotton.
3. The organisation of co-operative cotton markets.

It will be convenient to examine these stages separately.

1550. *The production and distribution of improved cotton seed*.—The view taken by the Co-operative Department and acquiesced in by the Director of Agriculture is that the discovery of improved strains of cotton seed and their initial popularization is the work of the Agricultural Department. It is only after the improved seed becomes known and a demand for it springs up that the Co-operative Department intervenes and undertakes to organise its distribution. This may be done in three ways:—

- (i) The ordinary village co-operative credit societies may obtain seed from the nearest Government farm or from some seed-grower certified by the Agricultural Department, and may advance such seed in lieu of cash to their members, recoveries being made at the end of the year in cash. This course has been tried in Dharwar and East Khandesh districts quite successfully; but not on a large scale, because, except in a few *talukas*, the demand for improved seed among ryots is not yet very keen, and because the stock of seed available with the Agricultural Department is strictly limited. The advantage of the method is that it is very economical and simple and utilises the existing organisation without causing any troublesome complications. Its disadvantages are that it throws the duty of producing sufficient improved seed on the agricultural staff, and that since no special precautions are taken to keep the improved cotton separate from other cotton at the gin, the improved seed is lost, and the strain has to be renewed from the central seed-producing farm every year.
- (ii) Special seed societies may be formed which obtain their seed at harvest by purchase either from a Government farm or from the public. The committee of the society are required to visit cotton fields while the crop is still growing and to arrange for the separate purchase and ginning of crops that will meet their needs. The defect of these societies are that they only have work for a few months in the year, to select and store seed properly is a comparatively expensive and unprofitable business, and it is difficult to find managing committee members with time and knowledge to perform these duties competently. A capital example of such a society run by the Rev. Canon Rivington and Mr. Itgi can be seen at Gadag.
- (iii) Seven seed societies in East Khandesh which, after obtaining their seed from a Government farm, arrange with selected members for its separate plantation. It is grown under the direct supervision of the committee and inferior strains are pulled up while the cotton is in the field. These selected growers hand over the whole of their seed cotton to the Society, which by that means is able to meet the needs of all its members.

(2) To avoid misconception, it may be mentioned that only eleven societies of types (ii) and (iii) above are yet in existence in this Presidency.

(3) I myself favour the first type of society and am strongly of opinion that while co-operative organisation can nearly everywhere be applied successfully to distribution, it is only rarely successful when applied

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to production. Much more knowledge and attention to details is required in producing and storing good seed cotton than is available in the ordinary village. I therefore advocate the production of improved strains of seed for which there is a keen demand (e.g., *neglectum roseum* in Khandesh and *kumpla* cross in Dharwar) on a greatly extended scale under the supervision of officers of the Agricultural Department. It might be grown on Government farms or by certified growers supervised either by the staff of the local agricultural association. The existing organization of co-operative credit societies is willing and ready to take over the whole distribution of such seed in such tracts as the Agricultural Department recommends, and could, in my opinion, perform this function more efficiently than any other agency. A beginning has been made, specially among the credit societies around Hubli, but much more could be done, if the seed was made available at a fair price. It is a matter of common knowledge that the supply of improved seed in the East Khandesh district is far short of the demand.

1551. *Financing agriculturists engaged in growing cotton*.—The inclusive cost of growing and picking cotton may be put at from Rs. 20 to 25 per acre. The number of cotton-growing ryots who possess sufficient capital to finance their own crop is certainly growing; but the great bulk of agriculturists have still to obtain their capital from *sahukars* and *dalals*. They obtain advances of seed in kind from them and they take cash loans for the expenses of weeding and picking. The rates of interest on such advances are usually by no means heavy, but a condition is almost universally imposed that the cotton shall be sold through the agency of the person making the advance. In some cases, in order to obtain working capital, the cultivators sell their crops as they stand in advance or they sell to the agent the option of buying the crop, when ready, at a specified rate. The disadvantage of this system is that it throws the cotton-growers into the hands of a single dealer, who, knowing that they cannot go elsewhere, takes gross advantage of their ignorance and general powerlessness. Any attempt to organise the sale of cotton by public auction must be preceded and accompanied by a system of finance which will free agriculturists from the fetters of their present engagements and leave them at liberty to sell their cotton in the open market.

(2) In this Presidency, the plan is to start as many village credit societies as possible within range of a cotton sale society, and to place these societies in a position adequately to finance all the cotton-growers amongst their members. Individual members of the sale society in whose villages no credit societies have yet been formed are financed by loans direct from the sale society, or, when its working capital proves insufficient, from the private funds of one of its authorised *dalals*. In the Dharwar district, the majority of villages within reach of the sale societies contain credit societies, and these societies are to a growing extent being federated into small unions containing five or six societies each, in whose favour a cash credit of between Rs. 50,000 and one lakh has been opened by the Provincial Co-operative Bank. The finance difficulty has, therefore, been nearly solved. In Khandesh, the number of societies yet formed near the sale societies are relatively much fewer, and the capital of the sale societies is by no means equal to all the demands that are made upon it. There is therefore much yet to be done in this direction, and more than half the business of cotton sale is still being done on behalf of non-members. It is essential not to go too fast in lending out large sums to agriculturists before they learn to use them prudently; but I am convinced that we are working on right lines and will solve the problem of adequate finance in a few years. The credit societies send lists of outstanding debts to the sale societies at the time of the cotton harvest, and the sale societies deduct these from the amounts realised from the cotton sold and remit them direct to the village societies. In this way the two classes of societies materially help each other. The credit societies enable the cultivators to avail themselves of the benefits offered by the sale societies, while the latter help the former by recovering outstanding debts on their behalf punctually and without trouble.

1552. *The organization of co-operative cotton markets*.—The present system of selling cotton in the Dharwar district and its chief defects have been described with absolute precision by the Hon'ble Mr. Keatinge in an article published in the first number of the "Bombay Co-operative Quarterly." I fully agree with all that he there says and in light of his paper think it unnecessary to go over the same ground again.

(2) In my experience, the faults of which cultivators are most commonly guilty are—

- (i) dirty and careless picking,
- (ii) spoiling cotton by damping it or heaping it on damp ground,
- (iii) carelessly mixing different classes of cotton together without any attempt at grading.

(3) The faults of which the *dalals* are most usually guilty are—

- (i) They are very frequently dishonest about weighment; they deceive the cultivator, not only as to the weight of the cotton brought in, but as to the current market price of cotton and in the calculation of the amount actually due to him.
- (ii) They charge all sorts of cesses on the transaction, e.g., *hamali*, (portage) *tolat*, *dharhada* (charity), *bardan* (sacking), deduction for samples or sacking, etc. These cesses, which fall entirely on the agriculturist, are by no means so prevalent in Gujarat or Khandesh as in the Karnatak.
- (iii) They are careless about grading and classification and do not make fair allowance for cleanly picked cotton, uniformly graded. If they were more particular about these points and ready to pay for what they wanted, the cultivators would learn to fall in with their requirements.

(4) With a market honey-combed with these undersirable practices, it is evident that the better men both among the growers and purchasers must welcome some independent agency which will make for honest sale. I consider that the friendly welcome which has been given to co-operative cotton markets wherever they have been established proves that the need of some neutral intervening agency for the purpose of cotton sale is strongly felt.

(5) The present methods of the sale of cotton are—

- (i) Small growers sell small lots to petty dealers in villages. These petty dealers cart the cotton to the nearest bazaar and sell it to the merchants.
- (ii) Small growers, and, in Gujarat, frequently big growers, sell their crop before picking in advance to the merchants. The merchants usually purchase the option of buying the outturn at some specified rate. This method often works out to the disadvantage of the cultivator, but shrewd *patidars* in Gujarat say that they often find it profitable.

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(iii) The majority of cultivators take their cotton into the market by cart and sell it on the spot to local *dalals* and merchants.

(iv) Some big growers arrange to have their cotton ginned and sell the *pukka kapas* direct to the big firms without the intervention of middlemen. By this method, if their cotton is good in quality and cleanly picked they secure for themselves the full benefit of the improved ginning percentage.

(6) The system described as (iv) above can scarcely be improved. Co-operative cotton sale societies are intended primarily for the first three classes. Their *modus operandi* is as follows—They secure a favourably situated plot of ground and engage a clerk to keep the accounts, and a *dawal* to manage sales and secure purchases. In Khandesh they buy weigh-bridges. In Dharwar, where cotton is done up in *docras*, weighment is done by scales. Special arrangements are made to secure accurate weighment under proper supervision. All carts off cotton brought into the markets are sold by public auction every day, except on days when the amount offered for sale is so small that no auction can be held. It is then the *dawal's* business to arrange sale by private treaty. Cash payments must as a rule be made by purchasers. The amount realised is made over at once to sellers after deducting loans due to credit societies and the small commission due to the sale society. An attempt is made to grade cotton for the guidance both of sellers and purchasers. The Agricultural Department has lent an officer to help in this work, and I am told that the grading made by the society under his guidance is very rarely called in question by the buyers. In some cases the buyers have tried to combine in order to prevent any one bidding at these auctions, but such combinations have not yet succeeded in holding together beyond a few days. The price of cotton in Bombay is telegraphed daily to the society and posted on a board for the information of buyers and sellers. Committee members do what they can to instruct growers bringing cotton to the market in the importance of using improved seed and of picking cotton cleanly.

(7) The advantages of this system are that the ryots see that the process of weighment and sale is carried on honestly and openly. They see for themselves at the public auction how the price of cotton is pulled down by damping and dirty picking. They obviously enjoy the excitement of seeing their produce made the subject of brisk competition among bidders. The *dalals* on the other hand are compelled to drop shady methods, since the weighment and price are recorded by the society, and are forced to content themselves with such margin of profit as they can secure under the auction system.

(8) Societies, in order to increase their business and power, sell the cotton of non-members as well as of members, but usually charge a higher commission on this business. This practice is not quite co-operative, but it is essential to the future success of these markets that the volume of their turnover should be as large as possible.

(9) The volume of business done by the three new co-operative cotton sale societies in East Khandesh during the season 1917-18 (up to January 6th) was as shown hereunder :—

EAST KHANDESH.

Name of society.	No. of carts sold.	QUANTITY OF COTTON SOLD.		Rate of commission charged.
		Weight in maunds.	Price.	
Pachora	1,986	9,269 (160 lbs. = 1 maund.)	Rs. 2,79,814	Members 1½ annas per cart, non-members 2 annas per cart.
Chalisgaon	491	4,931 (93 lbs. = 1 maund.)	80,000	Members ½ anna per maund, non-members 1 anna per maund.
Bodvad	7,177	(13 lbs. = 1 maund.)	...	1 anna per <i>palla</i> from members, 2 annas from non-members.
Nandre	3,000	...	...	1 anna per <i>palla</i> from all comers.

The crop was a poor one, owing to excessive late rains.

(10) The cotton-season in the Karnatak has not yet begun; but the figures showing the sales made last year by the four co-operative cotton sale societies there are given for purposes of comparison. It may be noted that in order to give these societies a good start, the Agricultural Department entrusted them with the auction sales of Cambodia, Dharwar, American, Broach and *umpla* cross cotton which had in previous years been managed departmentally. In the Dharwar district, the auction system is to be introduced in this year to an increased extent. Last year the work was experimental and several improvements are about to be introduced as soon as the season begins.

DHARWAR.

Name of society.	Quantity of cotton sold in lbs.	Method of sale.
Dharwar	129,556 398,808	Private treaty. Auction.
Hubli	234,514	Private treaty.
Anigeri	545,424	" "
Gadag	213,780 595,259	" " Auction.

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[Continued]

1553. (35) **Publication of Liverpool and Bombay prices.**—The above remarks answer the Committee's question 30. I would also like to add some remarks with regard to question 35. All co-operative cotton sale societies have been supplied daily during the season with telegrams from the Bombay Cotton Exchange Company giving current market quotations for cotton at the expense of this department. The quotations wired (for instance) to Khandesh are those for Broach cotton, which are always the truest index of the tendency of the market, and Khandesh fine and fully-good for the settlement on January 25th, and for ready delivery. These prices are posted conspicuously on a board in the middle of the society's compound, and the equivalent local price per maund for *kachha kapas* is worked out on a regular system and posted below them. The committees assure me that these telegrams are of the greatest use both to buyers and sellers. Only big buyers receive separate telegrams from Bombay and these they usually keep private. Small buyers rely on the societies' telegrams and the cultivators are advised by the society's *dawal* as to what constitutes a fair price in the light of them. I recommend that their daily publication should form an important feature in all sale societies.

Mr. R. B. EW BANK, I.C.S., called and examined.

1554. (President.) In this Presidency, the Director of Agriculture is also Director of Co-operative Societies. The success of this arrangement depends largely on the personalities of the Director of Agriculture and the Registrar. Personally, I get nothing but benefit out of this arrangement. I have the great advantage that before going to Government with any proposals, I have discussed them with Mr. Keatinge and when we are both agreed, it is very difficult for Government to take the opposite view. Co-operation over the greater part of this Presidency is, of course, directed to agricultural improvement. A link between the Co-operative and Agricultural Departments is therefore essential, and I am strongly in favour of the idea of a Rural or Development Commissioner. The Director of Agriculture is not also Registrar of Co-operative Societies. His relation to me is much the same as that of the Commissioner of Customs and Excise to the Collector of Salt in Bombay. When I have to go up to Government for help for cotton seed or sale societies or sugarcane societies or on any general questions, I first discuss them with Mr. Keatinge either on paper or personally. We are always in agreement before definite proposals are submitted. Administrative action I take on my own authority. The Director of Agriculture virtually acts as a Rural Commissioner. He personally does little inspection of co-operative societies though he has inspected the cotton sale societies in Dharwar.

1555. I am of opinion that all such questions as the improvement of crops should be the concern of the Agricultural Department. I would not have co-operative societies mixing themselves up with experimental agriculture at the present stage beyond utilizing the seed given out by the Agricultural Department. I think the point might be reached at which a society might properly grow its own seed. If anything in the way of rapid progress in the production of good seed is wanted, I think, an increase in the scope of the Agricultural Department and the official Government staff is necessary. We could do it but we should do it very much more slowly. From the co-operative point of view, we require a considerable increase in the staff of the Agricultural Department and also the multiplication of seed farms. I will mention one point in this connection and that is that in East Khandesh, the Agricultural Associations are not as moribund as they are in the most places. The Chopda Taluka Association has a good deal of money to spend. I would recommend that these associations should be invited to give a guarantee to registered seed growers that they will get ten per cent more than the ordinary rate, i.e., above the rate for ordinary Khandesh seed. If the Agricultural Associations could guarantee this, we could get any number of registered growers to produce *roseum* seed.

1556. I have already pointed out the danger in the issue of seed by the village societies; it lies in the careless handling of cotton and the consequent risk of the improved seed being lost at the time of ginning. The seed is sold as *kachha kapas* to the *dawal* and he takes it away and disposes of it. I have considered the question of setting up co-operative ginneries and am not in favour of them for the present. What we want to do is first of all to control the sale of cotton on a larger scale than we are doing now. Our sales are not on a very great scale so far. In Dharwar we have sold about two million pounds of *kapas*. We are bound at first to sell *kachha kapas* and to follow the market. As our operations grow, we want to sell *pukka kapas*, to get our cotton ginned separately so as to get the full benefit of the ginning percentage and to control the market. The seed societies in East Khandesh are new societies; this year the crop failed and so they are doing badly. They were all formed on the Berar model.

1557. Except in Gujarat, the co-operative movement is fairly active in the main cotton tract of the Presidency. I would not go so far as to say that the co-operative movement is slightly in advance of the Agricultural Department. I think these societies rely very much on the Agricultural Department for seed. In the Southern Division, the societies have taken over the auctions which were previously organized by the Agricultural Department. They have taken over all the auctions of Cambodia and Broach *kapas*.

1558. I consider that the publication of prices is a most useful provision and would advocate it in the case of all the sale societies. It costs about Rs. 100 a year for each society and is paid for out of Government funds. Tracts in which there are no societies do not get the benefit of the publication of prices as far as I know.

1559. (Mr. Wadia.) There are eight cotton sale societies—four in Dharwar and four in Khandesh. This year we could not get any seed of N. R. (*neglectum roseum*) cotton at all. We are trying to get seed from Berar but I am afraid we shall have to give out seed from the ginning factories. *Roseum* seed is the only kind of seed that we give out.

1560. As regards buying there is the system under which the Marwaris advance money and buy the standing crops, at a fixed price per maund. They do it simply as a speculation. Whatever the outturn may be, the cotton is bought at a fixed price per maund; the risk of the outturn lies with the agriculturist, and the risk of price with the *dawal*. If cotton advances in price, the cultivator loses money; on the other hand if the price goes down, theoretically he should make money. In any case, he does not get quite all that he ought to get. The *dawal* would usually condemn the cotton as poor in quality; also his calculations are difficult for the cultivator to follow.

1561. In Khandesh, we have introduced weigh-bridges but the local method of weighment is the tripod with scales. The weights vary from place to place. There are no standard weights; each place has its own maund in Khandesh. I do not think the cultivator is purposely cheated in regard to weights. The weights are not checked or certified as far as I know. If the co-operative cotton sale societies are a success, we shall not need to have licensed weighmen as in Berar as the weighment is done by our own men on a weigh-bridge. As to what should be done outside the co-operative sale societies, it is very hard to say. It would be a great

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benefit if there were licensed weighmen to weigh cotton in the villages before the cultivator takes it to the bazaar.

1562. I do not know whether there is any movement for educating the cultivator in picking cotton clean but it is one of the objects of our societies to induce them to pick clean by showing them the difference in the price obtained at the auctions for clean and dirty cotton. Otherwise there has been no attempt at direct education. It could be done if the market would co-operate with the Agricultural Department but I am told that the reduction in price which is made for dirty cotton is not really sufficient and that, therefore, the cultivator has no inducement to pick cotton clean. The practice of spoiling cotton by damping it or by heaping it on damp ground is certainly going out in Khandesh as people are realizing that they get a better price if cotton is marketed dry. There is a class of cultivator who has a little bit of cotton of his own and who buys bits of cotton from his neighbours, mixes them together and takes it to market. It is the cultivator who is to a small extent also a broker who does the mischief. We are doing nothing at all to prevent this at present; but when we have a firmer hold on the cultivators, we are going to start grading committees in villages where the people are intelligent enough in order to prevent promiscuous mixing. At present the *dalals* charge all sorts of cesses, e.g., *hamali* (portage), *tolat* (weighment), *dharmada* (charity) and *bardan* (sacking). These would be done away with if a system of central markets were established as in Berar. I am in favour of markets on the Berar system though I think our own co-operative lines are all right. We do not handle all the cotton that comes to the market. Some of the cesses are excessive; but it would be impossible to abolish them altogether; the cultivators must pay something for weighing, for *dharmada*, etc. The establishment of markets would not do away with them; but would regulate them. There are combinations of buyers at our co-operative sales not to bid beyond a certain limit; but I do not think that combination has affected prices much. Lint is called *pukka kapas* in Khandesh. *Kachha kapas* is seed cotton.

1563. I have no experience of ginneries in this Presidency. The only trouble we have with ginning factories in when we want to get seed kept separate. We then have to enter into a contract with the owner to keep the factory for our sole use for the day. We have to provide coolies, and to get it brushed out.

1564. I put in a copy of the rules under which the auctions are held. They take place throughout the season. We insist on weighments at the auctions being made on our weigh-bridges and not in the ginning factories and our weighment is binding both on the seller and the buyer. As regards quality, no question can be raised after the cotton has once been sold. The bidders at our auctions are certified men only. We do not allow outsiders. If they find stones or rubbish in the cotton, they report it to the society and the cultivators are punished in the best way possible and their price is reduced. As regards dampness and quality, it is for the buyers to judge; the cotton is sold by public auctions and they can examine it beforehand. We only admit complaints in regard to the finding of stones, sticks or obvious dishonesty of that sort.

1565. (Mr. Hodgkinson.) There is a good deal of cotton picked off the ground, especially at the second and third pickings. A certain amount of dirt, such as leaves and straws and little bits of dust, is picked up as well. The only suggestion I can make to encourage clean picking is that the *dalals* should either pay a considerably higher price for clean cotton or a lower price for dirty cotton than they do at present. Then they would be more likely to get clean cotton.

1566. In our auctions, we put the cotton under the general heads, "good," "fully good," etc. But the grading is not very accurate because we have no means of telling the ginning percentage at present. We have a special agricultural officer lent to our societies both in Khandesh and Dharwar who helps to grade the cotton. We have boxes of samples of cotton "fully good," "fine" and so on, provided by the Agricultural Department and the agricultural officer can test the cotton brought to the auctions against those.

1567. (Mr. Henderson.) We get great assistance in our sales from the Agricultural Department which has as much to do with these sales as we have. If this movement is successful, there will be perhaps fifty of these co-operative sale societies in a few years and the business will be on so large a scale that the Government staff will not be able to go on dealing with it. It must be taken over by other agency. A lot of work has been done by official helpers during the two years for which the societies have been working but this year there has been a change in attitude in that respect. There is no official in any of the societies in Dharwar. I do not think that it would be better if the sales were carried out by the Agricultural Department, though for the first few years, it is better to have the assistance of agricultural officers to teach us about the grading of the cotton. The cotton is being sold to expert cotton merchants who know what the cotton is, and can tell its value. We sell it by cart loads and not by blocks. Perhaps to get in touch with Bombay, agricultural officers might be better but we get in touch sufficiently well with the local men and they will bring the Bombay men in their train in time. This year, there has been no increase in the number of sale societies but there has been an increase in the cotton dealt with by them. What happens in a few places is that the committee goes out in the growing seasons and notes which fields look good. They get the cotton from those fields ginned separately and the seed kept separate. That is only being done at Gadag. The agriculturists in our ryotwari tracts are fairly intelligent; a large number of them in Dharwar gin their own cotton and deal directly with big merchants and make a profitable thing out of it.

1568. I believe that Broach cotton is not extending very much in Dharwar and that the Agricultural Department no longer advocates it. The *kumpla* cross is now recommended.

1569. (Mr. Roberts.) In East Khandesh, I am told that one cart load of cotton weighs one *khandi* roughly speaking. The number of carts that comes in on any particular day varies. In Bodwad last year the season lasted for 2½ months or about seventy days; the average would be 110 carts a day which probably means 200 carts at the busiest time. The classification in Khandesh is simple; all the cotton is called good. There is no real classification except at Pachora where the cotton is classified as "good" and "fully good." We do not give any guarantee; the merchants can judge for themselves. The carts are all sold separately except in cases in which one owner brings two or three carts and asks that they may be sold together. The sales take a long time and sometimes we have two people selling at once.

1570. The weigh-bridge method of weighing is very popular in East Khandesh and is accepted by both buyers and sellers. Unfortunately, owing to the war, we had to buy second hand weigh-bridges and there were difficulties in consequence but those have disappeared. There is a good deal of difference in the weights in use in Bombay. In Gujarat, the weight of the *bhar* is pretty regular and so is that of the *nag* in the south. but in Khandesh there are very great variations. Some simplification of weights in this Presidency is urgently necessary. I look at it from the point of view of the agriculturist; he is dealing with the local market and he knows what the local weight is and is not often deceived owing to ignorance of local weights. But a reform is urgent from the point of view of trade. It is true that it is difficult for the agriculturist to know whether he is getting the correct prices. Variations in weight give opportunity for an enormous amount of

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unfair dealing. On the other hand, we have telegrams from Bombay for each Khandesh quality, "good" "fully good" and "fine" posted up and we work out the corresponding local rates. This is only done in a very small number of places; I can only speak of the co-operative societies.

1571. In Dharwar, Cambodia is sold by auction at Gadag. Broach and *kumpla* cross are sold at Dharwar. I am not quite certain about Dharwar American. Altogether there are a million acres of cotton in the district. The auctions will be on a very big scale this year. I have already arranged to advance three lakhs of rupees from the Central Banks to cotton growers for expenses of cotton growing.

1572. I am strongly in favour of publication of Bombay prices. I would in all cases convert them to terms of the local weights. I consider that publication has been useful.

1573. (President.) I have not had many complaints from the purchasers in regard to mixing because they buy the cotton with their eyes open. A lot of mixing is done by small merchants. The village committees are supposed to see that cotton of one grade is sent in one cart. These committees will work under the Cotton Sale Committee. Co-operative sale societies represent the second stage of selling sales by Government being the first stage. The sales cannot for ever be controlled by Government. The keeping up of the best types of cotton would depend on the Agricultural Department.

1574. (Mr. Ashton.) There is no irrigation of cotton in East Khandesh, as far as I know. The water rate is generally very high. The soil is black soil and unsuitable for growing cotton under irrigation.

ANNEXURE.

Conditions for the guidance of bidders and cultivators at the Public Auction sales of Broach, Kumpla cross, Cambodia and Kumpla selected cotton to be held at Hubli.

(1) The net weight of bales after deducting the samples and *bardan* is recorded in a register. The sample of cotton taken from each *dokra* is 2½ lbs. No payment will be made to the cultivators for the samples taken. Of this sample of 2½ lbs., 2 lbs. sample will be given to the buyer in lint. The rest will be kept as sample by the Sale Society. The ginning expenses of the samples are borne by the Sale Society for which the seed will be taken by the Sale Society.

(2) Taking into consideration the loss due to dryage, 2 lbs. more than usual is deducted for *bardan* from each *dokra*. But if the purchasers want to reweigh any of them, the weight allowed for *bardan* will be 13 lbs. according to the usual practice. No special allowance will be made in weighment.

(3) Coolie charges for weighing the *dokras* have already been paid and correct weight has been recorded. If the purchasers want to see some or all bales re-weighed, they will have to pay coolie charges for the same, viz., six annas per *naga* of 1.344 lbs., or make their own arrangements for re-weighing.

(4) Insurance charges of Rs. 1-8-0 per *naga* will be charged to the cultivators in addition to other local charges like *dalali*, *dharmada*, weighing charges, etc.

(5) A sample of 100 tolas of seed cotton from each *dokra* is taken from all the *dokras* of each cultivator up to the limit of ten, mixed together and then the percentage of lint found out by ginning the seed cotton in power gins. When one person's *dokras* exceed ten, sample from every ten *dokras* is taken separately and the percentage of lint found out. Percentage of lint is taken from average samples but will not be guaranteed.

(6) The *dokras* are arranged in classes of different grades according to the high or low percentage of lint to seed cotton. In all there are five classes varying from 29 to 34 per cent. and above.

(7) Information regarding the number of *dokras* in each class and the approximate quantity of *kapas* and lint available from each is ready and will be supplied to bidders.

(8) If the number of *dokras* in each class exceed 200, the class will, if found necessary, be subdivided for sale. The price obtained for sub-division if varying, average price will be given to cultivators.

(9) The purchasers must pay on the date of sale 25 per cent. of the price of cotton purchased and the remaining amount within three days of the auction sale before the removal of the cotton.

(10) Purchasers will have to pay a commission of Rs. 1-4-0 per *naga* in addition to the price bid at the auction sale.

(11) The Sale Society is not prepared to accept any risk of fire, etc., regarding the purchased cotton beyond five days after the date of the auction and the purchasers will have to make their own arrangements for watching and insurance of the cotton standing in the compound after that period.

(12) Any cost in connection with the removal of cotton is to be borne by purchasers.

(13) No *dokras* will be allowed to be removed unless payment of the *kapas* bought, is made in full.

(14) The Sale Society is not bound to accept the highest or any bid.

(15) Hitherto the *kapas* received on the last day or the previous, was sold as unclassified. This year if the merchants so desire it will be classified after the auction and added to the respective grades according to the percentage of lint and charged according to the prices obtained for these grades at the auction sale.

(16) The acceptance or refusal of the prices obtained in the auction sale for the different grades of *kapas* rests with the Sale Society and not with cultivators or *dalals* (through whom *kapas* is put for auction). Those who do not agree to this power being given to the Sale Society need not send their *kapas* for auction to the depôt.

(17) Buyers may inspect the *kapas* as minutely as they can, before bidding in the auction sale. When the auction is over no complaints will be heard as regards mixtures or soiled *kapas*, etc. The Sale Society is taking all possible care in taking out average sample of *kapas* from each *dokra* for classification. Any doubtful *dokras* are rejected.

Mr. V. H. GONEHALLI, Assistant Registrar, Co-operative Societies, Bombay.

EXAMINED AT BOMBAY, JANUARY 26TH, 1918.

Written statement.

1575. Financial condition of cotton growing ryots.—Ryots, who grow cotton, borrow money at usurious rates of interest. In the cotton tract of the Ahmednagar district, the rate of interest is at least 24 per cent. per annum. They also borrow cotton-seed for sowing purposes. If a ryot borrows sixty pounds of cotton-seed in

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June he has to repay it by supplying to the creditor forty pounds of *kapas* in December. The price of sixty pounds of cotton-seed last June was Rs. 2-8 and the price of forty pounds of *kapas* is now Rs. 8. Ryots, who borrowed money for weeding the cotton crop, had to enter into what are called *jalap* or *lawani* transactions and bind themselves to repay the loan borrowed last August or September by supplying to the creditor *kapas* at Rs. 12 *palla*. A *palla* of *kapas* is 240 lbs. The man who borrowed Rs. 96 has now to supply eight *pallas* of *kapas* to the creditor or pay for it in cash at Rs. 50 per *palla* or pass a bond for value. This season, the cotton crop in the Ahmednagar district and Khandesh was bad. Those who borrowed money on the *jalap* or *lawani* system have therefore suffered heavy losses. The ryot wants money for purchasing bullocks and meeting other agricultural needs. At a time when he should be ploughing his fields or be engaged in other agricultural operations, he is at the door of the money-lender asking for a loan. Most money-lenders are not systematic and have not organised their business on a regular plan. The money-lender asks the ryot to come to him a week or a fortnight later. When he again comes, it is as likely as not that he may be asked to come a third time. All this results in a great wastage of agricultural efficiency. Ryots in the Deccan should begin to plough their cotton lands from November. But some of them have no bullocks and no money. The financial aid of the money-lender may come a little later. The ploughing season therefore passes. At sowing time the ryot has to be at the door of the money-lender who does money-lending and also seed business. There may be delay in obtaining seed from him and sowing not done at the proper time. Weeding and other operations also may be postponed for want of timely supply of money from the money-lender and the outturn of crop consequently reduced.

1576. *Quality of seed.*—As regards the quality of seed, it may be said that very few ryots keep their own cotton-seed. The *kapas* bought from different ryots of different villages is mixed at the ginny and the seed that emerges from the ginny and is ultimately used for sowing purposes can only be bad.

1577. *Losses suffered by ryots in marketing kapas.*—It is well known that the cotton-growing ryots suffer loss in marketing their *kapas*. Some lose in settling the rate; again, some lose in the weightment of *kapas*; again some lose in the calculation of the amounts due to them; again, some lose on account of purchasers or their *dalals* putting off making payment indefinitely or for some time; again, others lose in all or more than one of these ways.

1578. *Results of present system.*—As the cotton-growing industry is carried on under these disadvantages due to "bad finance and an undeveloped system of rural economy," the following are the results:—

- (1) Deterioration in the quality and reduction in the outturn of crop.
- (2) Loss to the ryot of those profits of the industry to which he is entitled.

1579. *Work of Co-operative Department.*—Efforts are being made in this Presidency to remove these disadvantages and enable the ryot to carry on his industry with greater profit to himself. We have been organising co-operative credit societies in important cotton-tracts to finance the ryots. We have begun to organise co-operative seed-growing and distributing societies in those tracts. We have also been giving attention to the question of marketing cotton and started societies for its sale.

1580. (i) *Co-operative Credit Societies.*—In East Khandesh, which has got the largest area under cotton in this Presidency, we have got eighty co-operative credit societies and we are on the eve of further rapid progress. The district of Dharwar, which is of great importance in respect of cotton-growing, is the most advanced co-operative district in the Presidency. In other cotton districts also, we are starting co-operative credit societies. These societies finance the cotton-growing ryots at a reasonable rate of interest. The usual rate of interest is 9½ per cent. These societies grant loans at the time when they are required for the purchase of bullocks, seed, implements and fodder and for various other agricultural purposes. They are mostly granted on personal security. Recently I have passed through the cotton-tract of the Ahmednagar district and I was told by the ryots of Miri in the Newasa taluka that they have derived much benefit through the operations of their credit society which has got a working capital of Rs. 23,000 and that their cotton-growing industry is improving. The members of the Miri Credit Society now propose to have an organisation for producing good cotton-seed for sowing purposes.

1581. (ii) *Co-operative Seed-growing and Distributing Societies.*—In Khandesh, we started last year seven small seed-societies for the production of good cotton-seed. Each society obtained N. R. (*roseum*) seed from the Government Farm at Jalgaon. It selected as its seed-growers a few of its members who have good cotton-lands and are noted for their agricultural skill. The seed obtained from the farm was supplied to the seed-growers and each seed-grower had to submit to the following regulations:—

- (i) The lands should be properly tilled, seed sown at the proper time and all other operations properly attended to.
 - (ii) The standing crop should be purified by uprooting all stray plants.
 - (iii) The first two pickings should be kept separately and got ginned at the gin to be selected by the Managing Committee.
 - (iv) The seed-grower should sell the lint separately and hand over the seed to the Managing Committee of the society at a price to be fixed by the Managing Committee.
- (2) Cultivators in East Khandesh know the superiority of the seed from the Government Farm over the ordinary seed and are convinced of the extra profits they make by sowing the former. Therefore the Managing Committee of each society had no difficulty in securing seed-growers who would submit to its regulations.
- (3) I summarise below the operations of two of these seed-growing and distributing societies:—

(i) *The Asoda Seed Society.*

It obtained 1,000 lbs. of N. R. seed and supplied it to four seed-growers.—(1) Daulat, (2) Shrivana, (3) Kamji and (4) Goba. The total area sown with it was 55 acres. The purification of the standing crop was supervised by the Agricultural Organiser, Co-operative Societies. The crop suffered from late rains. It has been picked and kept separately. It is yet to be ginned. It is estimated that it will yield nearly 5,600 lbs. of seed. The Managing Committee will purchase it at sixteen lbs. per rupee and sell it to members at fifteen lbs. per rupee. Non-members will be supplied with seed at a higher rate. Loans of seed will be made and 9½ per cent. per annum will be the rate of interest on the value of seed advanced in loan. The seed produced this year will suffice for nearly 400 acres. The area under cotton in the village of Asoda is roughly 2,030 acres, and the society should aim at producing nearly 30,000 lbs. of seed in order to be able to supply seed to all the ryots of the village and to secure uniformity of quality of crop in the whole village. If the

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season is good, an acre of N. R. cotton will produce about 300 lbs. of good seed. One hundred acres will therefore produce 30,000 lbs. of cotton-seed. For these 100 acres under control, the Asoda Seed Society will have to obtain 1,500 lbs. of N. R. seed from the Government Farm and appoint a sufficient number of seed-growers for the purpose of producing 30,000 lbs. of seed under the control of the society. As the seed society will grant loans of good seed at a reasonable rate of interest, the ryots will find it to their advantage to join the society and borrow seed from it only.

(ii) *The Bildi Seed Society.*

It obtained N. R. seed from the Jalgaon Government Farm and supplied it to four seed-growers appointed by it. The purification of the crop was supervised by the Agricultural Organiser, Co-operative Societies. The crop was much damaged by the late rains. It is yet to be ginned. It will yield nearly 5,000 lbs. of seed. It will be taken possession of by the Managing Committee and further arrangements made as in the case of the Asoda Society.

(4) There is no doubt that these seed-growing and distributing societies will rapidly multiply in Khandesh. In that case, a single Government seed farm will not be able to produce all the seed required by all the seed societies for supplying to their seed-growers. It may, therefore, be suggested that all the seed societies situated within a radius of, say, five miles should federate themselves into a seed-union and start a central seed farm under the control of the union. The seed required for the farm of the union should be obtained from the nearest Government seed farm. The cost of starting and maintaining the union-farm should be partly borne by the constituent village seed societies and partly by Government. If there are ten villages in the area of a seed union, each with an average area of 2,000 acres under cotton, and if each village has a seed society, the union farm will have to produce 15,000 lbs. of N. R. seed for supplying to the seed-growers of all the ten societies. The area of the union farm will have to be nearly fifty acres. If one Government seed farm is established in each important cotton-growing *taluka*, or tracts otherwise well-defined, then each such Government seed farm will have to produce selected seed of first-rate quality for the farms of all the co-operative seed unions established in its area of operations.

(5) The rapid establishment of village co-operative seed societies, co-operative seed unions and Government seed farms in any cotton district and their development is bound to result in an equally rapid improvement in the quality and outturn of the cotton crop of that district. These may be the lines of organisation, whether we have to introduce the American cotton of the Triumph variety in Sind, produce and distribute N. R. cotton-seed in Khandesh and extend the areas of Broach and Cambodia cottons in the Southern Mahratta Country.

(6) The seed-trade of this country is yet in an undeveloped condition. Capitalists who want big profits have not yet understood its possibilities. If we work strenuously and organise it on a co-operative basis, not only shall we have improved it, but also have put it under the control of the ryots themselves.

1582. *Co-operative sale of cotton.*—This problem of the cotton-growing industry of the country has received much attention in the last two years. In 1916, the Hon'ble Mr. G. F. Keatinge, C.I.E., I.C.S., submitted a note to Government, outlining a plan for the establishment of co-operative cotton sale societies. On this plan prepared by the Hon'ble Mr. Keatinge and approved by Government, we have started seven cotton sale societies—three in Khandesh and four in the Southern Mahratta Country. Each society has, of course, been started with due variations from the approved plan to suit local conditions and to meet local difficulties.

(2) Each cotton sale society in Khandesh has been organised with shares and limited liability. They are allowed to advance loans to members for the production of cotton crop. After a number of credit societies are started and developed in the area of each sale society, the latter will stop making loans to its members and its share-capital will be utilised for providing itself with godowns, etc.

(3) *Kapas* is brought every morning in carts to the ground of each sale society by owners, and they are there arranged according to the quality of *kapas* in them. After purchasers have gathered, the auction sale of *kapas* is commenced. Each cart or a number of carts of same quality and of same owner are sold separately. The Registrar of Co-operative Societies has arranged for a free service of daily telegrams from Bombay to these societies. The telegram received from Bombay gives the prices of cotton in Bombay on the previous day. Every morning, the Bombay prices received in the morning and those received on the previous morning and the prices obtained for sellers through the society on the previous day are noted on a board. Every seller reads them and the competition among purchasers enables him to secure proper prices for his cotton. After the *kapas* of each seller is sold, the weighing of it is done. Bullocks of each cart are unyoked and the cart with *kapas* in it is weighed on the weighbridge of the society. The weight, and also name of seller, name of purchaser and the rate at which *kapas* has been sold are all entered in a triplicate pass-book. One pass is given to seller, another to purchaser and the third kept with the society. The cart is taken to the gin of the purchaser and after emptying *kapas* at it, it is brought back to the society's weighbridge. The empty cart is weighed and the weight of *kapas*, the amount due to seller and the commission due to the society are calculated and entered in the passes given to seller and purchaser and in the pass with the society. The purchaser is bound to make payment to the seller before evening. From the passes kept with the society, the sale register of the society is written up daily. Each purchaser or *dalal* has also to keep a payment register to be provided by the society. The commission charged by each society to members for its services is lower than to non-members. In the evening, the secretary or the clerk of the society goes to purchasers and *dalals* and receives commission due to the society. Before doing this he checks the payment register and signs it, after satisfying himself that amounts due to sellers have been duly paid.

(4) The operations of the three cotton sale societies in Khandesh may be summarised as follows:—

(i) *The Pachora Cotton Sale Society, Ltd.*

This season it has marketed 8,945 maunds and 15 seers of *kapas* of the value of Rs. 2,69,846-13-3. For each cart of *kapas*, it takes one anna from members and two annas from non-members. It has got a weighbridge of the value of Rs. 892. It has not yet engaged a *dalal*, as the President of the society or some other experienced member of the Committee attends the auction sale of cotton. Formerly the local maund of *kapas* was one of 174 lbs. The society has introduced the maund of 164 lbs. which is exactly two railway maunds. Prices rose in Bombay for Khandesh Fine from Rs. 420 per *khandi* of lint on the 5th of November to Rs. 540 on the 20th of December. Similarly the rate secured for sellers under the management of the society rose from Rs. 24-10 per maund of 164 lbs. (two railway maunds) of *kapas* on the 5th of November to

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Rs. 32-8 per maund of the same weight on the 20th of December. Each purchaser of cotton has to maintain a payment register which is checked every evening by a member of the society's staff. In this way, steps are taken to see that the payment of amounts due to sellers is duly made.

(ii) *The Chalisgaon Cotton Sale Society, Ltd.*

This season it has marketed 3,219 maunds and 2 seers of *kapas*. Each maund of *kapas* is the local maund of 95 lbs. The society has purchased a weigh-bridge at a cost of Rs. 610. The cultivators who sell their *kapas* through the society have demanded that the society's maund should be one of forty seers (82 lbs.) and thus be equal to the railway maund. The society charges to members half an anna per maund of *kapas* sold and three-quarters of an anna to non-members. Of this half an anna goes to the *dalal* engaged by the society. The rate secured for the sellers under the management of this society rose from Rs. 16 per maund of 95 lbs. of *kapas* on the 22nd of November to Rs. 19-9 per maund of the same weight on the 20th of December.

(iii) *The Monteath Cotton Sale Society, Ltd., Bodwad.*

This season the society has marketed 3,600 *khandis* of *kapas*. The Bodwad *khandi* of *kapas* is 820 lbs. The society charges thirteen annas per cart to members and fourteen annas per cart to non-members. Of this, twelve annas are allowed to the *dalals* for their services. Each *dalal* has to keep a payment register which is checked every evening by the secretary of the society.

(5) The cotton sale societies stand in need of help in the following directions :—

- (1) Each cotton sale society should be recognised as a market by the Municipality or Sanitary Committee concerned and provided with water-supply and helped in other ways.
- (2) Government or local bodies concerned should acquire sites required for the business of these societies in the same way as land is acquired for the railway companies or municipal markets.
- (3) Roads should be made between the neighbouring villages and the business centres of these societies and steps thus taken to open up the country.
- (4) In the case of certain railway stations, there is a concessional rate of freight on cotton sent from them. Such concessions should be extended to those railway stations at which cotton sale societies are established.
- (5) Each railway station in the cotton districts should become a centre of cotton-trade and thus prove a centre of economic education to the ryots of neighbouring villages. Our policy should not be to have only a few big cotton markets and steps should be taken to see that the big cotton markets already established do not stand in the way of the development of these cotton sale societies.

(6) When we have got a number of credit societies and seed societies in the area of a cotton sale society, they may all be affiliated to each other for their mutual benefit. The loans due to credit societies and seed societies from their members may be remitted to them by the sale society from the sale-proceeds of the *kapas* sold by those members. As a result of the operations of the credit societies and seed societies, the sale society will begin to get more and more cotton of good and uniform quality for sale. If, in the near future, a number of cotton sale societies are started and developed in Khandesh, they will naturally think of federating with a view to put themselves in business relations with big cotton exporting firms and mills.

(7) We have only made a beginning and much patience and strenuous work is yet to be done before we reach our ideals. But the idea of co-operative sale has already attracted the imagination of cultivators. Every railway station which has got a few gins and presses should become the head-quarters of a cotton sale society.

1583. *Conclusion.*—Such is the three-fold co-operative organisation which is being slowly attempted. In this connection it is important to bear in mind what Lord Chelmsford, in opening the Madras Exhibition, said last month. His Excellency the Viceroy remarked:—

“The Agricultural Department has by researches on experimental stations evolved superior strains of cotton, which, if grown and marketed in a pure state, have been found to fetch better prices than the ordinary varieties. But in order to maintain the quality of the article, and to sell it in bulk, direct to the purchasing firms, the co-operation of growers is required, and it is satisfactory to note that the need for such a co-operation is being felt. Seed unions are being formed in the cotton tract, which will not only be the chief source of supply of pure cotton seed, but also serve as organisations for the joint sale and ginning of the improved article. In the case of cotton, it is needless to emphasize the importance to the cultivator of growing his crop pure and marketing it direct and well, and it is through co-operative organisations only that this object can be achieved.”

(2) In view of this pronouncement it is unnecessary to argue any further the great utility of the co-operative system in developing the cotton-growing industry of the country. Special measures for providing additional financial resources, trained staff, etc., with a view to develop this branch of the agricultural industry will no doubt benefit it. But every other measure devised to improve the general economic condition of the ryots in cotton tracts is sure to react favourably on the cotton-growing industry of the country. Organised efforts to promote well-digging, to enable ryots to keep in stock from April to September every year fodder sufficient for their cattle for one whole year and to provide them with superior draught cattle are bound to have a great and beneficial effect on the cotton-growing industry of the country.

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[Continued.]

RECEIPT NO.

Pachora Co-operative Cotton Market.

[illegible]

*NOTE.—The rate of *kachha kapas* cart is anna one and the rate of *pakka kapas* cart is annas two.

Signature of the clerk.

Signature of the member.

ANNEXURE.

Forms used by Cotton Sale Societies.

I.—TRIPPLICATE PASS BOOK.

RECEIPT NO.

Pachora Co-operative Cotton Market.

[illegible]

*NOR3.—The rate of *kachha kapas* cart is annas one and the rate of *pukka kapas* cart is annas two.

Signature of the clerk.

Signature of the member.

RECEIPT No.

Pachora Co-operative Cotton Market.

Name of the pur-chaser.	Name of the seller.	Number of carts.	Weight of the cart, in-cluding goods.	Net weight of the goods.	Rate per mannd.	Value.	* Rate of fee.	REMARKS.
			Md.	sr.	Ra.	Rs.	a.	p.

* NOTE.—The rate of *kachha kapas* cart is anna one and the rate of *pakka kapas* cart is annas two.

Signature of the clerk.

Signature of the member.

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Co-operative Cotton

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Bombay.]

[Continued.]

Sale Society.

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Bombay.]

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methods in dealing with new varieties only on more intense lines. The societies come in after the original preliminary demonstration work has been done on a very considerable scale.

1593. (Mr. Roberts.) The difficulty in getting sufficient seed in the tract in my charge arises from the fact that we have got only one Government seed farm of 140 acres at Jalgaon. We are using the seed produced by the cultivators to a certain extent but if we take the cultivators' seed, it means that their operations have to be controlled, otherwise we get mixed seed. It is fairly simple but the cultivator has to be taught. He does not gin his own seed; he sells his *kapas* to the merchant and it is ginned at the machinery and is even mixed with other *kapas* before ginning. Ginning can to a certain extent be controlled by special laws and regulations. But they alone cannot ensure a supply of pure seed to all cultivators. The seed produced by the Government farm is so small that there is great difficulty in meeting the demand. There should be no difficulty in increasing it ten times every year. The question of establishing more Government farms depends upon the area to be covered.

1594. We have got a million acres of cotton in East Khandesh. Our societies are only just starting operations. The price has gone up very high this year along with the price of the lint. Ordinary cotton seed generally sells at 24 pounds to the rupee but now it is sixteen to eighteen pounds. It is proposed to buy seed at sixteen lbs. to the rupee and to sell it at fifteen lbs. These rates will not cover expenses. But our idea at the beginning is to popularize the seed.

1595. There is an agricultural overseer in each district. He does not do much as regards the sale societies. There is agricultural organizers under me who belong to the co-operative branch. They help me in this work.

1596. The classification done is only roughly. The auctions are run by the chairman and the paid secretary of the society. The chairman and the secretary do the classification. The cotton is sold by carts. At Bodwad the secretary gets Rs. 25 a month, in one place he is honorary, in two places he gets one-fourth of the profits. Behind him there is a chairman who is a respectable man. The chairman or at least one member of the managing committee has to be present at the auctions all the time. The auctions do not take very much time. They start about 8 o'clock and end by 12 o'clock. It is done like an ordinary auction. If there were 200 carts, the auction might go on to 2 P.M.

Mr. H. N. BHALERAO, Agriculturist and Cotton Trader, Raver, East Khandesh.

EXAMINED AT BOMBAY, JANUARY 28TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

1597. (1) Experience.—Being a hereditary inhabitant of this place, I am stationed in the East Khandesh district since my very birth, namely, for the last 47 years, and I am personally in touch with cotton cultivators.

1598. (2) Varieties.—I am acquainted with the following sorts of cotton seeds grown in this district:—

(a) The old Indian cotton seed that was grown here 25 years ago. It is not used now-a-days nor is it available now. Fibres of that cotton were longer than those of the N. R. (*roseum*) cotton. Flowers were yellow and leaves short and isolated. The plant has many branches. The harvest was later by a month. It required much more rain. The cotton was softer than the N. R. sort and was dim white. Income accrued was less.

(b) N. R. cotton seed is now in use. In some parts of the district, the seeds of yellow and white flowers are grown together.

(c) Pure N. R. seed is rarely used.

1599. (3) Size of holdings.—About two-thirds of the agricultural land is under cotton cultivation and the remaining one-third is left for other crops.

1600. (4) Yields and profits.—Rich lands produce cotton from five to ten maunds per acre, poor ones produce from two to five maunds. The average profits rest with the condition of cotton markets.

1601. (5) Rotations and manures.—If cotton is sown in rotation with *kharij* crop such as *bajra*, *sasam*, *juar*, it gives a good outturn and the yield is still better if sown after *rabi* crop. Cattle dung and other village refuse is frequently used as manure. At times sheep and goats are made to sit in the fields. Very rarely cakes of castor oil are used. Instances of using nightsoil as manure are very rare.

1602. (6) Comparative returns.—The return from *deshi* short staple cotton, if compared with *deshi* long staple cotton, is more profitable. Exotic cotton is not sown at all.

1603. (7) Conditions affecting increase in area.—In Khandesh, *deshi* short staple cotton is sown in general. The special reason is that this district is very hot compared with others. This district is favoured with first rains which begin in the first week of June. The first rain that falls is the best for sowing cotton because there is warmth in the soil, and the good or bad condition of cotton crop chiefly depends upon the degree of warmth it receives from the soil after the first rainfall.

1604. (8) Uses of seed and seed selection.—The cotton seed is chiefly used as food for cows and buffaloes. They give the best milk, from which *ghee* is produced in great quantities of a superior quality. For sowing seed, selection is practised as under:—

(1) The seed must not have been spoiled either by water or by any other reason.

(2) It must not have been broken, that is, its external coating must have been preserved.

(3) At the mouth of the seed, there is a kind of thorn which must not be in a broken state as from that place an embryo comes out. People prefer seed which is blackish and light white.

(2) From my own experience, I may say that hand-ginned seed is the best, specially for sowing, as the thorn of the seed is preserved for embryo. Moreover, less hand-ginned seed is required than that ginned in the machine. The former produces greater and better quality than the latter. But now-a-days, the hand-ginned seed is not available. The cotton seed taken out from cotton sown in one field should not again be sown in the same field. Seed must be changed for sowing.

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1605. (9) General economic conditions.—Cotton markets should be opened everywhere, which will be very convenient and profitable to the agriculturists sowing cotton.

Mr. H. N. BHALERAO called and examined.

(Translation.)

1606. (Mr. Roberts.) I am an agriculturist and a registered seed grower of the Agricultural Department. I have been growing 50 acres under *neglectum roseum* for the last six years. The seed is generally purchased by the Agricultural Department at the fixed rate of 25 lbs. to the rupee. That is over Rs. 3 per maund. The seed is supplied by the Agricultural Department at the same rate to me for sowing. It is supplied in May. I gin the cotton in December and return the seed to the Agricultural Department in January. The Department sells the seed at the rate of twenty pounds to the rupee. I have not got a bigger area under *roseum* as I only commenced growing it four or five years ago.

1607. *Roseum* is suitable to Khandesh and we get a bigger crop from it. In a year of light rainfall it grows much better than any other variety: in a year of heavy rain it suffers a great deal.

1608. According to the terms of my contract, I cannot sell seed cotton; I must get it ginned and sell the lint separately. I get the cotton ginned at Raver. N. R. cotton fetches from Rs. 5 to Rs. 7 per *palla* of 240 pounds more in the bazaar than ordinary cotton.

1609. In my other survey numbers, Khandesh mixture is grown. I get bigger crops from N. R. cotton than from Khandesh mixture. On the whole, N. R. cotton is better for produce, sale and trade. In N. R. the proportion of *pakka* cotton is greater than that of ordinary cotton. The other lands have been given out on lease and my tenants are not willing to grow *roseum* but prefer to grow the local mixture; they do not want to take the trouble to get the cotton ginned separately and to return the seed.

1610. Selection is practised to some extent amongst the Khandesh mixture. Yellow flowered cotton is sometimes separated from white flower. The Agricultural Department has engaged persons to root out other cottons from the *roseum* cotton. I have no experience as regards the sales held by the Agricultural Department. Seed Societies have recently been started but I am not a member of a seed society. I am only a registered grower.

Mr. W. GADGIL, Superintendent, Government Farm, Dhulia, Khandesh.

EXAMINED AT BOMBAY, JANUARY 28TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

1611. (1) Experience.—I have been stationed in the Khandesh district for the last six years, while in the beginning of my service, I was at Dharwar (Southern Mahratta country) for three years. From the beginning of my service, I have been in close touch with the cotton cultivators of both the Khandesh and Karnatak tracts.

1612. (2) Varieties.—In Khandesh, *deshi* cotton, which is commonly grown over the whole tract, consists of the mixture of the following varieties, the mutual per centage of which varies according to the locality. But on the whole the following figures may be taken as average percentages:—

Khandesh mixture	N. R. (<i>Varadi</i>)	31.34
	N. R. C. (<i>Varadi</i>)	30.22
	N. V. (<i>Jari</i>)	10.34
	N. V. K. (<i>Jari</i>)	17.24
	N. V. M. (<i>Jari</i>)	6.50
	<i>Indicum</i> (<i>Bani</i>)	1.24
	Dharwar American (<i>Hirsutum</i>)	3.12
TOTAL		100

Out of these varieties, *indicum* and *hirsutum* are long staple cottons while the rest are all short-staple ones. (2) The average length of the fibre and ginning percentage and the yields of each of these varieties are given below:—

Name of variety.	Average length of the fibre.	Percentage of ginning.	Yield per acre in lbs. in the best season.
N. R.	$\frac{3}{4}$ to $\frac{1}{2}$ inch	37.50	lbs. 1,022
N. R. C.	$\frac{1}{2}$ "	35.50	943
N. V.	$\frac{3}{8}$ "	30.00	592
N. V. K.	$\frac{5}{8}$ "	27.10	380
N. V. M.	$\frac{5}{8}$ "	26.10	598
<i>Indicum</i>	$\frac{7}{8}$ "	22.5	192
<i>Hirsutum</i>	$\frac{1}{2}$ "	29.7	320

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[Continued.]

(3) N. R. is the earliest of all and opens very uniformly so that picking can be made quite clean and with less cost. The cotton is very fine and bulky. The *jari* varieties are very late and slightly dirty in colour. *Indicum* has got the longest staple and is very soft to the touch. It is also a late variety and its opening of bolls is not uniform. Dharwar American (*hirsutum*) has got a fairly uniform staple and its fibre is very soft and silky. It is a late variety and suffers from red leaf blight.

1613. (3) **Size of holdings.**—The average size of holdings in East Khandesh is about forty acres and in West Khandesh about 35 acres, out of which sixty per cent. in East Khandesh and fifty per cent. in West Khandesh is generally grown under cotton.

1614. (4) **Yields and profits.**—The average yields and profits per acre in East and West Khandesh are as follows:—

	Yield per acre Kapus.	Cost of cultivation per acre.	Net profit per acre.
	lbs.	Rs.	Rs. a. p.
East Khandesh	450	18	32 0 0
West Khandesh	400	16	28 8 0

1615. (5) **Rotations and manures.**—The following are the common rotations followed in Khandesh:—

I	Cotton	1st year.
	Juar and urid	2nd „
II	Cotton	1st year.
	Bajra and moth	2nd „
III	Cotton	1st year.
	Wheat, dry	2nd „]
	Juar and urid	3rd „
IV	Cotton	1st year.
	Cotton	2nd „
V	Cotton	1st year.
	Til	2nd „

(2) The only manure applied to crops is farmyard manure at the rate of thirty to forty cart loads (ten to thirteen tons) per acre once in three or four years before cotton. Only in the vicinity of big cities *poudrette* or crude night-soil is being applied at the rate of thirty carts per acre.

1616. (6) **Comparative returns.**—The statement showing the yields of each variety is given below:—

Variety.	Yield per acre in lbs.	Valuation of seed cotton in the Dhulia market per maund of 144 lbs.	Valuation of lint at Bombay per <i>khandi</i> of 784 lbs.	
	lbs.	Rs. c	Rs.	
<i>Deshi</i> short-stapled	N. R.	1,022	21	280
	N. R. C.	943	20	272
	N. V.	592	18½	320
	N. V. K.	390	18	277
	N. V. M.	593	18	275
Local mixture	650	18½	262	
<i>Deshi</i> long-stapled <i>Indicum</i>	192	19	320	
Exotic cottons	Dharwar American	320	20	290
	Buri	434	21	260
	Cambodia	480	28½	330

Basis of fine Khandesh Rs. 272, and Bani and Akola Rs. 320, fully good Khandesh, Rs. 262 fine Navasari, Rs. 345 and fine Broach Rs. 320.

1617. (7) **Conditions affecting increase in area.**—In normal years, the area under cotton is almost constant, but if there is a want of rain just in the beginning of the monsoon, i.e., in June and July, the cotton area is sure to be lessened. On the other hand, if there is too much rain, cotton crop does not thrive in deep black soils of the Tapti valley and the cultivator is required to grub up his cotton and prepare the land for *rabi* crops. The other fluctuating factors are the increase or decrease of cotton prices caused by bank failures world-wide war, etc. Under such circumstances, the cotton area may increase or decrease by about ten

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[Continued.]

to fifteen per cent. Taking the present conditions of soils, climatic conditions, nature of desirable rotations, necessity of fodder and food grains and the gradual increase of cotton wilt, I think that the cotton area has reached its highest limit although the tendency of the cultivator is to increase its cultivation by bringing virgin land under tillage.

1618. (8) **Uses of seed and seed selection.**—The seed is partly fed to cattle, utilized for sowing and exported to foreign countries *via* Bombay. The selection of seed is done on a very limited scale and the only point of selection taken into consideration is the higher ginning percentage. For example, localities like Betawad, Chopda, Dharangaon, etc., are famous for higher ginning percentage, and if cotton from such locality be brought in the market, it is ginned separately and the seed is sold for sowing purposes. For the last five years, N.R. cotton has established its reputation and the cultivators are rather particular to preserve its seed. Very little selection is done while the crop is standing. The seed from the third and fourth pickings, which is usually dirty and insect attacked, is generally not used for sowing.

(2) The hand gins are almost becoming extinct as they cannot compete with the power gins. Only in a very few places, *viz.*, Dhulia, Parola, etc., hand gins are sometimes used and this seed fetches nearly 25 per cent. more price than the machine ginned seed. On the other hand, the seed rate per acre has been much increased as percentage of sound seeds in the machine ginned is comparatively less. This can be verified from the following figures:—

	Machine ginned seed.	Hand ginned seed.
Seed rate per acre	18 to 20 lbs.	12 to 14 lbs.

1619. (9) **General economic conditions.**—While considering the suitability of long-stapled cotton in Khandesh, I would simply remark that the money value of the produce per acre should be the main standard of judgment, as it directly concerns the pocket of the cultivators. I have got full faith in the selection by hybridization and importation of new varieties, which are the only means of finding out one strain, which would compete with the present N. R. in point of money. But the view is now generally accepted that a good stapled cotton cannot be grown in a district where the season is short without deterioration of the fibre, and it is by no means impossible that from a cultivator's standpoint it will be found that N. R. will prove the more profitable for Khandesh where the season is short to begin with and frequently is rendered still shorter through the uncertain behaviours of the monsoon.

(b) "*Deshi*" long staple cotton.

1620. (11) **Varieties.**—I need not reply to these questions as they are concerned very little with Khandesh tract. I would simply mention the tracts and varieties of long-stapled cottons, which I have come across:—

Name of tract.	Scientific name.	Local name.
1. Southern Mahratta country from Satara to Dharwar.	<i>Gossypium herbaceum</i> . . .	Kumpla.
2. Southern Mahratta country from Dharwar to Gadag and Harihar.	1. <i>Hirsutum</i>	Dharwar American.
Ditto	2. Ditto	Cambodia.
3. Dharwar Taluka of Southern Mahratta country .	<i>Gossypium herbaceum</i> . . .	Broach.
4. Nawarpur Pita of Khandesh	Ditto	Ditto.

(c) *Exotic cotton.*

1621. (21) **Varieties.**—Trials of Cambodia and *buri* made in Khandesh are not very encouraging. The other details have been given above.

II.—COMMERCIAL ASPECT.

1622. (30) **Local trade customs.**—As soon as the picking is over, the cultivators bring their *kapas* in the market for sale provided the prices for cotton are not very low. Most of them have engaged their *dalals* (commission agents) who are responsible for all further transactions. Then the sample of the *kapas* is shown to several big merchants and they are asked to quote their prices for the same. The whole lot will be sold to the highest bidder and then the weightments are taken in the presence of the owner. The *dalals* hand over the price of *kapas* to the owner after deducting their usual commission which varies from one to two per cent. in different localities. Most of these merchants get their *kapas* ginned in the single roller ginning factory and the lint is sent to Bombay in pressed bales for sale.

(2) In the villages apart from the big marketing centres, the *kapas* is sold in the following ways:—

- There are always a few *sahukars* in each village who purchase the whole cotton of that village at the rate of cotton prevailing during the season. They always base their calculation on (1) the distance of that place from the big marketing centre, (2) the ginning percentage, (3) carting charges, (4) interest on the sum invested, and (5) the profit likely to be gained in the bargain. These *sahukars* then bring all the *kapas* to the central market and sell it as it is or convert it into seed and lint and then dispose of it.
- Secondly, there are some travelling agents in Khandesh, who wander from village to village for purchasing the cotton directly from the cultivators. The rates offered by them are somewhat higher than those of the local *sahukars*.
- Thirdly, about thirty per cent. of the cultivators of the distant villages cart their whole produce to the central market and settle the bargain with or without the help of the agents. This kind of transaction is more advantageous than the above.

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[Continued.]

As for the weightment of the produce, every cultivator loses a small portion on account of the practice of deducting additional weights for *bardan* (sacking) and samples. But it is very difficult to say how much loss he has to undergo by false weightments. The weights taken by the old balance (*tagri*) always differ when the produce is weighed on the platform weighing machine and this is the greatest drawback in the sale of the cultivators' produce.

(3) There is no system of selling the standing crop of cotton before harvest just like the cotton of Karnatak. But there was a worse system of making an agreement for selling his whole produce at a fixed rate usually settled by the *sahukar*. As the majority of the cultivators do not keep their own seed for the coming season, they are required to buy or borrow it from the seed merchants just at the time of sowing season. In the case of small farmers in the villages, the seed is taken from the *sahukar* either by cash payment if the money is available or by promising to pay the interest and the sum in kind. The interest in such cases varies from one to two per cent. per month. Some cultivators are compelled to return the same weight of *kapas* in exchange for the weight of the seed taken at the time of sowing. Others are bound to sell their *kapas* at a considerably lower rate for the money advanced to them by the *sahukars*. The same condition holds good in the case of money taken in advance for the purpose of weeding, intercultur- ing and other operations of the crop as well as for the maintenance of the family. This method is well known in Khandesh as *jalap* system. As an example I may mention that if the rate of *kapas* during the last season varied from Rs. 10 to 12 per maund of forty seers, the agreements in the *jalap* system are made at the rate of Rs. 7 to 8 per maund. Ten years ago, this system was everywhere common in Khandesh and at that time, even the well-known trading companies were advancing the money to the cultivators. But during the last few years, people got the bitter experience of this practice and consequently they are prepared to pay 24 to 36 per cent. interest on the money taken in advance, instead of adopting the *jalap* system. However, this method is still prevalent among the poor cultivators who have got no other recourse than to borrow money from the village Marwari; while these money-lenders make it a point not to advance a single farthing unless their cultivators are willing to sell their produce by the above method. At present about ten per cent. of the poor cultivators are compelled to sell their *kapas* by the *jalap* system. As the majority of the cultivators are badly in want of money, they will try to sell their produce from the beginning of harvest, i.e., from October. But if the prices are very low, they will wait for a month or two. By the end of December almost all the produce is sold as they will have to pay the assessment in January. In the cotton-growing tracts of Khandesh, the assessment is generally collected in one instalment.

(4) In the market, more importance is given to the higher ginning percentage and the prices vary according to the locality of the cotton tracts. For instance, *kapas* in the Copda and Yaval Talukas is valued more than that of Amalner or Jalgaon. Little importance is given to the length of the fibre except when the purchases are to be made by the mill-owners of Jalgaon or Amalner. Colour and cleanliness are also taken into consideration at the time of valuation. *Kapas* spoiled by rain generally fetches a very low price and the cultivators are not shrewd enough to sell the clean and unclean cottons in separate lots.

1623. *Suggestions for improvement of present system.*—I may now point out a few methods by which a farmer is likely to be benefited.

(1) Necessity of equal weights throughout the whole Khandesh both for *kapas* and seeds. During my visits in several places I have observed that a maund in Khandesh consists of the following different weights :—

Maund = { 40 seers in Jalgaon. 72 seers in Dhulia. 80 seers in Pachora.	Maund = { 48 seers at Dharangaon. 46 seers at Kajgaon. 45½ seers at Malegaon.
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Although the weights vary in different places, the proportion of the prices is not the same and hence it becomes misleading to the ordinary cultivators at the time of deciding the market in which he has to sell his produce profitably.

(c) Necessity of intimating to the cultivators the daily market rates of *kapas* and cotton, even in the smallest village. This should be done by the village *patels* and *kulkarnis* (village headmen and accountants) who will keep the farmers always in touch with market prices and thereby they will get better opportunity in selling their produce just as they please.

(3) Necessity of making the use of the platform weighing machines more common in the districts. At the same time it will be quite necessary to appoint some responsible persons to inspect the accuracy of such machines.

(4) To prevent the *jalap* system, some arrangements should be made for advancing the money to the cultivators just at the time of sowing, weeding, harvesting, etc. This will put a complete stop to the objectionable system.

(5) Necessity of forming some co-operative seed societies for supplying the pure and sound seed to the cultivators without taking exorbitant prices. A beginning of this work has been made by some seed societies.

(6) Experimenting with a central market (for one tract) in which the whole *kapas* is to be graded according to the ginning percentages and then it is to be sold by general auction. I mean by this the system so common in the Karnatak for selling the newly introduced Broach and Cambodia cottons.

1624. (31) *Standardization of commercial names.*—The following are the commercial names of the various grades of cotton of Khandesh :—

(1) Superfine.	(3) Fully good.
(2) Fine.	(4) Ordinary.

The classification is made from the colour, silky feel, cleanliness and length of the staple, and, in my opinion, the names are quite suitable for Khandesh tract.

IV.—MANUFACTURE.

(a) Ginning and Pressing.

1625. (36) *Type and number of gins and presses.*—In Khandesh, single roller Platt Brothers gins are used in all factories.

1626. (37) *Size of bale.*—The size of the bale in Khandesh is 1½ feet × 1½ feet × 4½ feet and its average weight is 400 lbs.

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[Continued.]

1627. (38) *Saw gins versus roller gins.*—From the trials made of the saw gins and roller gins, I may state that saw gins are not suitable for Khandesh cotton as they cut the fibre and thereby reduce its strength. This fact has been corroborated by the experiments made in the Amalner and Jalgaon mills.

V.—GENERAL.

1628. (46) *Attitude of buyers to improved cottons.*—The mill-owners of Jalgaon and Amalner are prepared to encourage the growth of improved cottons by offering five per cent. more price. This will be seen in the case of cotton coming from Ajanta-caves-side (from the Nizam's Dominions) which contains a fairly large percentage of Dharwar American variety.

Mr. W. GADGIL called and examined.

1629. (President.) I am a Graduate of the Poona College. I passed out in 1909. I was first appointed Assistant Superintendent of the Dharwar Farm on Rs. 40 a month. I am now getting Rs. 100 as Superintendent of the Dhulia Farm. I am a Bachelor of Agriculture.

1630. (Mr. Roberts.) The figures given in paragraph 1612 of my written evidence are the average of three seasons. The plots which were side by side measured twenty *guntas* which is equal to half an acre. I had only one series. N.V.K. is *neglectum verum Kathiawarense*. In Khandesh, we have been separating out the types and testing them side by side and we are putting out what seems to us the most profitable per acre. We have only taken the money value into consideration. This N. R. (*roseum*) cotton which we are putting out gets the same price as the ordinary mixture but if the cotton is picked clean, it fetches nearly Rs. 5 to Rs. 10 more per *palla* of 240 lbs. The peculiarity of *neglectum roseum* is that it can be picked very clean. The picking is very easy and less costly, as the bolls open well. In practice the difference is not more than a rupee per *palla* as the cultivators do not care about picking the cotton clean. Besides Raver is not a good market. Dhulia is a better market than Raver. It is not possible to pick the Khandesh mixture clean. Some varieties such as *neglectum verum*, Dharwar American and *malvense* cannot be picked clean. A certain percentage of leaf and dust always comes in the seed cotton.

1631. I produce samples of a cross between the *bani* of Hinganghat and the Comilla of Assam. The ginning percentage is 35 as compared with 37.5 for *roseum*. It was valued recently at Rs. 640 per Bombay *khandi* as compared with Rs. 610 for fine *roseum*. I am talking about the latest price. Good Broach would fetch Rs. 610 to-day and fine Khandesh Rs. 610. Machine ginned Khandesh would be valued here in Bombay at Rs. 585. *Roseum* cotton is a better cotton than the ordinary Khandesh and is valued as fine Khandesh.

1632. I am also doing district work. Last year two lakhs of pounds of seed were in the district which would be sufficient for ten thousand acres. I am giving the figures for the seed distributed in Khandesh proper. That is the total quantity of seed distributed by the Agricultural Department. Seed unions have recently been started and seed for another five thousand acres may have been distributed through other agencies. We generally distribute this seed without any condition. Some of the cultivators reserve their own seed. The total area under this seed this year may be fairly put as under 15,000 acres. We have been going on with this seed since 1913. Last year the area was about the same. We have not got any definite data in regard to the increase in area. If there has been any increase this year, it has only been about three or four thousand acres. Pure seed is very difficult to get. We cannot bind all the other cultivators to bring all their cotton for ginning and so to get separate pure seed. That condition is not enforced with other cultivators than the registered seed growers. I think the best way of distributing the seed is through the seed societies which we have started very recently. I myself started six societies in Khandesh last year. If the seed is supplied to a small cultivator, it is not possible for him to get all his *kapas* ginned separately, and he prefers to sell it in the open market. The ginning factories are under the control of the merchants, who have got the monopoly of the ginning. This year two or three ginning factories worked by oil engines have been started in West Khandesh so that the small cultivators may gin their own cotton and sell the lint. These gins are not the property of seed unions; they are the property of individuals. Only in one case does the factory belong to the union whilst three independent persons have started their own ginneries. In these ginning factories, private cultivators can get their cotton ginned but, as far as I know, the owners of the factories would prefer to gin our N. R. cotton because it is a more profitable business to gin *roseum* cotton than to gin any mixture owing to the higher ginning percentage of our *neglectum roseum*. *Roseum* gives about 37½ per cent. of lint while the local cotton only gives about 33 to 34 per cent. That means at least four per cent. more lint per hundred seers. We sell seed to the cultivators at the rate of 20 lbs. per rupee and purchase it at 25 lbs. to the rupee from the registered seed growers. The profit per acre from *roseum* over the Khandesh mixture varies from Rs. 7 to Rs. 12 per acre according to the season. The seed for an acre costs about twelve annas. Sixteen pounds to the acre is the usual seed rate. Control is difficult: we might find several cultivators who would be willing to grow N. R. and abide by the contract but it would be difficult for the Department to control them unless the staff is increased. As things are at present, we should not be able to supervise all their cotton and get all the seed back. I do not think there is any other type in the Khandesh mixture which is worse than *roseum* so far as the length of the staple is concerned. The mixture of any other type with *roseum* would improve the quality of Khandesh cotton. As regards length of staple, we can at once detect whether it is pure *roseum* or a mixture. We cannot spread this cotton rapidly because the Department is not willing to purchase all the *kapas* or seed of this *kapas*. There is always a risk about selling a big lot. If there is no sale for this cotton, then probably the whole lot would remain unsold. There is a demand for pure seed and, of course, if it has been grown under the supervision of the Department, we can call it a cent. per cent. pure seed. The cultivators do not appreciate the seed more readily because we do not help them to sell their *kapas*. The area could be rapidly increased but we cannot be sure that the whole area would be under pure *roseum*, so long as every precaution for purification is not being taken by the cultivator.

1633. The yield of the cross is very low. This year it was 500 lbs. per acre on the farm whereas the average for *roseum* was 800 lbs. The yield on the Dhulia Farm this year has been exceptionally good although the cotton in the whole of Khandesh has suffered. Last year the yield of the cross was about 450 lbs. as compared with 700 lbs. for *roseum*.

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Mr. K. D. KULKARNI.

1634. In order to get more reliable tests it is necessary to have duplicate plots. I do not consider the Dhulia soil wholly representative of the Khandesh soil. The climate is different and the soil is different from that of other parts of Khandesh. The Dhulia Farm has got a medium black soil whereas in the Tapti Valley there is a very deep retentive soil. It would be rather dangerous to put the new types of cottons out on a large scale in the district without further testing. In Khandesh, there is also the *barad* tract of very light red soils to which the results obtained on the Dhulia Farm may not be applicable.

1635. The staple of *roseum* is the lowest in the Khandesh mixture but it fetches a better price than the mixture because there is a better demand for it. It is commonly believed that *roseum* cotton is required for mixing with wool in half proportions. It is altogether rougher than the mixture. It is on its colour that it gets the higher price. It does not get a lower price on account of its staple being shorter. Staple is not considered in buying cotton in Khandesh; the buyers always go according to the ginning percentage.

1636. I think there is some chance for long staple cotton in the Tapti Valley where there is a *Peta* (small *taluka*) called Nawapur in which we have been successful in introducing Broach cotton. I think if similar trials were made in other parts of the Tapti Valley, either Broach, Cambodia or American cotton might be found suitable. Of course, I cannot say unless we make experiments but it is quite possible that these cottons would succeed because the soil is very retentive. In these tracts, cotton is sown as late as September just as Dharwar American is in the Dharwar District. So it might be possible to grow Dharwar American in the Tapti Valley. No irrigation is given to cotton but they are able to manage without rain as the soil is very retentive. They do not get any of the north-east monsoon; the rain generally stops after October.

1637. (Mr. Wadia.) The ginning percentage of the cross between *bani* and Comilla is about 35. That of *roseum* is 37 to 38. There is thus a difference of 3½ per cent. which means a good deal.

1638. Hand gins are disappearing because hand-ginning is very costly. The machine-ginning for 240 pounds of lint costs Rs. 4, and hand-ginning the same quantity costs something like Rs. 10. Hand-ginning therefore costs nearly 2½ times as much as machine-ginning. The high charge for hand-ginning is not made up for by the saving or better price for hand-ginned seed. That is only Rs. 2 against the extra charge of Rs. 6 for hand-ginning.

1639. As regards the *jalap* system when the poor cultivator is in want of money for weeding, for seed or for any other agricultural purpose, he borrows from the *sahukar*, who does not lend the money on interest, but he binds the cultivator under a contract, known as *jalap*, to return that money in *kapas* at a fixed rate which is generally very low compared to the prevailing market rate. This really means that the cultivator repays the loan in kind.

1640. I have started six seed societies in Khandesh. I am not connected with the Co-operative Department. I simply assisted the Department in starting the seed societies. The co-operative seed societies have no monetary transactions. They simply purchase seed and distribute it to their members on condition that the seed growers will return the seed to the society at a fixed rate. If more co-operative societies were instituted it would be a good thing. There are 80 to 85 co-operative credit societies in East Khandesh. The area under cotton in Khandesh is about 14 lakhs of acres and the work of these 85 societies is therefore nothing as compared to the wants of the tract. At least 2,000 societies would be necessary to do real good.

1641. In Khandesh, by the use of scale pan, which is the ordinary method of weighment, there is a good chance of the cultivators being cheated. It is only at Jalgaon and at Amalner that there are the platform weighing machines. It is only the big ginners who keep the platform weighing machines. Generally weighment is made in the ginning factory where the transaction is generally settled. The rates are settled in the market and all the carts are taken to the gineries and weighment is made there. Sometimes the weights are wrong and sometimes the scale pan itself is wrong. In East Khandesh there are municipal bye-laws under which correct weights and measures must be kept. The weights and measures are generally inspected by the chief officer of the municipality and also by the *Mamlatdars*. Of course, if the weights are right, there ought to be no cheating but the transactions cannot be frequently inspected. There ought to be some supervising body to look after the scales and weights.

1642. A five per cent. premium is not enough to encourage the cultivation of better staple cotton because the yield per acre of such cotton is too low. I think the market ought to pay Rs. 100 more per Bombay *khandi*. There is a remnant of American cotton in the present Khandesh mixture.

1643. (Mr. Hodgkinson.) The trials of Cambodia at Dhulia are not encouraging. The yield per acre is very small; and so is the ginning percentage, which is only 34. Trials ought to be made in other tracts and the time of sowing should be changed. There are two canal tracts in which it should be sown in May as well as in September. Cotton in Khandesh is generally sown in the month of June. I have made all these recommendations in my monthly reports.

Mr. K. D. KULKARNI, Cotton Supervisor, Khandesh.

EXAMINED AT BOMBAY, JANUARY 28TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton

1644. (1) Experience.—I have been stationed in Khandesh, East and West, for four years and am in actual touch with cultivators.

1645. (2) Varieties.—Khandeshi is the variety grown in Khandesh, which is a mixture of *waradi* and *jari* with a little of Dharwari in it. The Department is giving out now pure seed of N. R. (*neglectum roseum*) *waradi*, narrow lobed, and it is spreading rapidly in the district.

1646. (3) Size of holdings.—The average size of holdings is twenty acres in the thickly-populated tracts of Khandesh, while the less thickly parts have an average of 25 acres; generally two-thirds of each holding is under cotton.

1647. (4) Yields and profits.—The average yield of seed cotton is 400 lbs. per acre for East Khandesh and 300 lbs. for West Khandesh and the average profit per acre is Rs. 25 to 30; the yield of pure *waradi* is nearly 80 lbs. more per acre and the profit Rs. 10 to Rs. 15 more, due to higher yield and ginning.

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[Continued.]

1648. (5) Rotations and manures.—In West Khandesh, *bajra*, *til* and ground-nut are generally rotated with cotton, while in East Khandesh, *juar*, *bajra*, ground-nut and sometimes *til* and *urid* are rotated with cotton except the Chalisgaon Taluka where the rotations are similar to West Khandesh. Farmyard manure is the only manure used.

1649. (6) Comparative returns.—Here there are no two different varieties, short-stapled and long-stapled, except the *Khandeshi* and *waradi* mentioned above, and both are classed as short-stapled. The profits of cotton are nearly 1½ times as much as other crops, such as *juar*, wheat, etc. No exotic cotton is grown in Khandesh.

1650. (7) Conditions affecting increase in area.—The area under the *deshi* short-staple cotton decreases if there be no timely rains of *mriga* and *aradra nakshatra* and then in West Khandesh, *bajra* takes the place of cotton, while in East Khandesh, the area is generally reserved for *rabi* crops such as wheat, linseed and coriander. The area under *Khandeshi* cotton is as much as could be fully utilized, but the area under short-staple cotton (if N. R. be classed as short-staple) will increase at the expense of *Khandeshi* cotton, due to its higher yields, higher ginning, early maturity, clean picking and better colour, and there is no chance to limit the increase as long as finer cotton does not pay as much as 1½ times the price of what is given for short-stapled cotton.

1651. (8) Uses of seed and seed selection.—The cotton-seed is generally consumed by cattle, and much of it, nearly two to three lakhs of bags, goes to Kathiawar every year, via Bombay and Bhavnagar, to feed the cattle there. The oil percentage of Khandesh seed is less than that of Gujarati cotton seed, due probably to the hot and dry climate, and hence is not used for oil-extracting in Navsari where Gujarati seed is preferred, though *Khandeshi* is cheaper. The selection of seed practised on Khandesh farms is for higher ginning and better growth and the crop of the Jalgaon farm grown from such selected seed is worth observing. The general cultivator does not select his seed, nor does he gin his seed by hand-gins but buys it from some local seed merchant, who stores the seed of some good lots of cotton coming to the gin; but the Agricultural Department supplies good seed to the selected seed-growers from the first and second pickings of the farm, ginned on its own gin, and the crop from this seed, when grown on the seed-grower's area, is again ginned under the supervision of the Agricultural Department so as not to allow any admixture in gins with the local seed, and this is again sold to the general public to have better crops, and they are again occasionally informed how to keep their crop pure, and how to get the seed ginned separately. In this way, some seed societies are being worked, and each village having a seed society will be a centre of good seed, not only for the village itself, but also for the surrounding villages. Five such seed societies are working in East Khandesh.

1652. (9) General economic conditions.—The economic state of Khandesh is generally satisfactory but the cultivators are just appreciating the use of good seed regarding cotton, and if the seed merchants will also show equal eagerness to store good seed, there will be general improvement as, though the Department or the societies may supply some seed, still the cultivators generally buy articles on credit and the merchant is the right helper in this case. Secondly, the cotton money that comes in the hands of the illiterate cultivators is spent partly in drink by the lower classes and partly in litigation by the better classes and so co-operative societies and banks will be more helpful to teach them economy, and as years of good crops and good prices are not always available, it will save them from money-lending and other vices.

(b) "Deshi" long-stapled cotton.

1653. (10) Experience.—I was stationed in the Ahmedabad district for nine months and was in actual touch with the cultivators.

1654. (11) Varieties.—*Wagad*, *lalio* and *khanuri* are the three long-stapled varieties in the district.

1655. (12) Size of holdings.—The average size of holdings in which cotton is grown is ten acres in Ahmedabad proper and twenty acres in Dhanduka and Viramgam Talukas touching Kathiawar.

1656. (13) Yields and profits and comparative returns.—The average yields of the cotton mentioned above are as below, with and without irrigation per acre:—

	Irrigated. lbs.	Unirrigated. lbs.	PROFITS PER ACRE.	
			Irrigated.	Dry.
Wagad	1,000	400	120	40
Lalio	1,200	350	135	35
Khanuri	...	500	...	40
Mathio (short-staple)	800	380	70	30

The cotton profits are nearly double those of any other local crop such as *bajra*, *juar*, *gawar* and other pulses.

1657. (14) Rotations and manures.—Cotton is generally rotated with *bajra* in sandy loam *talukas* such as Daskroi, Sanavad, Dholka and with *juar* or wheat in Dhanduka, Viramgam and Gogha in the black soil. As for manure, farmyard manure is the manure given to cotton, but in parts of Viramgam and Dhanduka where the land is treeless, it is generally burnt as fuel and considered to give more leaf growth to the cotton crop, if applied.

1658. (15) Conditions affecting increase in area.—The increase in area under *deshi* long-staple cotton is affected in the Daskroi and Dholka Talukas by the better prices of the rice crop grown there under irrigation, by the cold season of *pranteg* and *modosa* that burns it by the Christmas cold and by the backward condition of the Bhils and Kolis who grow only food-crops and will not prosper by cotton cultivation, as the money realized will go into the hands of bankers and the poor people will be in want of food-stuffs, if not grown by them.

1659. (16) Suitability of existing varieties.—In the Dholka and Daskroi Talukas, *khanuri* instead of *lalio* is spreading rapidly. *Wagad* is rightly grown in Viramgam and Sanand, and *wagad*, *khanuri* and *lalio* are all being grown in the Dhanduka Taluka, besides *mathio* on Rampur side, according to the nature of the soil. Supply of good seed of these varieties is the only remedy to keep them pure and no superior ones can be introduced in these localities.

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a mixture of varieties; the staple of *roseum* is the shortest. Some of the other varieties have a good deal longer staple than that of *roseum*. I should say about a quarter of an inch longer.

1679. I have got fifteen seed growers, one or two in each *taluka*. All of them get a better price for their seed. The total area under *neglectum roseum* is not more than 10,000 to 15,000 acres in all. The total area under cotton in East Khandesh is 1,300,000 acres so that the area under pure *roseum* is only one per cent. of the total. The trade has not yet taken it up.

1680. I have seen cotton going from Jalgaon to Bhusaval and Raver and from Bodvad to Burhanpur and Malkapur in order to get a better price. Inferior Khandesh cotton would be classed as "Bengals." I have seen Sind cotton. It is similar to Khandesh cotton. The big difference in the quotations for Khandesh and "Bengals" may be due to fibre and colour. I think it must be a question of colour. As far as staple is concerned they are equal. "Bengals" are not equal to the cotton grown in the southern portion of Khandesh which is classed as fine Khandesh.

1681. (Mr. Wadia.) *Kanvi*, *wagad* and *lathio* are all *gossypium herbaceum*. *Mathio* is a mixture of *roseum* and *neglectum*. *Rozi* is *gossypium arboreum*. In Sanand and Viramgam, only *wagad* is grown but in Dhanduka there are both varieties. For Sanand, Viramgam and Dhanduka, I would recommend that only pure *wagad* should be grown. Similarly in the Daskroi Taluka of Ahmedabad and the part of Sanand from Ahmedabad up to Sanand, only *lathio* should be grown. Round Dhanduka the varieties are mixed on account of natural conditions. Round Anand in the Kaira district, where *rozi* is grown mixed with *lathio*, only pure *lathio* seed should be supplied and *rozi* should disappear. It is already doing so on account of its lower ginning percentage and price and also on account of the roughness of its fibre. I have suggested four places for trial plots: Anand, Viramgam, Dhanduka and Prantaj. In Prantaj, we might try *roseum* which alone will grow there but in the interests of the finer counts, inferior varieties should not be put in on a large scale. In the Kaira district, *rozi* is being replaced by *kanvi*. There should be a plot at Anand from which the seed of *kanvi* should be distributed in the Kaira district. It has already been proved that *kanvi* is better than *rozi*.

1682. 1027.-A does not spread more because the petty merchants do not pay a better price to the villagers but they take the profit themselves. On the average of three years, there is a difference of eight pounds of seed cotton between selection I-A and ordinary Surat *deshi* in favour of the latter. At the same time, the ginning percentage of selection I-A is 3.3 per cent. more, which, comparing the figures of yield, comes to nearly seventeen pounds per acre. At the same time also, selection I-A is valued at Rs. 8 more per *khandi*. So that though in the yield of *kapas*, the profit per acre for selection I-A is Rs. 2 less than for ordinary Surat *deshi*, on the basis of the price of lint it is Rs. 2 per acre more. Adding this to the advantage of seventeen pounds per acre owing to the higher ginning percentage, the total extra profit on selection I-A is Rs. 8.8 per acre. Sufficient seed of selection I-A was given out for nearly 10,000 acres round Surat and 10,000 acres in the Baroda State, some five years ago. The area fell to 1,000 acres as there was no market for it.

1683. The ginning percentage of *kanvi*, i.e., of Broach and *goghari* mixture, is 39.4. The percentage of *goghari* in the mixture round Dabhoi is ninety. Near Broach it is nearly fifty per cent. It decreases to ten per cent. below Surat. *Goghari* is being mixed with Broach everywhere, because the ginning percentage of *kanvi* is 39.4 whilst that of Broach is only 33.4. The Broach merchant gives ten annas more for every forty pounds of lint of Broach cotton which works out at nearly Rs. 3 per acre. The higher proportion of the lint of *kanvi* makes the yield per acre sixteen pounds more than of Broach. When *kanvi* is sold on the basis of ginning percentage, there is a net gain of Rs. 8 per acre. So that, if we assume the yields to be equal, there is a net profit of Rs. 5 per acre from growing *kanvi*. *Kanvi*, however, is considered to give a better yield. They were grown on the Broach farm for four or five years side by side and it was found that *kanvi* yields better than Broach. I have, however, assumed equal yields and still there is a large profit from *kanvi*. Therefore *kanvi* is bound to replace Broach in the north of the Broach tract.

1684. There is only one man working on cotton in Gujarat. In Khandesh there is one man and in the Karnatak one. There are, therefore, only three men for the whole Presidency. There is no variety which is being put out successfully on a large scale in Gujarat or Khandesh. *Roseum* is being given out in Khandesh. The seed given out is expected to cover 10,000 to 15,000 acres.

Mr. L. S. POTNIS, Mamlatdar, Bhusawal, East Khandesh.

EXAMINED AT BOMBAY JANUARY 30TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

1685. (1) Experience.—I have been stationed in East Khandesh District for the last 3½ years. I was also stationed at Kalvan in Nasik for nearly three years but there was a very small cotton tract. As a Mamlatdar and Chief Revenue Officer of a *taluka*, I have been in actual touch with cotton cultivators, besides I personally take an interest in agriculture and co-operation. I am in touch with them in several capacities.

1686. (2) Varieties.—The short-stapled variety of Khandesh called Khandeshi is the only variety grown in both districts.

1687. (3) Size of holdings.—The average size of holdings is from 10 to 25 acres in both the districts.

1688. (4) Yields and profits.—The average yield of cotton per acre is 450 lbs. and the average profit varies from Rs. 35 to Rs. 40.

1689. (5) Rotations and manures.—The general rotation followed is two years cotton and one year *juar* or sometimes ground-nut, *mung*, *urid* and *bajra* are also rotated in light soils in East Khandesh. Farmyard manure is the only manure given to the cotton crop.

1690. (6) Comparative returns.—There being neither exotics nor any *deshi* long-stapled cotton, the comparison of the short-stapled is made with the other crops of the district to show the yield and profit.

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[Continued.]

Average according to current prices.

Crop.	YIELD IN LBS.		RATE PER RUPEE.		Gross profit.	Cost of cultivation.
	Grain.	Fodder.	Grain.	Fodder.		
					Rs.	Rs.
Juar	657	1,523	16	150	41+10=51	19
Wheat	425	600	14	100	30+6=36	17
Seed cotton	428	...	7	...	61	25
Gram	570	...	20	...	28½	19

Net profit—Rs. 32, 19, 36, 9½ respectively.

1691. (7) Conditions affecting increase in area.—The area under cotton fluctuates largely in the district of East Khandesh, increasing if there be early rain in June and July and decreasing if the rains are late. Also the prices of the past season similarly affect the area on a small scale. In Khandesh, the increase of area under short-staple cotton has almost reached its maximum and only the low prices of cotton for two successive seasons will limit the increase or partly decrease it.

1692. (8) Uses of seed and seed selection.—Generally the seed goes to feed the cattle in Khandesh and to Kathiawar via Bombay, while part of it is being utilized in Navsari and Bombay mills for the extraction of oil. The cultivators generally do not select their seed, but purchase it from the seed merchants from whatever lot these merchants might have kept for themselves as good seed and this is taken from gins as hand gins have gone out of use altogether either for seed or fibre.

1693. (9) General economic conditions.—As compared with other cultivators of non-cotton districts in the Deccan, a Khandeshi cotton cultivator is generally a fairly well-to-do cultivator. As cotton cultivation can be made with the least number of cattle and with less amount of labour and supervision, he is not required to spend a large amount. Besides there is always a ready market for his produce and he gets a substantially good amount when he is required to pay his land revenue dues. But he is very reckless and spends a good deal in drinking and purchasing unnecessary luxuries. If he gets a good sum by high prices, he will purchase a pair of ponies, purchase gold and other ornaments and will not also fail to spend in *tamashas* or other vices. Excepting the shrewd class of Rewa *kunbi* cultivators, he is generally found to be at the end of his resources in April and May. In many cases, they are required to borrow by this time of the year for the purchase of bullocks, manure, seed and even for purchasing grain for their maintenance. A *marwari sahukar* comes forward and advances money for whatever purposes he wants. High rates of interests are charged and many a time there is a condition that the cotton or other produce grown by him is to be sold to this *sahukar*. When the crop is ready, it is given to the *sahukar* and he purchases it at the lowest rate. The settlement of accounts is delayed and several times the disputes go as far as civil courts. This is applicable to Tirola *kunbi*, Deccani *kunbi* and *malis* and *gujar* cultivators. But Rewa *kunbis* are very shrewd. They are frugal, abstain from drinking and are generally in touch with the market. They, as a rule, are less indebted and more well-to-do.

II.—COMMERCIAL ASPECT.

1694. (30) Local trade customs.—The local trade customs in regard to the marketing of the cotton crop with which I am acquainted are:—

- (1) Generally big cultivators gin their cotton and then sell it with a view to have the seed to themselves for sowing purposes in the next season and also for feeding their milch cattle. But such instances are very rare.
- (2) Medium cultivators either bring their seed cotton to markets and then sell it or sell it to traders in the village itself. These traders move from place to place purchasing cotton from individual agriculturists. The majority of cotton growers fall under this category.
- (3) Small cultivators generally sell their cotton to petty traders in the villages themselves. But such instances are very few.

All the seed cotton is thus concentrated in gins where it is sold to agents of companies in Bombay invariably as ginned cotton through *dalals* or middlemen who are sometimes capitalists also.

(2) Though the Khandeshi agriculturist is proverbially indolent, he is generally unwilling to receive advances on cotton unless he is pressed to do so by exceptional pecuniary needs. He would choose to borrow money and pay off his debts out of the return he might get for his cotton. Future buying and contracts are also found in several cases, but such contracts are in maunds and not for the whole crop. There are also one or two cases in each village when the cotton growers being deeply indebted take their whole crop to *sahukars* after picking, who purchase it at the lowest possible rates and deduct their dues before returning anything to the cotton grower.

(3) When traders, small or big, move from village to village purchasing cotton, the ignorant agriculturist suffers as a rule inasmuch as the trader gives him his own rate as current rate and there is besides the "turn of the scale."

(4) This state of things can be improved by establishing cotton markets at suitable centres where the daily Bombay rates might be quoted and current weightment made, and the agriculturists induced to bring their carts for sale to such markets.

(5) The statements annexed herewith will give an idea as to the excoases charged in present markets and the weights of maunds prevalent in different centres.

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[Continued.]

1695. (31) **Standardization of commercial names.**—Khandesh cotton is classed as "fine," "fully good" and "good". The "fine" class coming from Ajanta hills and *ghat* portion of the southern *talukas* and the north-eastern *talukas* of East Khandesh. "Fully good" comes from the eastern *talukas* of East Khandesh and the rest can be classed as "good". But these distinctions are not definite as in a good season much of the cotton goes under "fine" and "fully good", while in a bad season "fine" is rarely available. The names are not standardized in East Khandesh, but the Bombay merchants in their cotton markets keep samples of these types for each season from the first lot received and with these the Bombay sales of Khandesh cotton are compared whenever there is a dispute.

1696. (32) **Buying agencies.**—The best form of buying agency that suggests itself to me is a combination of capitalists on co-operative lines, the capital being raised by shares. Each Presidency may have one or more such societies with branches at suitable places according to local requirements. Since all the cotton produced in a particular year is sold within a period of two or three months and nothing remains behind, there is no fear for the society to make purchases of whole cotton. In this way cotton prices will be controlled and a reasonable profit guaranteed to all. All speculation in cotton dealing will be over.

III.—STATISTICAL.

1697. (33) **Improvement of cotton forecast.**—Though I have not gone deeply into the question of all these statistics, still from the statistics which I am required to send I say that cotton forecasts are not sufficiently accurate, because they are at first based on the acreage supplied by village officers which in a majority of cases is no doubt approximate. I can, however, say that village officers daily and hourly acquainted with village lands and cultivators are in a better position to arrive at a correct estimate of area under cultivation in a given year. Circle Inspectors also have to check these estimates in a good percentage of cases, Mamlatdars taking only some tests. All these give no doubt a good approach to truth and if these very agencies are more carefully worked, they will give almost correct results. Besides if there be organized markets based on co-operative principles and if the distribution of seed be organised through such selected areas, a very correct estimate will be arrived at.

1698. (34) **Improvement of other statistical information.**—The statistical information such as cotton press returns is of very little use to petty cotton dealers. It may be of some use to big companies. But this can be used for encouragement to improve cotton cultivation if separate figures of bales are given as far as the cultivation of each sort of different variety is concerned and the prices realized in Bombay markets for such variety. I mean that the bales of each variety like N. R., *kumpla*, *bani*, *jari* separately ginned and pressed and the maximum prices of varieties in Bombay markets should be given. This will give encouragement to cultivators to cultivate pure varieties and to the traders to keep them pure and sell them in that form instead of the present system of mixing in gins and presses.

1699. (35) **Publication of Liverpool and Bombay prices.**—Daily publication of Liverpool cotton prices is of no use as far as Khandesh is concerned. But daily publication of Bombay prices is necessary. It keeps the cotton cultivators in touch with the cotton prices in Bombay markets and hence there is very little chance of their being cheated by traders. It is sure to serve as a guide both to cultivators and traders. This year they were of great use in Bodwad market.

1700. **Present state of the cotton trade and suggestions for its organization.**—From the experiments of the Agricultural Department it has been proved that N. R. or *roseum* variety of cotton is the best variety for cultivation in Khandesh. It has been also proved by that Department to the satisfaction of cultivators that it gives a larger yield and that its ginning percentage is also more as compared with other varieties. The variety being one of the indigenous varieties in Khandesh, there was nothing new. Only it was mixed with other varieties. The cultivators state that it has become very difficult to get pure seed of any particular variety from the time machine gins were introduced in Khandesh. All sorts of seed cotton are brought in gins by traders and big cultivators and they are ginned together without taking any care to keep the purity of the seed. Sometimes bad types of seed cotton are specially mixed with the best types by cotton traders (taking care to escape detection) in order to get the prices of the best types for bad ones. This ordinary and deliberate mixing of seed cotton spoils the purity of the cotton seed. No care is even taken to see whether the cotton is of first or second picking or of third or fourth picking. Thus not only bad varieties are mixed with good varieties but inferior and diseased seed is mixed with healthy seed. As the generality of cultivators purchase their seed from big cotton traders, this mixed seed falls to their lot and the purity of any special varieties is lost.

(2) The Agricultural Department has established seed farms and introduced the system of registered seed growers and a good deal of pure seed is distributed every year directly and through agricultural associations. But there being no arrangement by which the growers of such seed can get higher rates in the market, the cultivator is slack in getting it ginned himself and keeping its purity in the form in which he receives it from the department. There is also no arrangement and control over the gin owners in order to check the mixing of seed cotton which is daily practised before their own eyes.

(3) The cotton traders too take no interest in getting good and pure cotton grown in the tract in which they trade and they generally look to their own interest and to their own profits instead of to the interests and profits of cotton cultivators in the tract in which they carry on their trade.

(4) Cotton prices generally go with Bombay prices all over Khandesh. It seems the cotton traders at Bombay attach importance to the cotton of particular places and not to particular varieties. Hence the cotton bales sent from Khamgaon and Akola though of the same variety and same sort as those in Khandesh get higher rates in Bombay. This is the case even in Khandesh itself. As one goes further on from Chalisgaon, Pachora, to Bodwad he gets higher prices for cotton irrespective of variety. Taking advantage of this custom many traders purchase cotton in Khandesh and send it to Malkapur and Khamgaon in Berar by railway and get it ginned or pressed there and the Bombay merchants purchase it at the rate of Khamgaon or Akola cotton though it is really Khandesh cotton. This transport to the opposite direction and this mixing will not be stopped unless cotton is sold in Bombay markets by special varieties. Cotton cultivators also will not be very keen in growing best varieties and keeping them pure from intermixture of seeds unless they are convinced that they can get good prices by growing any special varieties and by keeping good seed.

(5) The Co-operative Department have also started some co-operative seed societies, but for the same reasons stated above, no marked improvement is seen. I am fully convinced that no agricultural or co-opera-

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[Continued.]

tive movement in this direction will be successful unless there is a control over the markets. Gin and press owners must either be controlled by any regulations or by ties of co-operation. If such a situation is created, the cotton growers will get good prices for special varieties of cotton grown by them and the purity of the seed can be kept by separate and careful ginning and if mixture of different varieties be avoided in press factories, the cotton traders will realize the importance of separate sale of such varieties.

(6) At present there are very few regular markets. Petty dealers in cotton run from village to village and house to house and purchase cotton at cheaper rates, taking advantage of the ignorance of villagers about the real rates. The cotton growers instead of taking any trouble of going to any cotton markets sell their cotton to these petty dealers and do not get the daily market rates. Owing to the prevalence of such system on a large scale there is no regular weight prevalent in the district. At some places the cotton maund is of 43 lbs., at some 45 lbs. and at some places 100 lbs. A statement of all such different weights of Khandeshi maund I know is appended herewith. Though the cotton growers are paid some higher rate for this increase in the weight of a maund it is not in proportion to the increase. It is not possible to introduce similar weights in all cotton trading centres unless these markets be controlled by any regulation. Besides some *kadati* (excess) and sample is taken from the sellers as per statement annexed. Some money is charged for *dhamadaya* (charity) and the *araya* or *dalai* through whom this sale is effected gets a commission. All this can't be stopped unless the markets are controlled by any regulation.

(7) If any such markets be established and if they can be controlled, pure seed can be distributed, pure cotton can be grown and sold. It can be graded and best and pure seed obtained by separate ginning. This seed can again be distributed to cultivators and area under the same variety increased tenfold next year. If the same procedure be followed next year and then for some years successively, the cotton from any particular tract will be found to be quite pure and of the same variety. If proper rate be given for such special varieties when unmixed, any variety which suits any particular area best can be introduced in a very short time and with much better results, than what are seen by the present concentration of the energies of men from the Agricultural and Co-operative Departments. By this I do not mean that these Departments have not concentrated their energies at all. They have done their utmost but, in my opinion, a different direction was necessary.

(8) My scheme for opening such markets is as under:—Some central bazar places should be selected. In such selection, care should be taken that no diversion of cotton is possible to other places, owing to the situation prices paid by Bombay merchants for cotton bales sent from these places. Besides there should be at least two or three gins and at least one press in the neighbourhood. Taking a group of all the villages in a radius of ten to fifteen miles a cotton sale society should be formed and it should be registered under the Co-operative Act. All the cotton growers in the tract should be made the members of such a society. Then a market of such a society should be established. In the establishment of such markets, it is necessary to get the co-operation of the gin and press owners, because if they go against and increase the ginning and pressing rates with a mischievous tendency diversion is possible. But as they are likely to get more cotton by this way and as their clients are likely to be sure, it is not very difficult to get their co-operation. Government arrangement should be made to supply daily market rates at Bombay by special telegrams. These rates should be published in these markets when they are opened for the day's transactions. As the cultivators are profited by such arrangements they are sure to bring their carts to these markets. Such arrangements being also very good for big cotton merchants, a large number of such merchants generally visit such market to make purchases. The greater the number of purchasers, the keener the competition and higher the rates for cotton sellers. As such institutions are regulated and bound by some bye-laws and rules, uniformity of weights can be kept, the practice of taking excesses like *kadati* and *namona* (sample) avoided. Correct weighing can be made in the presence of the secretary or chairman and all petty mischiefs can be avoided. Money can also be paid instantly either by the purchasers or by licensed *dalals*, if there be any. If arrangement for godowns be made in such markets the cotton growers will also be able to wait and sell the cotton when they think that they will get higher prices.

(9) Seed distribution can be taken in hand by such societies and if the cultivation, purification and gradation and ginning and storage and redistribution of seed be watched by a man of the Agricultural Department in every such market, the object aimed at will be gained in a very short time. These sale societies markets are also useful in relieving the economic pressure on the cotton growers. A very large amount can be collected by making the members purchase shares of Rs. 5 each. This amount can be utilized in making small loans to cotton growing members when they want money very badly, especially in the sowing and weeding seasons. *Jalap* system, or selling cotton crops before they are gathered, can be stopped to a great extent. If this sale society be supplemented by starting co-operative credit societies in each of the villages in the radius specified above, the cotton growers will be financially assisted very much and relieved from the oppression of the local *sahukars* to a great extent. By spreading a net work of such co-operative societies within the radius of this market, big co-operative unions can be established and cash credit for a large amount can be obtained from the central co-operative banks and the cotton growers' economic pressure removed to a large extent.

(10) I have made a small beginning in this direction by establishing a cotton market and starting a cotton sale society at Bodwad in Bhusawal Taluka. More than 7,000 carts were sold in this market and cotton growers in the neighbourhood have considered it a boon. Owing to the publication of daily rates in Bombay markets, the tricks of petty Marwaris in taking advantage of the ignorance of villagers were stopped. The necessary co-operation of gin and press owners was obtained and there was not the slightest hitch. But the higher prices paid for Malkapur and Khamgaon cotton bales had some effect; and a good deal of cotton purchased in this market was sent by rail to Khamgaon and Malkapur. If this be stopped by increasing railway freight for cotton taken to opposite direction no such diversion is possible. But such diversions are not possible in all places, and if the cotton sold in Bombay be by varieties and not by places there will be no ground for such fears in future.

(11) To make such markets secure, it is necessary to have some legislation. Sales in villages should be stopped. Villagers should be made to bring their cotton to such markets. Gin and press owners should be stopped from allowing any mixture of cotton in their gins and presses and they should be licensed and if they allow any such mixture, their licenses should be cancelled. Besides this there should be uniformity of weights in all the markets. More markets should be under the control of the specialists from Agricultural Department as far as distribution of seed and purification of cotton plants sown and gradation of cotton brought to markets is concerned. The economic development of such cotton tracts by financing the cotton cultivators when they are in need of money should be given to the Co-operative Department.

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Mr. L. S. POTNIS.

[Continued.]

ANNEXURE.

(i)

Charges levied on marketing of cotton in East Khandesh.

	Dharangaon.	Amalner.	Bhusawal.	
Dalali from the seller	5 to 8 seers.	5 to 8 as.	...	} per cart of seed cotton of 1,200 pounds.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	
Dharmadaya	0 1 0	0 1 0	0 1 0	
Dalali from the purchaser	0 5 0	0 2 0	...	} per palla of ginned cotton
Excess weight taken	Nil.	5 seers.	...	
Kadati or excess weight	7½ seers.	3½ seers.	7½ seers.	
Sample	¼ seer.	¼ seer.	¼ seer.	} per palla of ginned cotton
	Rs. A. P.	Rs. A. P.	Rs. A. P.	
Arat from purchaser	0 6 0	0 6 0	0 4 0	
Dharmadaya	0 2 0	0 2 0	0 1 0	}
Per bale dharmadaya	0 1 6	0 1 6	...	

N.B.—As for Bodwad since the establishment of the cotton market all these charges are discontinued and a dalal gets twelve annas for each cart sold through him.

(ii)

Weight of the maund of seed cotton in different markets in East Khandesh.

	lbs.		lbs.
Dharangaon	100	Raver	86
Amalner	144	Bodwad	43
Jalgaon	96	Bhusawal	45

Mr. L. S. POTNIS called and examined.

1701. (President.) I am the Mamlatdar of the Bhusawal taluka in East Khandesh, that is the revenue officer of the taluka. I am closely in touch with the cultivators. The Khandesh cotton is not improving. There has been deterioration in the seed as the result of mixing. As a remedy to prevent mixing, I have formulated a detailed scheme for the establishment of cotton markets. That would help a great deal but the cotton seed societies must also undertake the distribution of the seed. The sale of cotton in the markets should be made compulsory. The markets should be co-operative concerns. The cotton growers will then have some voice in their management. I have discussed the question with Mr. Ewbank, who was favourably impressed and proposes to experiment with it.

1702. As regards statistics, we have to depend upon the figures of village officers. They give the area only and we estimate the possible outturn. We give an anna valuation based on our own information. If markets were established, more information would be available.

1703. I am against the publication of Liverpool prices but I think that the publication of Bombay prices would be useful. The Bombay prices published should be those of any particular Khandesh cotton and the price of Broach should also be published as a guide.

1704. Deterioration of cotton largely coincides with the more extensive introduction of machine gins. That is the public opinion. Formerly when there was a large number of hand gins in existence, more care was taken of the seed; the cultivators ginned their own seed and bought as little as possible.

1705. There are some registered seed growers in my taluka but they have not come much under my observation. There are three or four co-operative credit societies but they are doing nothing in regard to cotton in the way of distribution of seed. I have started a cotton market and a cotton sale society. The ginning and pressing factory owners must co-operate. They should be members of the cotton market committee so that they will not work against it.

1706. Something might be done to prevent the movement of cotton by differential tariffs on the railways. Cotton, for instance, is taken from Bodwad to Khamgaon. I think that legislation would be useful in stopping abuses. Then the villagers would be convinced that malpractices were against their interests.

1707. (Mr. Roberts.) I am very keen on the standardization of weights, on the establishment of Central markets and on the prevention of the transport of kapas by rail from short staple to long staple tracts.

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Mr. P. C. PATIL.

Mr. P. C. PATIL, L.Ag., Deputy Director of Agriculture, Northern Division, Poona.

EXAMINED AT BOMBAY, FEBRUARY 1ST, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

1708. (1) Experience.—In my Division (comprising Gujarat, Khandesh, Nasik, Ahmednagar, and Poona districts) short staple cotton is grown extensively, in Khandesh and parts of Ahmednagar and Nasik districts, where I have been working as Divisional Inspector of Agriculture and recently (for the last 2½ years) as Acting Deputy Director. I was working as Divisional Inspector of Agriculture for the Central Division and had then held the charge of Sholapur which was then included in the Central Division. Sholapur district also grows short staple cotton.

1709. (2) Varieties.—The variety grown in this short staple cotton tract has not got any special name though it is often called Khandeshi cotton. It is made up of five distinct strains, one of which, called N. R., *neglectum roseum*, is superior to others in point of yield per acre and ginning percentage. Owing to the suitability of this strain, the Agricultural Department has undertaken the work of producing and distributing pure N. R. seed with good results. It may be noted that the component strains of Khandesh cotton (*Gossypium neglectum*) are short staple ones. N. R. and N. R. C. (bearing white flowers) are shorter in staple than N. V., N. V. M. and N. V. K. (bearing yellow flowers). N. R. however, is far superior in yield and ginning as will be seen from the following figures, which refer to Government Farms.

Name of the strain.	Length of fibre.	Yield per acre in lbs.	Ginning percentage (Dhulia).
N. R. (<i>neglectum roseum</i>)	½ inch	946	37.50
N. R. C. (<i>neglectum roseum cutchicum</i>)	½ "	861	35.50
N. V. (<i>neglectum verum</i>)	¾ "	660	30.00
N. V. K. (<i>neglectum verum kathiawarens</i>)	¾ "	560	27.00
N. V. M. (<i>neglectum verum malvense</i>)	¾ "	640	26.00

In addition to these five strains, traces of *bani* (*G. neglectum*) and Dharwar American (*G. hirsutum*) to the extent of four per cent. are met with in Khandesh cotton. They represent the relics of former attempts towards the introduction of superior varieties in Khandesh.

1710. (3) Size of holdings.—The average size of holdings in the respective districts comprising the short staple cotton tract and the percentage area of cotton in the holding is given in the subjoined table :—

Name of the district.	Average size of holding in the district.	Percentage of cotton to gross cropped area in the district.
East Khandesh	Acres. 21.4	46
West Khandesh	25.6	34
Ahmednagar	37.6	6
Nasik	28.5	5
Sholapur	47.5	4

1711. (5) Rotation and manures.—The following rotations are generally observed :—

Name of the district.	1st year.	2nd year.	3rd year.
East Khandesh	Cotton or Cotton	Juar and urid Cotton	Again cotton Juar and urad
West Khandesh	Cotton	Bajra and moth or Juar or Til	Again cotton.
Cotton growing talukas of Nasik district.	Cotton	Bajra	Again cotton
Cotton growing talukas of Ahmednagar district.	Cotton	Rabi juar	Do.

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[Continued.]

(2) Cattle dung manure is generally applied once every three or four years at the rate of ten to twelve tons per acre. In the Departmental experiments at the Jalgaon Farm, the application of crude night soil to cotton crop was found to yield very good results. The method is now extensively practised at Jalgaon and the demand for crude night soil has far exceeded the supply. The prices realized by the Jalgaon Municipality have risen from Re. 1 in 1915 to Rs. 1-10-0 in 1918 for one cart-load. The Department is demonstrating this method in West Khandesh, Nasik and other districts. In the interest of improvement of agriculture, it is necessary that all the Municipalities in the cotton growing districts should adopt the Jalgaon system and make the local produce of night soil, either crude or manufactured, into poudrette available to the farmers.

1712. (6) **Comparative returns.**—In the short staple cotton tract, neither *deshi* long staple cotton nor exotics grow successfully. Cotton (short staple) pays better than any other crop grown in the tract, as will be seen from the following statement showing the average yields and profits per acre :—

Name of district.	Crop.	AVERAGE YIELD PER ACRE.		Average net profit per acre in Rs.
		Kind.	Quantity in lbs.	
Jalgaon	Cotton	Seed cotton	450	Rs. A. P. 30 0 0
	Juar	Grain	650	} 25 12 0
	Fodder		2,000	
Dhulia	Cotton	Seed cotton	375	22 0 0
	Bajra	Grain	500	} 15 8 0
	Fodder		2,000	

1713. (7) **Conditions affecting increase in area.**—The area under cotton in Khandesh districts has probably reached its maximum, and looking to the grain and fodder requirements of the tract, I think that, under the present circumstances, further extension of cotton is not much possible. There is, however, some scope for extension in Poona and Nasik districts. It has also been found at Sholapur that irrigation increases the yield of short staple cotton so as to leave a decent margin of profit after paying irrigation charges. If, therefore, on the tail areas of the Nira and Pravara Canals, water be given at fairly cheap rates, people will go in for cotton.

(2) The area under cotton fluctuates with the prices and character of the season. When the prices are high, it goes up. More area is put to cotton, if the monsoon opens early, and with sufficient rainfall; otherwise some of the area intended for cotton goes under other crops, viz., *bajra*, winter *juar*, *wheat*, etc.

1714. (8) **Uses of seed and seed selection.**—Cotton seed is used for sowing, feeding cattle and for extracting oil. Since the advent of machine gins, the farmer gradually gave up the practice of preserving his own seed. One occasionally meets with a cotton merchant who gins good lots of seed cotton separately and keeps the seed for sale. The farmer does not either care to select or keep his own seed. In this country there are no seed merchants in the sense in which the term is used in European countries. Generally in India, a seed merchant stocks any seed he gets and gives it out for seed purposes.

(2) The supply of good seed of cotton in this tract of my division has been given very careful attention by our Department. We have at present two seed farms and 35 seed growers. The supply from these agencies is, however, not sufficient to meet the requirements of the total cotton acreage in this tract. We are, therefore, forming co-operative societies for growing and distributing pure N. R. seed. The scheme of work is as follows :—The Departmental seed farms will supply seed only for the central farms of the seed societies. The seed produced on these central farms will go to the seed growers of the seed societies and the seed from them will ultimately be distributed to the general public. Last year, we made a beginning by starting seven such societies. The number is, however, very small in consideration of the extent of the cotton tract. The work in this direction will, however, be extended as more money and men are available to the Department. The seed societies do not receive any financial help from the Department, yet their organization and supervision requires more staff.

1715. **Desirability of establishing cotton sale societies.**—Good seed will enable the farmer to produce more and better cotton. To get the full advantage of this, however, he must be a member of one or more societies for financing him with money and for selling his cotton. At present he has to pay a very heavy rate of interest on the money he borrows from his *sahukar* (at 12 to 24 per cent.) and has to pay probably one to two per cent. of the total receipts as charges as brokerage, charity, etc. Credit and sale can be combined in one society and the farmer can borrow money at a considerably lower rate of interest and can sell his cotton through the society at a greater advantage. At present he loses in weight, in rate and has to pay, in addition, half a dozen charges. Three such societies (called cotton markets) have been formed in Khandesh, mainly through the efforts of the Revenue officers and these societies are doing good work.

1716. **Desirability of standardization of weights.**—The advantages of sale societies will be more obvious when the difficulties due to different standards of weight in one and the same district are considered. The

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Mr. P. C. PATIL.

[Continued.]

weight of a maund varies for each commodity. Even for cotton it varies in almost each of the big markets. I give the weights for some of the markets in Khandesh alone :—

A maund of cotton at Jalgaon	weighs	96 lbs.
" Bodwad	"	42 "
" Jamner	"	43 "
" Betawad	"	43 "
" Dhamangaon	"	100 "
" Dhulia	"	144 "
" Pachora	"	92 "
" Amalner	"	144 "

(2) Prices of cotton per maund in such markets vary but not always in proportion to the quantity and the farmer—illiterate as he is—does not know where to sell his produce. The shrewd merchants have got, in this faulty system, a very good means to deceive the farmer. Common standard weights all over the country will help the farmer very considerably.

1717. **Desirability of control over charity charges.**—I also think it necessary that some kind of control be placed over the management of charity charges. The merchant recovers the charges from the farmer and spends as he likes on things which are often not at all useful to the farmer. For example—feeding dogs and birds and even insects, such charges are common in some parts. Why should the money be not spent for providing shelter and water near the markets for bullocks which haul the commodity or spend part of the fund on opening demonstration plots or cattle breeding stations, and thus benefit the men who pay such charges?

(b) "*Deshi*" long-staple cotton.

1718. (10) **Experience.**—I have been working for the last 2½ years as Acting Deputy Director of Agriculture, Northern Division, which includes Gujarat districts. I have to tour very often in this tract to inspect experimental farms and the demonstration work carried through the District Agricultural Overseers. Surat, Broach, Ahmadabad and the surrounding tract of His Highness the Gaikwar are the principal cotton (long staple) growing tracts in Gujarat. Lately, the area under cotton is increasing in Kaira and western talukas of Panch Mahals district as well.

1719. (11) **Varieties.**—Surat grows *Surtee-Broach*.

Broach grows *kanvi* which is a mixture of *Surtee-Broach* and *Goghari*, except in Hansot Taluka which grows *Surtee-Broach* almost pure.

Kaira grows *kanvi* and *rozi* (a perennial variety).

Ahmadabad grows *lali* and *wagad* generally separately. *Gogha*, part of Dhandhuka, grows short staple cotton called *mathio*, which is in fact of Khandesh type.

Panch Mahals—Kalol and Halol Talukas—grow *kanvi*.

(2) The following will give a rough idea of the staple, ginning percentage and valuation of the several varieties of cotton grown in Gujarat :—

Variety of cotton.	Approximate length of staple in inches.	Ginning percentage.	Rate of seed cotton per 40 lbs. at their original places of production before war.	REMARKS.
Navsari-Broach	¾ inch.	31.0	5.54	Long staple cotton.
Surtee-Broach	¾ "	31.9	5.45	
Kanvi	¾ "	36.11	5.6	
Rozi	¾ "	25.0	3.18	
Lali	¾ "	34.0	4.69	
Wagad	¾ "	33.0	4.92	Short staple cotton.
Mathio	¾ "	35.0	4.48	

(3) *Kanvi* which is a mixture of *Broach* and *goghari* is replacing *Broach* pure. *Goghari* gins better and yields more on *besar* soil (medium black soils). It gins about forty per cent. as against 36 of *kanvi*. The trade does not appreciate staple as it does higher ginning, and hence *kanvi* and *goghari* are steadily ginning ground. Unless the trade gives a premium of about Rs. 80 per *khandi* (784 lbs. of lint) for pure *Broach*, people will go in for *goghari* or at least *Kanvi*.

(4) Though Navsari and Surat grow one and the same variety, the quality of cotton produced near Navsari is superior to that of Surat. In fact, as we proceed from *Broach* downwards to Navsari, the quality gradually improves probably with deeper soil, more rainfall and proximity to the sea.

(5) Distribution of *wagad* and *lali* in Ahmadabad district suits the soil conditions. In fact, exchange of varieties will not, to my mind, do any permanent good.

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Mr. P. C. PATIL.

[Continued.]

1720. (14) Rotations and manures.—The following rotations are generally observed :—

District.	Rotation.	Remarks.
Surat	1. Cotton	In some <i>talukas</i> it differs slightly according to other conditions.
	2. <i>Juar</i>	
Broach	1. (i) Cotton	
	(ii) <i>Rabi juar</i>	Fairly large percentage of acreage under cotton is not given any rotation and a partial fallow system is followed. Often bare fallowing is also practised.
	2. (i) Cotton	
	(ii) Wheat	In sandy loam, and
Ahmedabad	1. Cotton	
	2. <i>Bajra</i>	In black soil.
	1. Cotton	
	2. <i>Juar</i> or wheat	

Kaira—*Rosi* cotton is sown with *bajra* mixture.

(2) There is no regular system of manuring. Manure is scarcely applied in Surat district to cotton except once in five or six years. The available supply preferably goes for rice and garden crops. However in some *talukas* like Olpad, farmyard manure is given regularly once in five or six years at about five tons to an acre. In Broach district, the farmers depend more on fallowing and give more manure only to those lands which border villages. In Ahmedabad, they give once in three or four years about five tons of farmyard manure to an acre. In Bhal tract, no manuring is given.

1721. (13) Yields and profits and comparative returns.—The average yields and net profits of the different varieties of cotton (long and short staple) and other *deshi* crops with which they are rotated are given in the following statement :—

Name of district.	Name of crops.	AVERAGE YIELD.		Average net profit per acre in Rs. before war.
		Kind of yield.	Quantity in lbs.	
Surat	Surti cotton	Seed cotton	360	Rs. A. P. 27 0 0
	<i>Juar</i>	Grain	760	} 27 0 0
		<i>Karbi</i> (fodder)	2,500	
Broach	Broach cotton	Seed cotton	400	30 0 0
	<i>Juar</i>	Grain	820	} 27 0 0
		Fodder	2,500	
Ahmadabad	<i>Lalio</i> or <i>wagad</i> cotton	Seed cotton	375	29 0 0
	<i>Bajra</i>	Grain	640	} 28 0 0
		Fodder	2,500	
	<i>Mathio</i> cotton	Seed cotton	450	30 0 0

1722. (16) Suitability of existing varieties.—*Deshi* short staple cotton grows well in the *goradu* soil of Kaira and Ahmadabad districts but it is not desirable to encourage this variety. Exotic cottons were tried and Cambodia grew well in sandy soils under irrigation. It has, however, been found to deteriorate in ginning and is susceptible to diseases.

1723. (15) Conditions affecting increase in area.—The undermentioned causes generally affect the acreage of the long staple cottons in Gujarat :—

- (1) Like the other cotton tracts, rise in prices and early adequate rainfall increase the area under cotton.
- (2) In the Ahmadabad district, the cultivation of *lallo* and *kanvi* cotton is supplemented by four to six waterings in winter. If well sinking is encouraged, the area under these cotton may increase appreciably. In Surat and Broach districts, deficiency of manure is keenly felt. If the system of utilising night soil be introduced extensively, the acreage as well as the yield of cotton would increase materially and thereby add to the aggregate production of cotton. It may also, to a certain extent, dispense with the necessity of observing some of the rotations in cotton and thus increase the area.
- (3) Facilities for transport and marketing count considerably in the case of cotton cultivation. Encouragement for ginning and pressing factories in suitable cotton growing centres may, by diminishing the cost of transport and by removing some of the difficulties of marketing, add to the net profits and tend to enhance the acreage under cotton where it does not, at present, leave an enticing margin over other crops.
- (4) The adoption of uniform weights is one of the crying necessities for the trade in the *mofussil*. Legislation in this matter would remove the chances of frauds so notoriously practised by dealers upon the illiterate and ignorant farmers.

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Mr. P. C. PATIL.

[Continued.]

1724. (18) Use of seed and seed selection.—Cotton seed is used for sowing, for feeding cattle and for export to foreign countries. Some of it is also used for extracting oil in India. The farmer does not observe seed selection nor does he hand-gin it.

1725. *Improved strains of cotton*.—The Agricultural Department has been working on cotton for a long time and has found out two strains (*viz.*, 1027 A.L.F. and Selection I-A) for quality. There are others for yield and ginning. The Agricultural Department has taken at present some villages in hand and all the area under cotton is sown with the seed of Selection I-A. With this seed the farmers realize about seven per cent. higher prices. The Department has, however, to organize the collection, grading and sale of its produce. This causes some delay in payments and naturally gives room to the cultivators to grumble. The premium of Rs. 11 per *b'ar* of 924 lbs. or seven per cent. that is paid for this cotton is not proportionate to its quality and unless a still higher rate is obtained, the area under improved cotton will not increase rapidly.

1726. (17) Prevention of mixing of different varieties.—Fraudulent mixing of short staple cotton is a very difficult question to be dealt with by the Government, and it should be left to the trade combinations such as the Trade Association and Chamber of Commerce, Bombay, who may be asked by Government to publish periodically their valuation of cotton dealt with by the principal cotton merchants and to pass their opinions on their transactions. Probably such reviews might give a healthy tone to trade, since the names of those who deal in or encourage fraudulent mixing will be known to the public.

Mr. P. C. PATIL called and examined.

1727. (*President*.) I am the Deputy Director of the Northern Division. I took the degree of L.Ag. at the Poona Agricultural College. After doing so, I was sent to England and other European countries to study agriculture. I was first appointed Probationary Superintendent of the Agricultural College Farm. After being there for two years, I was appointed Probationary Inspector. The holders of those appointments were then called Divisional Inspectors. Now they are called Divisional Superintendents of Agriculture. For the last 2½ years, I have been acting as Deputy Director. In two or three tracts in my Division, cotton is the principal crop but not everywhere. There are two Commissioners' Divisions in my charge, the Northern and the Central Divisions. The Central Division consists of Poona, Nasik, Ahmednagar and East and West Khandesh. Cotton is the principal crop in East and West Khandesh, part of Nasik and part of Ahmednagar. It is only short staple cotton. In the Northern Division which includes the whole of Gujarat, the cotton growing districts are Surat, Broach and Ahmadabad, but during the last two or three years, it has extended in the Kaira district and to a less extent in Panch Mahals. In these districts, long staple cotton is grown.

1728. In the short staple tract, we are distributing N. R. (*roseum*) on account of its higher ginning percentage and higher yield per acre. According to the results of the special varietal tests at the Dhulia Farm, N. R. gives about 946 lbs. of seed cotton per acre. The outturns in the first and last statements in my written evidence (paragraphs 1709 and 1721) are those on Government Farms, while the fourth statement (paragraph 1712) represents yields of average cultivators. The ginning percentage of N. R. is 37.5 at Dhulia, and as we go eastwards it increases and at Jalgaon it is 39. I do not think that there is any possibility of growing long staple cotton in the districts in which short staple is grown on account of climatic conditions. We had tried long staple without success. The season is too short.

1729. I have included Broach under long staple. It is true that Broach is deteriorating on account of its mixture with *goghari*. We are trying to keep Broach pure, but as a cultivator or a merchant can purchase any seed he likes, we cannot check the spread of *goghari*. Between Nausari and Surat, the cotton growing tract is nearer the sea; the soil is more retentive and deeper and also the tract gets a heavier rainfall. On this account *goghari* does not grow so well and there the good strains grow very nicely. In the north, the soil is not so deep; and is only medium black, so that there pure Broach does not succeed so well as *goghari*. Round Jambusar and Broach, pure *goghari* grows much better than Broach. At Broach you find a mixture of the two. For a long time past, *goghari* is being grown in some parts practically pure. To my mind the trouble about mixing is not the mixture of really short staple cotton with really long staple cotton but the strains. For example, in Khandesh cotton, there are five strains. N. R. (*roseum*) is a short staple cotton but it yields better and has a higher ginning percentage and so the people are taking to it. In that way one might say that the quality was deteriorating. In the same way, in Gujarat, pure Broach is better than *goghari*, as regards staple. I do not think that N. R. (*roseum*) cotton will be taken by the cultivators, nor does it thrive there. They do not care to take short staple cotton and grow it there.

1730. The fact that Broach cotton is disappearing is not satisfactory. Something ought to be done to keep up the name of Broach but nothing has been done yet. We are not doing anything to keep it pure. I am not anxious to spread *goghari*. We have got at Surat four selected strains of Broach and one of them is superior in staple and two in ginning and yield to Nausari. We ought to have something ready to give out when people want cotton with a high ginning percentage and a high yield. The cultivators are not getting a proper premium for the pure strains and though we have been growing them for the last three years in seven villages, they are not extending. We only get about Rs. 11 per *b'ar* or seven per cent. above the price of ordinary Surat cotton for two strains, 1027 A.L.F. and Selection I-A. One is a cross and the other a selection. I do not do selection work myself. It is done by two assistants, one on Rs. 90 per mensem and the other on Rs. 120. One is a Graduate of the Agricultural College and the other was trained by Mr. Fletcher. They have been specially trained in Botany. The breeding work is not expanding much. The crosses were made with the help of Professor Gammie. Many of them were rejected; some were kept and from among them, those only which proved best were propagated. The cross 1027 A. L.F. and the Selection I-A proved the best. We have other strains also but these are the most promising. Professor Gammie directs the assistants in breeding work. He has made a special point of visiting the work at least twice in each season. We have not done much breeding work on *goghari*. We have found out strain of *goghari* and have been doing considerable work on selection. Even if we do not issue pure *goghari*, people know that it gives a better yield and a higher ginning percentage, and so take to it.

1731. I have ten districts under me which is really a very big charge. There are about ten farms and demonstration plots. Some of them are big farms and some are small plots. There are 35 seed growers and seven seed societies in my division. My head-quarters are at Poona; I have no farm there. I do advisory and inspection work and the research work is done by the Graduate assistants under my directions. The farm at Poona, being a College Farm, is under the Professor of Agriculture. There is another farm ten miles from Poona which is also attached to the college. Near Poona, I have no farm as Deputy Director of Agriculture. I should certainly prefer to have one and I have made a representation accordingly. Under

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the circumstances, all I can do is supervision and dissemination and practically no research work. When I was Divisional Inspector, I used to get very good opportunities for research work. Before that, when I was Superintendent of the College Farm, I had a Farm under my control. I am now worse off in that respect than when I was a Divisional Inspector.

1732. (Mr. Roberts.) In certain *talukas* in East Khandesh such as Chopda about sixty per cent. of the cotton is N.R. (*roseum*). In the south, there is a very large proportion of the yellow flowered varieties, viz., N.V. and N.V.M. The yields per acre of the different types given in my written evidence are those on the Dhulia Farm only. When these yields were recorded I was not in charge. Of all the strains in Khandesh cotton, N. R. gives much better yield. In 1916, a mixture was grown on one plot and N.R. (*roseum*) on another plot at Dhulia. We thought that the mixture would pay better but in the end N.R. (*roseum*) turned out to be much better. Though it is shorter in staple, it is uniform and yields thirty to fifty per cent. more than *jari*. The yield of N.R. (*roseum*) is 946 lbs. per acre and that of *jari* (N.V.M.) is 640 lbs. That means a difference of fifty per cent. Even if you deducted twenty per cent. from the value of N. R., it would still pay better. The traders know that N. R. is short staple and yet because it is clean and white, they pay more for it. They do not attach much importance to the shortness of staple. That is very largely because all the cotton from one tract is assumed to be of the same staple. I do not think as regards the *neglectum* varieties that the trade attaches any importance to staple. All they care about is cleanliness and white colour. N. R. (*roseum*) cotton is mostly exported and it is used for mixing with wool. That is why although it is rough and short, it fetches as good a price as the mixture. If the price went down by more than twenty per cent. I do not think that the cultivators would grow N. R. (*roseum*). They would grow the mixture.

1733. On the Nira and Pravara Canals, the charge for sugarcane is Rs. 40 per acre. There is scope for extension of cotton on canal tracts as there is plenty of water available during rains for this crop. The Nira Left Bank Canal is already working. The Right Bank and Pravara Canals are very big projects and if some provision were made, people might go in for cotton. I do not think cotton is included in the schedule of water rates. I know a Mr. Madki who grew about 100 acres of cotton under irrigation and got about 900 lbs. an acre while the average for the district was 450 pounds. Near Dhond, one man has got an oil engine for growing cotton.

1734. I do not think there is much prospect for *deshi* long staple or for exotics in the Khandesh tract. It is a short staple tract. The area under N. R. (*roseum*) depends upon various circumstances. This year the area will go down as we have not got sufficient seed for distribution. There were 120 acres under cotton on the seed farm. This year we got only eighty lbs. per acre from Jalgaon. That is practically nothing. It is only just sufficient for our seed growers. N. R. cotton is not extending fast because we are not for the present able to supply the growing demand of seed. We have only 35 seed-growers, each of whom grows about forty acres but there are lakhs of acres under cotton in Khandesh. For 35 seed growers, we require seed for about 1,500 acres or 30,000 lbs. of seed. We issue twenty lbs. of seed to an acre. The seven seed societies also distribute seed. The whole area under N. R. would come to about 40,000 acres. The difficulty is that the cultivators sell their seed cotton and the merchants mix the seed. We cannot handle more than forty seed growers with our present staff which is limited. If we had a sufficient staff, we could buy all the cotton and gin it on the central farms of the agricultural associations. I have outlined a scheme for distributing seed on the lines followed in the Central Provinces and if that were adopted, we should have several farms instead of one. We have been working at N. R. for five years. Last year we started about seven societies. The difficulty is in regard to staff. There is only one Deputy Director of Agriculture for ten districts. The Deputy Director cannot get round more than once in two months. I would suggest two graduates for district work. In addition, two agricultural overseers who would be non-graduates would be required for each district or about twenty non-graduates for my charge. Non-graduates are not generally entrusted with selection work. Of our present staff, many are employed on the farms. It would be possible to expand work more rapidly but there must be sufficient staff. The number of Deputy Directors' Divisions should be increased; in fact Khandesh itself should form a division.

1735. Another point in regard to Khandesh is that, I am strongly in favour of regulating the weights used in the markets. The cultivators lose very heavily, on account of the different weights. In some cases the maund is 40 lbs, in some 42 lbs and in some 46 lbs; it ranges up to 144 pounds. Where there is a difference of two or three pounds, the cultivators cannot appreciate it and suffer accordingly.

1736. In the Agricultural Department, we use the botanical names of the cottons grown. *Kanvi* is a mixture of Broach and *goghari*. *Roz* is a separate variety. Botanically *goghari*, Broach, *wagad* and *lallo* are the same. They are *herbaceums*. The bolls of *wagad* do not open; those of *lallo* open very freely. I have studied the cotton of Gujarat closely for the last two years and think that there is less scope to improve the cottons there. At the most, we can stop the mixture of *goghari* and Broach. In Ahmedabad, *lallo* is grown on the more sandy and loamy soils whereas *wagad* is always grown on black and *beaur* (medium black) soils. *Lallo* and *wagad* have no separate botanical names. They are both varieties of *herbaceum*. *Mathio* is a mixture of *neglectums* as in Khandesh. We cannot alter these conditions except the encroachment of *goghari* into Broach type. I cannot suggest any remedy for that. If we were to stop seed being taken from one district to another, it would mean a big staff and I do not know whether it would pay to maintain such a big staff. Besides it would also be a hardship to the people. If the trade were to pay adequately for the staple, the cultivators might grow pure Broach. At present the lint of pure Broach gets a premium of about Rs. 30 per *khandi* over that of *goghari* mixture, whereas in my opinion it should be at least Rs. 80. Our improved strain of Broach is as pure as Navsari. If the same strain were grown at Navsari, it would give better results. Even if a pure strain of Surat were grown at Navsari, it would give better results. There is no botanical difference between Surti-Broach and our improved variety. There is a slight difference of staple for every ten miles in the Broach tract and a man will take his cotton ten miles to another station to get the mark of that station. People cart their stuff by road.

1737. The co-operative movement is strong in Khandesh but it is not so strong in Gujarat, and there is no organization at present to stop mixing. In Khandesh the people are taking very fast to co-operative organization. We have three cotton markets, seven seed societies and a number of credit societies, while in Gujarat, people do not take to co-operation so well.

1738. The area under Selection No. I-A is only about 1,500 acres. It does not spread. The people are not satisfied with the premium they get for it. They have to collect the cotton and to wait to be paid. The ginning percentage of our selection is higher, but I am not sure about the yield. On the farms, it yields a little better; but we have not tested it on cultivators' farms. The farmer does not appreciate these improvements unless he gets a higher price for his cotton. At present, he only gets seven per cent. or Rs. 11 per *bhar*

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of 924 lbs. of seed cotton more. That is not enough and there is considerable difficulty in getting even that. We have to negotiate with the firms and also to get an advance of money and hand it over to the cultivators. That means a lot of trouble and that is one reason why it is not extending. The cultivators cannot sell their cotton any day they like. They have to wait for a certain time. I think that something should be done to organize sales and to make things easy for the cultivator. We are organizing to some extent but even so we cannot get more than Rs. 11 per *bhar*. As to organization, we only appoint a man, get the cotton collected, grade it and then sell it. For the present, we are selling it to one particular merchant. We do not sell it by auction. People are not ready to come over from Bombay and bid there. So long as the firm advances money we can sell the cotton to it; the Department cannot advance so much money. Unless the cultivators get a higher price nothing can be done. That is the only remedy.

1739. Occasionally when there are no good roads and no ginneries, the people do not take their cotton direct to the factories but sell it to the petty dealers who go to them. If factories were distributed all over the district and if proper roads were made, the cultivators would probably grow still more cotton. In the Ahmadabad district there are hardly any roads and it is very difficult to cart cotton to the markets. From Traj in the Matar Taluka of the Kaira district people have to take their cotton to Ahmadabad 25 to 30 miles away.

1740. (Mr. Wadia.) Broach cotton, if grown pure, does not get a proper premium because *goghari* yields better and has a higher ginning percentage. Five years ago, there was a larger difference than now between pure Broach and pure *goghari*. In those days, Broach used to be Rs. 35 per *khandi* lower than Surat. Now Broach has got mixed with *goghari* and so it has gone down in price still lower. Instead of being Rs. 35 lower, it is now Rs. 50 lower than Surat. Instead of being Rs. 55 lower than Navsari, it is Rs. 90 lower than Navsari. If it becomes more mixed it will go down. If the cultivator is allowed to grow *goghari* and to mix it with Broach, pure Broach will disappear.

1741. As regards the complaints of mixture in the cotton supplied to the Hon'ble Mr. Purushotamdas, I may explain that I was not in charge when the seed was distributed. Seed was distributed for 1,500 acres. People may have mixed their own cotton with it. It is not unlikely that the seed may have been mixed. But what can be done with only one man? He cannot look after seven villages and be sure that the cotton is not mixed. If one cultivator mixes his cotton, that does not mean that our seed was mixed.

Mr. LALSINHEJI RAISINHEJI DESAI, Landowner, Viramgam.

EXAMINED AT AHMADABAD, FEBRUARY 7TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "*Deshi*" long staple cotton.

1742. (10) Experience.—I have resided in the Viramgam Taluka from my birth and I have been in actual touch with the cotton cultivators for the last seven years.

1743. (11) Varieties.—*Wagad* is cultivated in Viramgam Taluka and it is known as Viramgam Kadi cotton. No other variety of cotton is cultivated in this taluka.

1744. (12) Size of holdings.—Nearly fifty per cent. of land is devoted to cotton cultivation, but owing to high prices of cotton for the last two years, sixty per cent. of land was made use of in cotton cultivation and in the current year even more than sixty per cent. of land was cultivated under cotton, but heavy rain has destroyed some portion of it.

1745. (13) Yields and profits.—No other variety of cotton but *wagad* is grown in this taluka and the average product per acre is eight to ten maunds of cotton pods or two to 2½ maunds of cotton. The net profit per acre is Rs. 15 to 20.

1746. (14) Rotation and manures.—In other soil but black, for the most part *juar* is grown after cotton. Manure is rarely made use of and, where it is used, only cowdung is taken into use.

1747. (15) Conditions affecting increase in area.—If the season for the working of gins be lengthened, if *lakavi* at small rates of interest be freely given to the farmers for building new wells, if water-rates for cotton are lessened and if labour becomes less expensive than now, cotton can be cultivated more than at present.

1748. (16) Suitability of existing variety.—Some reasonable farmers grow pure *wagad* cotton, while others who use cotton seeds are unable to grow good cotton. If farmers can be persuaded to use pure *wagad* seeds, pure *wagad* cotton can be produced and by-the-by the cotton can be more long stapled. It is impossible to introduce cultivation of other superior qualities of cotton unless due water-supply is provided for.

1749. (17) Prevention of mixing of different varieties.—If pure seeds are supplied by the Government at low rates, if the farmers using pure seeds be encouraged and if ginning factories be instructed not to gin low cotton, the present mixing will be stopped.

1750. (18) Uses of seed and seed selection.—The cotton seeds are used only in feeding cattle. The pure cotton seeds are not specially selected and the cotton is not hand-ginned for seed sowing purposes.

1751. (19) General economic conditions.—In this taluka, in preparing land for cotton-growing, it is not at all cultivated in winter, but if it is twice cultivated as it should be, if in monsoons cotton fields are freed of foreign plants as many times as possible and if twelve pounds of seeds are sown per acre instead of eighteen pounds as at present, the net profit per acre would be Rs. 25 to 30 against Rs. 15 to 20 now obtained.

Mr. LALSINHEJI RAISINHEJI DESAI called and examined.

(Translation.)

1752. (Mr. Roberts.) I am a land owner and do not know anything about ginning and pressing factories. The seed rate for cotton cultivation is eighteen pounds per acre. I get my seed from the ginning factories. The cultivators buy seed from merchants on whom they can rely for pure seed. They do pay some

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attention to getting seed from reliable men. The cultivators distinguish between seed for sowing and seed for feeding cattle. But they are often cheated by merchants who charge higher rates for seed, saying that it is meant for sowing whereas, in reality, they are giving seed meant for feeding cattle. I think that there is a necessity for the supply of guaranteed seed and that if such guaranteed seed were sold even at a higher price, the cultivators would be willing to pay that price for it. They would appreciate it.

1753. There is room for improvement in the cultivation of cotton in my part of the country. Any cultivation such as ploughing or harrowing done after the harvesting of the previous crop would be beneficial to the succeeding crop. What I specially mean is harrowing just after harvest. At the present time, it is the practice only to harrow just before sowing cotton. If ploughing is done instead, it would be beneficial. I have seen cotton cultivation in Surat. The rows of cotton here are closer together and the cotton is much thicker in the rows than it is at Surat. I suppose that is due to the ignorance of the cultivators. The distance between the rows here is about sixteen inches whereas in Surat it is about two feet or more. There they have a fallow system.

1754. I have almost eight thousand acres of land. I do not cultivate the land but let it out to tenants. I sometimes cultivate small plots of land myself in order to demonstrate agricultural improvements to my tenants. At present, I am experimenting upon the distance necessary between rows. The cultivation is done on the share system except that I have given out a thousand acres on cash rents. The lands were waste lands at the beginning and so I charged a very low rate. Under the cash rent system I got Rs. 1-4-0 to Rs. 1-12 per acre. I am an *Inamdar* (holder of land on favourable tenure). I pay the assessment which is only annas two per acre.

1755. (Mr. Wadia.) If the ginning season were lengthened, the merchants would not have to store seed cotton to gin the following year as they are forced to do at present. In Viramgam, the ginowners and merchants have a regular rule that there shall be no ginning after about the middle of June.

1756. (Mr. Roberts.) An agricultural association was recently started in my district of which I am the secretary. It is for the Viramgam taluka. It was only recently started and therefore no work has yet been done. Since the formation of the association, whenever I ask for any advice from the Agricultural Department regarding cultivation or manure I always get it.

1757. Three thousand acres of my land are under cotton. The most profitable crop here is cotton. I get the rent for my cotton fields in kind. I get one-fourth or one-third of the produce as rent. I do not pay any of the picking charges. In some places the pickers are paid in cash and in some places they get paid in cotton. Some years ago they used to be paid in money but now they are being paid four annas a day and one or two lbs. of cotton bolls. This is owing to the scarcity of labour. I sell my cotton through *dalals* to *vakharaias*. They are merchants who have godowns where they pick the bolls and separate out the *kapas*. I do not sell direct to the ginning factories. Most of the ginowners here work on commission.

Rao Sahib AMBASHANKER UTTAMRAM MALJI, Landholder and Honorary Organizer of Co-operative Societies, Broach.

EXAMINED AT BROACH, FEBRUARY 11TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

1758. (1 and 10) Experience.—I am a permanent resident of Broach. I own lands in all talukas but one of the district. As such and also as a pleader and organizer of co-operative societies in the district I have been often in actual touch with cultivators. My district is principally a cotton-growing district.

1759. (2 and 11) Varieties.—‘*Bharuchi*’ real *deshi* and *goghari* principally and Surat and Cambodia by selection are grown in this district. The last two are sown in a very negligible area. The *goghari* crop is steadily increasing on account of its higher ginning percentage and superior colour.

1760. (4 and 13) Yields and profits.—Rs. 25 per acre every alternate year in Ankleswar and Wagda talukas and Rs. 50 per acre in Broach, Amod and Jambusar talukas are the annual yield, all cost being debited against the same. These costs are estimated at Rs. 12 per acre. The Wagda lands are mostly seashore and low-lying.

1761. (5 and 14) Rotations and manures.—Ordinarily cotton fields are kept fallow every alternate year. Of late, partial fallow system has grown. Where, however, these are grown every year, they are sown with *lang* (pulse) or *til* seeds. The ordinary manure for cotton fields is animal dung and urine mixed with daily sweeping refuse of the residential and cattle sheds.

1762. (6 and 13) Comparative returns.—I only know that the long staple cotton grown in the Navsari district fetches about Rs. 90 more and that grown in Surat Rs. 75 more *per khandi*. This type and Cambodia cotton grown in the Broach district are, however, sometimes sold at a discount as there are no buyers at hand and they give out ten to fifteen per cent. less outturn in ginning. The quantity grown of this type is besides not large. Cultivators are very conservative to grow new types of cotton, except as an experiment and they do this in a very small area. In the absence of a large quantity for sale, the experiment, though otherwise successful during the first year, has proved a failure when the crops have reached the marketing stage. I have, however, no experience of a repeated crop of this type in the second or following years. Ginning charges are also sometimes higher for ginning this type of cotton owing to special changes required in working the machines. The result is that the cultivators discontinue the experiment the very next year with a bad precedent to their brother cultivators and it is very difficult to induce them again to introduce another novelty thereafter.

1763. (7 and 15) Conditions affecting increase in area.—The area of short staple cotton is increasing every year and unless high prices for long staple cotton are guaranteed, short staple cotton cultivation cannot be reduced. Please see further observations in my answer to question No. 45 in paragraph 1773 *infra*.

1764. (16) Suitability of existing varieties.—I do not think it is possible in my district to introduce any quality higher than Cambodia. As noticed by Dr. Voelcker, such attempts through the Government Department have failed. I cannot say if subsequent inventions in science will favour possibilities in this behalf.

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1765. (17) Prevention of mixing of different varieties.—The question of preventing the mixing of different varieties is a very complicated one. The mixing is a huge fraud not unoften participated in by merchants and gin owners and not uncommonly even by press owners and the chief reason for it is that gin and press owners are not merely factory people but they also do a lot of business on their own account.

1766. (8 and 18) Uses of seed and seed selection.—Seeds are exported in large quantities and are also used in feeding buffaloes and kine. Selection of seed is confined to a few agriculturists. They largely depend upon the village *bania* who stores such seeds. Few get a supply direct from ginning factories. Some are careful to secure such seeds of their own cotton, ginned at the factory. Hand-ginned cotton seeds though to be preferred are heard of very rarely.

1767. (9 and 19) General economic conditions.—Broach cotton is comparatively a long staple cotton of this country and can spin 28s. to 34s. In view of the difficulties of loss in ginning, cultivators are giving up this type in spite of an apparent higher price. *Goghari* is taking its place very swiftly. To avoid this deterioration in staple the following means are suggested :—

- (1) Establishment of cotton associations.
- (2) Opening of cotton markets.
- (3) Maintaining seed farms.
- (4) Establishing co-operative ginning factories on small scales.
- (5) Establishing co-operative buying and selling agencies.
- (6) Prohibition of mixing in a factory by declaring the same to be an offence and holding the factory owner responsible for it.
- (7) Making it compulsory on all cotton merchants to enrol themselves on the association and disabling all business with non-members.
- (8) Decentralization of the *Colaba Jelha* into cities with banking facilities.
- (9) Appointment of an expert native officer by Government or by the cotton association, if that is feasible, to look after all cotton arrangements in the cotton growing districts.

II.—COMMERCIAL ASPECT.

1768. (30) Local trade customs.—The cotton crop is marketed in a manner very disadvantageous to poor cultivators, particularly where there are no co-operative societies. *Takari* is not very much availed of actually for agricultural needs and the allotments where made are really too small and hardly advanced in time. The result is that agriculturists sell from the fields at a great discount. Buyers are again middlemen financed by factory owners and they advance something like ten per cent. against agreement to sell new crop. Another custom is to sell at one's own doors through these middlemen again. In the absence of other facilities and sometimes to save both time and trouble, agriculturists prefer such selling at their own villages. These sales are also at a small discount and sometimes result in undue advantages to buyers.

1769. (32) Buying agencies.—Co-operative buying and selling societies on a large scale should be formed of cotton merchants. Buying and selling should both be done on these lines. To help genuine and honest competition against syndicate buyers, buying agencies ought to be started in the Presidency centres and without much greed of profits if they start agencies with sister societies in the *mofussil* the net work would prove a boon. The Hon'ble Mr. Keatinge has made a small beginning in this direction in the Karnatak but in my humble opinion this is not enough. The opening of cotton markets, though assisting the agriculturists in a way, would not be sufficient guarantee against a combination of buyers seeking their own profits. Many middlemen in this business have already brought the business into disrepute and these require to be eliminated.

III.—STATISTICAL.

1770. (35) Publication of Liverpool and Bombay prices.—It is desirable that these prices are authoritatively but timely published in the up-country markets.

IV.—MANUFACTURE.

(b) Spinning and weaving.

1771. (43) Counts spun and market for yarn or cloth.—30s. to 100s are spun in the Broach Industrial Cotton Spinning and Weaving Company, Limited, floated by me, and the principal market for them is in the Madras Presidency. The machinery is specially adopted to higher counts. The cotton used is Egyptian for over 40s. and Cambodia for 30s. to 40s. The fine cloth manufactured has also found Madras as a principal buyer.

1772. (44) Condition of cotton.—Cotton bales fully pressed are received almost in a sound condition.

1773. (45) Effect of replacement of short staple cotton by long staple.—If proper arrangements are made to buy long staple cotton at better prices, the agriculturists would be induced to give up short staple crop; but people of my district fully realize from ginning outturns whether proper prices are obtained. Mere higher prices on sales of long staples would not satisfy them. The prices must sufficiently compensate for the ginning losses as well. In the absence of sufficiently high prices *goghari* quality has very much taken the place of *bharuchi* cotton with much better advantages owing to better outturns and colour. The ginning percentage of *bharuchi* is 35 and of *goghari* 45 and this tells its own tale.

RAO SAHIB AMBASHANKER UTTAMRAM MALJI called and examined.

1774. (President.) I am a landholder and honorary organizer of co-operative societies. I do not do any cotton cultivation myself. I have leased out all my lands. *Goghari* is very rapidly taking the place of Broach and to remedy this I have suggested certain methods in my written evidence. The suggestions in paragraph 1767 of my written evidence are made in regard to all sorts of cotton business. *Goghari* pays the cultivator better at present on account of its better outturn and higher ginning percentage. In the long run, the agriculturists will lose but that will only be so if a better price can be obtained for Broach *deshi* cotton. I think it is largely a matter of price at present.

1775. I floated the Broach Industrial Cotton Spinning and Weaving Company, Limited. At present it is in voluntary liquidation. Hoosenbhai Ahmedbhai Habibbhai made a firm offer of eighteen lakhs with a deposit of five lakhs. The Company was started with a capital of ten lakhs paid up and as there is now

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an offer of eighteen lakhs, it is really better to liquidate it. We spin 40s to 100s from Egyptian cotton imported from Alexandria. We use American cotton too; we used to get a supply from Liverpool but on account of the cost we gave up the idea, and took to Cambodia from Tinnevely district in Madras. That suits us for 40s quite as well.

1776. If co-operative societies were started in the way I have mentioned in my written evidence, it would be much to the advantage of the cultivators; it would go a great way towards eliminating the middle men who are quite irresponsible. I refer to men who were originally agriculturists but are taking to business. They own no capital, even if rich in other ways, on account of the *bhagdari* tenure of their district under which in one *bhag* there are so many sharers and unless all of them are judgment debtors, the *bhag* cannot be sold; if they lose in business, they cannot be made responsible for the loss. Anybody can take to this business, and a number of people speculate and fail every year. They are very intelligent people but have not been properly trained as business men. If they were linked up by co-operation, they would be very good material but the business ought to be confined to the members of the co-operative association. There ought to be co-operative societies for ginning and pressing, i.e., co-operative societies to deal with the produce from the field to the factory. Different societies can take the business up piece by piece.

1777. I had no complaints in regard to the cotton that I received from Alexandria or about Cambodia except in one case. We had our agents there. We got the bales transported to Broach via Mangalore and Bombay when the British India Steam Navigation Company's boats were running. We have not so far got any cotton society in this tract though we have some credit societies.

1778. (Mr. Wadia.) We do not use *deshi* cotton. My mill only spins 40s and above. It is a mill meant only for higher counts, and it pays. I have no spinning experience of Broach, Surats, etc. We used Navsari once but then on account of certain special machinery much of the cotton could not pass through it successfully and had to be taken out as waste. That was a trial for 40s.

1779. I find that the difference between old Broach and Navsari and between Surat and Navsari is widening. I believe that in the last five years the difference in price between Broach and Navsari has gone up to twenty per cent. I am talking of the villages as a whole. Mixing is carried on on a very large scale and that is why Broach has gone down and Navsari is going up. At present the premium of Navsari over Broach is about Rs. 100 per *khandi* taking a rough figure. I attribute this to mixing. The ginners and pressers are responsible. They may be hoodwinked to a certain extent but I think they mix intentionally. They are themselves doing business and therefore it is advantageous to mix. They are the people whom I desire to eliminate. They purchase the cotton; they advance money to cultivators. They gin, press and sell themselves, in fact they manage everything themselves. They take the lion's share of the business. *Goghari* cotton has a better ginning percentage than Broach; being whiter in colour it improves the look of Broach *deshi* cotton. That is why it is used for mixing as the mixture sometimes looks better. The smaller price and better outturn of *goghari* are the two greatest factors in promoting its use for mixing. If mixing were stopped and old Broach *deshi* were put on the market separately, then it would come up in price very nearly to Surat cotton. My idea as to the prevention of mixing is this: if any mixing is done on the factory premises, it cannot ordinarily escape the notice of the manager and he should be held responsible. I think a law should be passed to stop mixing; without a law nothing can be done. The situation cannot be improved unless a definite assurance that he is getting pure cotton is held out to the buyer. I know of some cases of pure cheating. If gineries were licensed and mixing were made penal, it would assist. The condition that a license should be forfeited in the case of mixing being detected would alleviate the evil to a great extent.

1780. There is damping in the pressing factories in this district. A small percentage of damping is required by press-owners. A percentage might be fixed. I do not know why they want to be allowed to damp.

1781. Seed is sometimes exported and sometimes it is sold to cultivators but it is only a very limited number of cultivators who buy selected cotton seed. Most cultivators buy mixed seed from the village *banias* or from the gineries. They sow mixed seed and the result is mixed cotton. The whole thing requires to be overhauled from top to bottom. The use of mixed seed tends to deteriorate the crop year after year. The fact is that the agriculturists require to be trained in agriculture. I do not say that they do not know anything but I maintain that now-a-days they do not care as much as they used to do about the selection of seed or about its germinating capacity. What is wanted is that the dignity of self labour should be brought in agricultural schools. As it is, most of the cultivators are not punctual in their work, they frequent courts and hotels and agriculture is more and more passing into the hands of the *Bhils*. Manual labour must be taught in the schools and more agricultural colleges and schools must be opened. Vernacular courses in agriculture should be prescribed in the rural schools. There should be short vernacular courses of six months in the Agricultural Colleges as I understand there are in the Punjab. Otherwise the Government assessment will suffer in the long run as the land will not be giving such good returns as at present. When the agriculturists know nothing about rotations, diseases of plants and animals and the like, the Government assessment is bound to be in danger. It would be a good thing to have societies on the lines of Mr. Itgi's society at Dharwar. The Agricultural Department must undertake the distribution of proper seed. The growth of long staple cotton would be a success provided there were proper buying facilities. In the gineries, changes have to be made in the knives and rollers to gin the better cottons. If no extra price is paid for the better cotton, the extra cost of ginning is a serious matter.

1782. As regards the suggestion in my written evidence that the Colaba *Jetha* should be decentralized, I would explain that at present there are no banking facilities in up country towns. No advances can be obtained against full-pressed bales—even from the Bank of Bombay. The result is that all the bales as soon as they are ready, even those of factory owners, are naturally sent to Bombay in order to get funds against them. The cotton is stored in the Colaba *Jetha* and is sent back again upcountry as it is required.

1783. The Government assessment falls due in the early part of the cotton season. Personally I do not think that Government should be at all apprehensive in regard to their assessment. They have got ample securities and safeguards for its recovery. At present, the buyers take advantage of the fact that the cultivators have to sell at a cheaper rate in order to pay the instalments of land revenue. The cotton is sold and the bales go to Bombay. If some banking facilities for obtaining money against the cotton were provided, the cultivators would not be compelled to sell their cotton to the factory owners, for excepting the factory owners to them, there are no exporters of cotton to Bombay. They could keep it up until the price improved. The Government assessment is recovered between February and April. The Commissioner has authority to change the time of the assessment under the Land Revenue Code. The same date is usually fixed every year though sometimes it is changed. I would make the dates about a month later, that is April and May.

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By banking facilities, I do not mean necessarily co-operative banks, as they cannot undertake a very large business. The Bombay Bank should give some facilities under which money could be advanced to the local mills here.

1784. At present the Director of Agriculture and his staff look after the agricultural part, I mean the raising of crops and the condition of crops. The staff of the Department is not sufficient. Each cotton growing district and there are not very many of them, requires separate assistance until cotton growing associations can be formed locally. Till then, the Department may have to look after the condition of the crop from time to time. I want Indian officers for the subordinate staff of the Agricultural Department to be of use to the people, but, of course, the highest officer at the top might be an European. I do not object to the control of European officers but, for the subordinate staff, I want men who can talk with the people and who must therefore be from among the people otherwise the difficulties in regard to language and understanding the people will continue.

1785. The ginners and middlemen advance money to the cultivators. They buy the standing crop. Payment is made according to the outturn. It is only the rate that is fixed. The merchants fix a low enough rate when they advance the money to prevent their losing. The cultivators have to sell because they are badly in need of money.

1786. I have not worked out what should be the difference in price between Broach and *goghari* which would induce the cultivator to grow Broach again. There is no ready cotton for sale at present. *Goghari* is now looked upon as Broach and is passed as Broach cotton. The price of Broach in Bombay yesterday was Rs. 639 per *khandi* of 784 lbs. That is Bombay weight. Here it changed hands at a price of Rs. 707 per *khandi* of 884 lbs. That is the price of the Broach cotton, which is now growing and which will have to be delivered as soon as the crop is ready. The difference between Broach and Navsari would be between Rs. 90 and Rs. 100. The difference between Navsari and Surat would be Rs. 75.

1787. (Mr. Hodgkinson.) The complaint of the deterioration of Broach cotton is a very old one; even in Dr. Voelcker's report, there is something about it. Even in the Navsari tract, *goghari* is now growing. Things are getting worse every year. Mixing is the chief cause of deterioration though there are other points as well. There is no proper selection of seed and no proper care is taken in the fields. Picking is not properly done. Unripe bolls are picked with the ripe ones. There are ordinarily two pickings during season months. The buyers of seed cotton are not interested in long staple cotton. I mean the local buyers. Unless long staple cotton goes direct to the spinner, it does not go separately to Bombay. The difficulty is that the long and short staple cotton do not go separately to Bombay. If arrangements were made to send them separately to Bombay and they were purchased there at their proper price, then the area under long staple cotton would increase. I should not be afraid that the trade would not give a proper price for long staple cotton in Bombay: there are mills there which spin the finer counts and they would interest themselves in buying it. In fact when working my mill, I bought once as much Cambodia and Egyptian cotton from the Government farms as I could possibly get both from Sind and other places even in the Central Provinces in order to spin higher counts. I found that I got it cheaper than cotton from Tinnevely. Dholleras cotton spins up to 30s, 32s and 33s. It can sometimes go up to 34s. Pure Navsari spins up to 40s. Broach cotton, without any mixing would spin up to 34s. Mixed with *goghari*, as it is at present, it can spin up to 32s.

1788. Cambodia has been grown in this district, but owing to failures the experiments were not repeated. The failure was due to want of proper prices and to want of buyers of this type of cotton. The cotton itself was a success. My friend Mr. Chimanlal grows it in his village of Tham. I bought it at a lower price than Tinnevely cotton. If satisfactory prices could be obtained, Cambodia could be grown here. There is no irrigation here. Cambodia does not require much moisture. It is only with pure American types that irrigation is required. There is no special manuring done here except in a very few tracts where they use artificial manures.

1789. (Mr. Roberts.) It would certainly be of use to us if we had cotton markets here provided the buyers were held responsible in their own lines. Otherwise it would be very easy for them to form a combination and buy up the lot. Irresponsible people must be kept away. A good deal of the cotton is purchased at the cultivator's own door by the agents of the merchants. In such cases, the price is very much under the proper price. If markets were established, the cultivators would bring the cotton to the market but at the same time it must be remembered that they are not used to this sort of thing for the reason that it means a lot of trouble to remove the cotton from the village to the market. That requires animals and servants must be kept engaged for the purpose. If they find that by going to the city they have to incur additional cost, they will continue to sell at their own door. The mills do not buy very much cotton direct from the cultivators. It is the ginners who mostly buy in this way. Several of them go to the houses of the cultivators. That must affect the price. Some of these ginners have their own villages marked out separately in which they alone do business and no one else can compete with them. They have got their own *clientele* and have a kind of monopoly. Cotton markets would not do away with that entirely but would help the cultivator to secure a fair price. At present prices it is more profitable to grow short staple cotton. The financial aspect is that to which the agriculturists look and they cannot be blamed for that. But if they were given better prices for the long staple, the reputation of the cotton could be maintained and at the same time its growth encouraged. But a great deal higher premium would be required than at present.

Mr. BHIMBHAI MORARJI DESAI, Divisional Superintendent of Agriculture, Northern Division, Surat.

EXAMINED AT BROACH, FEBRUARY 11TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

1790. (1) Experience.—I have been stationed at Surat first as Superintendent, Surat Farm, for a period of nearly eleven years and then a Divisional Inspector of Agriculture for the whole of the Northern Division

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and the two districts of Khandesh (for about two years). In the interval of my Superintendentship of the Surat Farm, I was transferred temporarily for eleven months and four months in the Punjab and Sind respectively on special duty. I have been in actual touch with the cotton cultivators for the last twenty-one years.

(2) As the two districts of Khandesh are not in my charge now and as I have nothing to do with Sind and the Punjab now, I am giving information only for Gujarat.

1791. (2) **Varieties.**—*Mathio* is a short staple variety similar to the *neglectum* type of Khandesh cottons. It is a mixture of yellow and white flowered cotton. It is grown to a large extent only in two *talukas* of the Ahmadabad District, viz., Dhandhuka and Gogha, and to a very large extent in the Native States of Kathiawar. Of late, the Khandesh cotton is being introduced by the Department in the Eastern Mahals of the Panch Mahals District, where no cotton was grown up till now through fear of the late varieties being killed by frost.

1792. (3) **Size of holdings.**—The average size of holding in the Dhandhuka *talukas* is 22 acres and 2 *guathas* of which forty per cent. is under cotton.

1793. (4) **Yields and profits.**—The average yield of *mathio* is from 320 to 360 lbs. of seed cotton per acre and the average gross income comes to between Rs. 28 to Rs. 32 in ordinary years and with the present enhanced prices it comes to between Rs. 56 to Rs. 63. But, if there are water facilities, the crop is allowed to stand as ratoon and is given three to four waterings and the second harvest is taken in April-May. These two combined will yield up to 480 lbs. of seed cotton per acre which in ordinary years will fetch Rs. 42 and with the present high prices, Rs. 84.

1794. (5) **Rotations and manures.**—The general rotations after cotton are either *juar*, *bajra* or a pulse crop of either *moth* or *mung*. Cotton is not manured but when irrigated wheat is taken after *juar* or *bajra*, farmyard manure is generally given to wheat to the extent of about fifteen to twenty carts per acre. This is only to a very small cotton area with water facilities. The other area very rarely gets any manure as cow-dung is generally used as fuel.

1795. (6) **Comparative returns.**—The difference between the return of *mathio* and that of *wagad* and *lathio* is as under :—

Variety.	Yield of seed cotton per acre.	Rate per maund of seed cotton present prices.	Value of gross produce.
		Rs. a. p.	
<i>Mathio</i>	320 to 360 lbs.	7 0 0	Rs. 56 to 63
<i>Wagad</i>	320 to 360 lbs.	9 8 0	Rs. 76 to 85-8-0
<i>Lathio</i>	360 to 400 lbs.	9 0 0	Rs. 81 to 90

N.B.—The short staple variety is generally grown on very poor and shallow soils which do not reserve enough moisture to mature the late varieties and hence the yield per acre of *mathio* is comparatively low.

(2) The difference between returns of cotton and other crops is shown below :—

Crops	Gross value at present prices.
	Rs. a. p.
<i>Juar</i> (irrigated)	80 0 0 59 8 0
Wheat (unirrigated)	59 0 0
<i>Bajra</i>	45 0 0

(3) There are no exotics to be compared with.

1796. (7) **Condition affecting increase in area.**—The area under *deshi* short staple cotton does not fluctuate to any considerable extent except under the following conditions :—On account of the uncertainty of the rains people go in for an earlier maturing variety rather than risk a failure or a partial failure with the late varieties and hence the area under short staple cotton increases after a year of scant rainfall and vice versa.

(2) The possibilities of an increase under the *deshi* short staple cotton in addition to the above are —

- Inducements given to cultivators by ginners by giving little higher prices in order to secure high ginning of short staple cottons and then mixing them with long staple ones in order to enhance their profits.
- Indiscriminate paying by the trade for good and bad qualities.
- Early maturity of short staple cottons brings in money to cultivators when most needed by them for other agricultural purposes.

The factors which would limit the above increase are—

- Stopping of adulteration either by legislation or by trade, by either giving the best prices according to quality or making out ginners and traders, who mix cottons in a special publication yearly from the Chambers or any such body.
- The cultivators should be taught better methods of cultivation and manuring so as to avoid any fears of losing the crop even though the late rains fail or they be scanty by preparing soils in such a way that they conserve more moisture for a longer period.
- The want of money to needy cultivators may be remedied by either co-operative societies or by agricultural banks.

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1797. (8) **Uses of seed and seed selection.**—The cotton seed is used for the three purposes :—

- Seed used as seed for sowing.
- Seed used as cattle feed.
- Seed either crushed in the country for extracting oil or exported to other countries.

(2) No seed selection is practised. Seed for sowing is always purchased either from gineries or from merchants. The seed is not hand-ginned but, in very rare cases, very careful cultivators take seed cotton of the first or second picking separately in the gineries and get it ginned there.

(b) "*Deshi*" long staple cotton.

1798. (11) **Varieties.**—The following varieties of *deshi* long staple cottons are grown in Gujarat :—

- The higher class of *herbaceum* cotton known as Navsari and Surtee (Surat). This is the finest type grown in the southern *talukas* of the Surat District and the intervening Baroda territory.
- Broach deshi*.—This is grown between Broach and Itola extending east to Chanded in the black soil tract known as *kanam*. This was some fifty years back the fine Broach of the tract. Of late the variety is being mixed up with *goghari*, a rougher and shorter staple cotton of *herbaceum* type, and now the mixture has gone up to between forty to sixty per cent.
- Kanvi*.—This is similar to the above and is grown in Dabhoi, Sankheda and in parts of Chota Udepur State. This variety is now being introduced into the newly opened tracts of Thasra, Kapadvanj, Matar, Mehemabad and the western *talukas* of the Panch Mahals District.
- Goghari*.—This is grown mostly pure in Jambusar and Amod *talukas* of the Broach District. It succeeds better on either *goradu* or *besar* soils but does not do well on deep black retentive soils. It is a coarser variety of the *herbaceum* type. The cotton has a white colour with short, brittle and weak staple; but has a high ginning percentage.
- Rozii*.—This is grown now-a-days on a very small scale in parts of Kaira and Ahmadabad Districts as a subordinate crop with other cereals. Though this is a long staple cotton, on account of its being picked at short intervals, the fibre is brittle and the cotton dirty. The ginning percentage is also low. It is generally mixed with other cottons and sold in the market.
- Lathio*.—This is similar to Broach cotton grown on sandy loams with or without irrigation and also on sweet black soils in parts of Ahmadabad and Kaira Districts. The percentage of *goghari* mixture varies.
- Wagad*.—This is very largely grown in Ahmadabad District and in Kathiawar. It is grown on slightly saltish loamy or black soils and the best variety from Kathiawar is valued equal to that of good Broach. It is a hardier variety than *lathio* and thrives well even with less rainfall. In parts where there are many thefts committed, this variety is specially grown as the thieves cannot find the cotton in the fields on account of its closed bolls.

1799. (12) **Size of holdings.**—The following details show the average size of holdings and the percentage of the holdings under cotton in the three principal cotton growing districts of Gujarat : (a) Surat, (b) Broach, and (c) Ahmadabad :—

District.	Taluka.	Size of holding.	Percentage of the holding under cotton.
		acres-guntas	
Surat	Chorashi	6 9	28
Do.	Olpad	8 7	32
Do.	Bardoli	8 7	28
Do.	Jalalpur	6 2	19
Do.	Chikhli	10 9	9
Do.	Mandvi	9 5	16
Broach	Broach	13 2	48
Do.	Ankleswar	9 9	44
Do.	Vagra	16 7	33
Do.	Amod	18 5	49
Do.	Jambusar	10 6	55
Ahmadabad	Daskroi	7 0	11
Do.	Sanand	11 4	25
Do.	Viramgam	21 1	58
Do.	Dholka	10 9	39
Do.	Dhandhuka	22 2	40

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1800. (13) **Yields and profits and comparative returns.**—The average yields and gross income of different varieties of cotton are given below :—

Name of variety of Cotton.	Average yield of seed cotton per acre.	Gross income per acre.	REMARKS.
	Ls.	Rs. a. p.	
Navsari	360	103 8 0	
Surtee	360	99 0 0	
Broach <i>deshi</i>	400	97 0 0	
Kanvi	400	85 0 0	
Goghari	400	85 0 0	
Rozi	150	27 0 0	With other crops.
Lalio	400	90 0 0	
Wagad	360	85 8 0	

(2) *Goghari* as such is not sold in the bazaar and there are no quotations for it; but it is sold as mixed with *Broach deshi*. If the trade differentiates between these and quotes rates for a mixture of over sixty per cent. as for pure *goghari*, which will not exceed the *Khandeshi*, it is possible that the cultivators will begin to find their own mistake in mixing up the two varieties.

(3) Comparative outturns of other crops of the rotation compared.

Name of district.	Crop.	Gross income.
		Rs a. p.
Surat	Cotton	99 0 0
	Juar with pulses	78 4 0
Broach	Cotton	97 0 0
	Juar	76 4 0
	Wheat	55 0 0
Ahmadabad	Cotton—	
	Wagad	85 8 0
	Lalio	90 0 0
	Mathio	63 0 0
	Juar	60 0 0
	Bajra	45 0 0
	Wheat—	
	Irrigated	59 8 0
	Unirrigated	50 0 0
Kaira	Cotton	85 0 0
	Cereals and mixture	67 8 0

1801. (14) **Rotations and manures.**—*Surat District.*—In the cotton growing tract of this district except the Olpad *taluka* where *juar* or wheat are rotated with cotton, the general rotation is cotton and *juar* in alternate years with rarely a third year rotation of *til* and *tur*. On account of the recent abnormal increase in the prices of cotton, in some cases, cotton after cotton is taken without observing any rotation. Farmyard manure to the extent of fifteen cart-loads per acre is applied once in five years or so. In cases where the manure is required for rice areas or garden lands, the dry crop area under cotton and *juar* practically receives no manure for a very long time. Of late people of Bardoli Taluka and parts of Jalalpur have begun to grow *san* as a green manure crop along with their cotton with promising results.

(2) *Broach District.*—In this district wheat, *rabi juar* or *lang* are generally rotated with cotton in good soils and wheat with cotton in saltish coast lands. No rotation is followed in partial fallow system. Farmyard manure is scarce in the district and is only applied to fields near the village sites.

(3) *Kaira and Panch Mahals.*—In the newly opened tracts of Kaira and Panch Mahals, either no rotation is practised or cotton is continuously grown in partial fallow systems. In parts of Kaira, viz., Mehemadabad, Nadiad and Anand, cotton is grown in rotation with garden crops. In this case, the other crops get farmyard manure but in the former case no manure is applied.

(4) *Ahmadabad District.*—In this district cotton is rotated with *juar* or wheat on heavier soils and with *bajra* on lighter soils. Farmyard manure to the extent of ten to fifteen cart-loads per acre is applied once in four to five years.

1802. (15) **Conditions affecting increase in area.**—The special conditions which would affect any increase in the area under *deshi* long staple cottons are :—

(i) An increase in the prices of cotton will bring about a corresponding increase in area subject to the corresponding prices of food crops.

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- (ii) Favourableness or otherwise of the season, e.g., favourable early rains increase the area under cotton and *vice versa*, so also good and bad opening of cotton is dependent on weather conditions or scant rainfall towards the closing of the rains.
- (iii) By training public opinion as to the future advantages of growing long staple cotton where it could be successfully grown and training the cultivators similarly.
- (iv) Advising cultivators to keep their own seed as safety against the merchants and ginners trying to gin seed of inferior varieties, which would ultimately give them cotton of higher ginning though of inferior quality.
- (v) Giving special encouragements by way of giving prices and other concessions for growing long staple cottons where short staple is being grown.
- (vi) *Broach deshi, wagad or lalio* could be grown in the whole of Gujarat in places where *mathio* or *goghari* or *Khandeshi* are now being grown and the area under them could be increased if the ginning season is lengthened or irrigation facilities are given wherever possible, e.g., North Gujarat (Charotar), Panch Mahals, etc. It could also be increased in parts by teaching the cultivators the better methods of cultivation of cotton without observing rotations with other crops, e.g., strip cultivation as practised in Broach; square sowing; sowing cotton with rice where there is too much moisture; giving facilities for draining areas which are water-logged or which reserve more than necessary moisture, e.g., in Olpad, Hansot, Bhal, Chikhli, Wagra and parts of Broach Taluka.
- (vii) Lastly, if facilities are given in the way of securing or maintaining labour which cultivators have already secured by their own means and which is getting scarce and dear day by day.

(2) With all these above suggestions, I venture to suggest that the best means of increasing the cotton outturn will be by increasing the general cotton yield of the cotton growing tract by better methods of cultivation and easy and cheap manuring as any increase in the cotton area is likely to decrease the area under food and fodder crops and the consequent increase in their prices will bring the profits of the cultivators to the same level as those of cotton or in some cases of careful cultivators even more than the cotton returns.

1803. (16) **Suitability of existing Varieties.**—The varieties of *deshi* long staple cotton grown in the different districts of Gujarat are suitable to the localities according to their soils and climatic conditions. The only thing required is anyhow to stop the pure varieties of Surtee Broach, Broach *deshi*, *lalio* and *wagad* being mixed with the inferior varieties of *goghari* or *mathio*.

(2) As for the introduction of superior types, it may be said that it is possible either by crossing or by selection to produce a superior type for each district as is done for the Surat District on the Government Experimental Farm, Surat. Three superior varieties (two crosses and a selection) have been established for a long time and are being introduced in the surrounding villages of the Farm for the last eight years. Cross 1027 A.L.F. is even superior to fine Navsari and could be introduced in the whole tract. I have been distributing the seed of these varieties but from my personal experience it may be said that, unless Government intervenes and authorises the Revenue and Agricultural Departments to get the seed of a particular proved variety sown by the cultivators of the tract, i.e. (Surat and Broach), it will not be possible to push superior types on a larger scale in a short period. As for Northern Gujarat, either the local varieties have to be similarly improved or if water facilities are provided for, it is possible to introduce the above types or even the American types grown in the Punjab.

1804. (17) **Prevention of mixing of different varieties.**—In order to prevent the mixing of *deshi* long staple cotton with *deshi* short staple cotton in the field—

- (i) It is but necessary to provide cultivators with pure seed of *deshi* long staple cotton by opening seed stores at convenient centres till the cultivators are trained to select and separately gin their own seed.
- (ii) If the above is not possible, to arrange with certain gin-owners to secure seed of particular pure varieties and give the same to the cultivators for seed purposes on special terms under licenses.
- (iii) By resorting to legislation for prohibiting the import of seed cotton or seed from one tract to another as the mixing of *goghari* cannot be detected from *deshi* in the field till the plants begin to boll and open, otherwise other *neglectum* varieties or exotics could be detected and removed by the cultivators at the time of thinning.

(2) To prevent mixing of superior with inferior varieties in the factory it is but necessary to have legislation or, if that is not desirable, the Trade, specially the Chambers of Commerce, should mark out and publish annually the names of such factories and persons who mix them.

1805. **General notes regarding the economic and other conditions of the cotton growing tracts.**—The economic condition of the cultivators of the cotton growing tracts of Surat, Broach and Kaira Districts has greatly improved during the last ten years due to high prices of cotton and other agricultural products. But it is not so in the Panch Mahals or in parts of Ahmadabad District where there are many *Talukdari* villages and the system of assessment is different.

(2) In the cotton growing tracts of Surat, Broach and Ahmadabad and parts of Kaira, cultivators are not able to keep many cattle and the supply of manure is inadequate as cow-dung is used as fuel in several places. If by some means fodder and fuel may be made easily available to these people, the general improvement in cultivation could be easily effected.

(3) The cultivators of these cotton tracts have not got full time work and if some house industries be introduced, it will help much to improve their conditions and consequently their agriculture.

(4) Cultivators have to resort to forward (*jalap*) sales for two reasons : (1) for securing money when most needed before the crop matures. In so doing for a small gain in money they lose from Rs. 20 to Rs. 30 per *bhar* (*bhar*—924 lbs.) of seed cotton and even more in Dholka and Dhandhuka and Viramgam *talukas* of Ahmadabad and in the Panch Mahals.

(2) During the last two or three years cultivators are selling their produce by forward sales (*jalap*) through fear of the market falling down at harvest time. In this case too, they lose the same amount. This system could be checked by organising sales through co-operative societies or through cotton sales societies, or by other means, which organisations might advance the money if required by the cultivators or arrange to secure the real market rates in advance sales.

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(5) The cultivators of Surat and Broach know well except in the above cases how best to dispose of their produce but in Ahmadabad and the other backward parts, the *dalals* or *aratyas* eat away the profits of the cultivators. It is necessary to introduce organised sales there.

(6) Gin-owners and press-owners should not be allowed to form combination as Rs. 5 per *pakka* bale is lost to the growers by the formation of these combinations.

(7) That Government may keep inspectors or any local officers to inspect the weigh-bridges to see that they are correct as cultivators do not understand the mechanism.

(8) As far as the past history of cotton is concerned, it seems desirable to improve the plant by careful study of its history, habit, good cultivation, selection and cross breeding instead of trying to improve it by importing exotics.

(9) If special strains are secured by any of the methods suggested above, they should be propagated on either the seed farms or through agency of seed growers and distributed in the locality.

(10) In order to do the above, each cotton growing tract should have a seed farm for the study of that particular variety and the production of improved seed.

(11) The local authorities may be authorised to entertain the necessary staff.

(12) Buying agencies should be licensed and the licenses taken away if it is found by a committee of merchants with one or two officers of the Department that the buyer has made fraudulent transactions; or that Government aided and supervised special agencies be started as stated above.

(13) The ginning factories are superfluous and irregularly situated. The Collector or the committee suggested above may be empowered to check or stop the erection of factories at undesirable places or where they are already superfluous.

Mr. BHIMBHAI MORARJI DESAI called and examined.

1806. (President.) I have 21 years' service in the Agricultural Department. I was employed in the Agricultural Department from the very beginning immediately after graduating in the diploma course at Poona. At first I was a clerk on the Surat Farm, then a Farm Superintendent and then a Divisional Inspector. I am at present Divisional Superintendent, Northern Division. My charge consists of the Northern Division excepting the Thana District. I have five districts, Surat, Broach, Ahmadabad, Kaira and Panch Mahals. The total cultivated area amounts to about fifty lakhs of acres. As a Divisional Inspector, I have to inspect the farms in my Division. There are three farms at Surat, Dahod and Nadiad. There are also smaller plots for special experiments and for demonstration purposes. The bigger farms are looked after by the Deputy-Director. I am entirely responsible for the smaller plots. There are two of these: one at Broach and the other at Amalsad in the Surat District. In addition to this, I have to give advice to the cultivators or big land-owners whenever they ask for it. I go to the Native States whenever I am asked to do so. I have also to manage all the Agricultural shows, demonstrations and exhibitions and also to exercise general supervision over the district agricultural overseers of whom there are five, one for each district.

1807. The principal crops of my tracts differ according to the district. In Surat they are cotton and *juar*, in Broach they are mainly cotton, *juar*, wheat and *lang*, a pulse crop which comes into the rotations as a fodder crop. In Kaira district, they are tobacco, *tur*, *kodra*, *bajra* and other millets. Irrigated wheat is also grown as a *rabi* crop. Cotton has only recently been introduced. In Panch Mahals, the principal crops are wheat, gram and rice; cotton is also a recent introduction in that district. In Ahmadabad cotton, *juar*, *bajra*, rice, wheat and pulses are the principal crops.

1808. As regards cotton, the whole tract is in my charge. My main work is on cotton. If attempts are made to introduce it anywhere, I give help by lending a trained man or by lending the cultivators' implements. Cotton was recently introduced into the Prantaj Taluka. The cultivators were given the services of a trained man for two seasons and were also lent implements. For the last four years, I have been pushing the local cottons, *lallo* and *kanvi*, and selections are being made. Selection work is going on at Surat on Surat and Broach *deshi* and on *goghari* at Broach. During my 21 years of service, I have noticed a little deterioration in the staple of Broach which I attribute to scantiness of rainfall. *Goghari* and Broach *deshi* are generally equal in yield. Taking into consideration the ginning percentage and the present price, I have arrived at the conclusion that the gross income from *goghari* is Rs. 85 per acre and that from Broach *deshi* is Rs. 97. According to my calculations, *goghari* is a little below Broach *deshi*. If the figures are correct, there is no justification for trying to push *goghari*. I have taken 35 as the ginning percentage of *goghari* as that is the percentage of *goghari* in a factory. On the basis of our small samples, it may be 40 or 45 but when taken on a very large scale, we do not get that ginning percentage and 35 is the correct percentage. The ginning percentage of Broach *deshi* is 31 to 32 as reported by the ginners. In our small samples, it goes up to 34 as against 40 to 45 for *goghari*. The cultivator has got it into his head that the ginning percentage of *goghari* is very good and that it yields better than Broach. I think that is a wrong impression. We have seen on the plots we had that it does not yield better than Broach *deshi*. Three years' figures for the experiments on the Broach farm show that the average difference between *goghari* and Broach *deshi* is only about ten or fifteen pounds per acre in favour of the former.

1809. As regards the best cottons to be pushed in the different districts, I do not believe in *malhio*; it was introduced with the famine in one or two *talukas* here and over the greater part of Kathiawar owing to the scanty rainfall after the famine of 1900. Otherwise, the cottons growing in the different districts are the most suitable for them. Broach *deshi* is the best suited for Surat and Broach, *lallo* for Kaira, part of Panch Mahals and part of Ahmadabad and *wagad* for the rest of the Ahmadabad district. I do not differentiate between *kanvi* and *lallo*. All these cottons have been separated out by Mr. Gammie. Amongst these types, there has not been much work in regard to selection and purification. I think much scientific work is still required in Gujarat because it is very difficult to sort out these different types. Until the bolls open, we cannot make out which is which.

1810. (Mr. Roberts.) Cotton is by far the most important crop that I have to deal with. *Lallo* is a separate variety, similar but a little superior to *goghari*. There is a great deal of difference between the staple and quality of the lint of Broach *deshi* and *lallo*. Broach *deshi* likes heavy soils whereas *lallo* likes light soils. *Lallo* is a pure variety but it is a different type from Broach *deshi* altogether. My general conclusion is that these pure types, viz., Broach *deshi*, *wagad* and *lallo*, should be kept as the main varieties in Gujarat because

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if we wanted to introduce one variety throughout the whole of Gujarat, it would fail. Broach *deshi* would not suit the northern portion, say the Viramgam, Ahmadabad or Kaira tracts.

1811. The *deshi* cotton may be improved either by selection or by crossing from Broach up to Navsari. We tried, in 1911, to distribute pure seed of the improved Surat varieties in all the *talukas* of the Broach district simply to see whether it would suit the climate or not and whether there was any difference between the local Broach and our improved seed. It was given out to selected cultivators. As regards the actual outturn, of *kapas*, there was no complaint. But when selling the crop there was trouble, as it was found that there had been a big change. The ginning percentage was lower than that of the Broach mixture and no ginner was willing to pay so high a price for it. The cultivators on the contrary wanted to get compensation from the Department. Since then we have dropped this idea and we have started a plot at Broach with the idea of improving the strain and the ginning percentage on the same lines as at Surat. Experience has shown that it is very difficult to introduce a good quality combined with a low ginning percentage. We are still going on with this improved variety in Surat. I have been distributing seed since 1907-08. I have been distributing three varieties; they are all being distributed according to instructions from the Deputy Director and they have been kept up until now. In 1907-08, 446 lbs. of improved seed were distributed. In 1911-12, 11,452 acres were grown with improved seed. Three varieties were grown: 1018 P. G., 1027 A.L.F. and selected Broach, that is selection I.A. These were distributed in separate groups of villages. In 1912-13, 17,945 acres were grown, again with the same three varieties. That was the largest area sown with improved seed. That was the year in which there was trouble with the Syndicate and it closed down its operations. In 1913-14, we distributed the seed without any condition and without any promise in regard to obtaining any premium for the cultivators but we arranged to sell their produce for them. In that year we got 3,640 acres. Three varieties were again distributed and arrangements were made with two gin owners who offered to pay them Rs. 3 or Rs. 4 premium per *bhar* of 924 lbs. That arrangement failed because the buyers in Bombay and Ahmadabad wanted a certificate from me that the variety was pure. So the cultivators were disappointed as they could not realise any extra profit from their crop. From 1914-15 I tried a different arrangement altogether which is being continued up till now. In that year, I tried to form a group of six or seven villages and the cultivators in each village selected one or two persons as the members of a Committee with myself as Chairman to supervise all the work from the distribution of seed until the cotton was marketed. In 1914-15 we have had 559 acres. In 1915-16, we had 1,504 acres; in 1916-17, 897 acres and this year, we have 1,200 acres. This year mostly one variety was given out; selection I.A. There was not enough seed for all the villages. We are eventually going to give out one variety only but the buyer did not object to getting cotton of three varieties. He mixes the whole lot and grades it according to his requirements. The buyer is the Hon'ble Mr. Purshottamdas Thakurdas. He has been buying since 1913-14 and the premium realised is Rs. 10½ more per *bhar* of 924 lbs. The premium differs every season but last season it was Rs. 10½ per *bhar* of seed cotton. At the high rates now prevailing, the premium represents only 1½ or 2 per cent. but it used to come to about seven per cent. The price per *bhar* is now Rs. 275 at Surat. The ginning percentage of our cotton is about two per cent. higher than that of Surat *deshi*. The premium of Rs. 10½ includes the higher ginning percentage and the higher quality. The premium works out at Rs. 12 per *khandi* (= 798 lbs.) of cleaned cotton. The true value would be about Rs. 30 more per *khandi*. We are not getting the full value but still the present premium gives us two per cent. more. We cannot increase the area under this cotton more rapidly because it requires more staff and there are other difficulties. The system can only work if the cultivators are financed. The whole crop has to be ginned and that is against their instinct. If seed cotton (*kapas*) were sold, there would be the same trouble as there was with the Bombay Syndicate in regard to fixing the standard rate. I have heard no complaint from the cultivators that our improved cotton yields less than the ordinary Surat. On all our cottons there is no loss in yield. On the contrary, 1018 P. G. is very much valued by the cultivators as it opens better. The whole difficulty is one of price. If I could get Rs. 20 more per *bhar*, I think the cultivators would run to get seed. They do not care about a small premium. To get this they have to come under our control and inspection and sell at our convenience, and that they object to. Unless the premium is sufficiently big, it is difficult to push things forward. What I mean is that the ordinary day's difference in price may be as big as my premium. The cultivators know that and so they do not trouble about the small difference. The trade ought to give us the actual value. As soon as the cotton goes to the ginning factory, the first two pickings of a particular village are kept in separate heaps in the ginning yard. That is quite enough for our seed purposes. When the ginning factory begins to work, I and two of my clerks or fieldmen go there and get all the gins cleaned and any seed left from ordinary ginning removed. Our selected cotton is then ginned. The seed is taken back to the farm to be stored there for the ensuing season. As soon as the rains approach, I get a list of all the growers in the villages, by sending a fieldman round. As far as possible, the whole village grows our improved seed so that there is no fear of mixing. I keep something like one fourth of the quantity of seed in reserve for second sowings if there are abnormal rains and second sowing has to be resorted to. In that case, I give the seed to those who require it. As soon as the crop is established, my fieldman goes round and inspects every field. He enters in the remarks column of his list that the crop is in such and such condition. I go and check things myself at the time of flowering and bolting. I can check if there is any fraudulent mixing by bringing in fresh cotton from other places. In order to act as a safeguard from any frauds on the part of the cultivators, all growers of the cotton have been asked to report to me anything in the form of mixing or adulteration that may take place in their villages because each individual has a particular interest in it. For instance, if any one tries to bring in *deshi*, i.e., Surat *deshi* cotton which has got a low ginning percentage, each member will suffer to a certain extent. Therefore they inform me about any attempts to mix the cotton. As soon as the crop is ready, they communicate with me in regard to arrangements for sale. I sold 51 *khandis* to Hon'ble Mr. Purshottamdas in November last when the market was rising. When making contracts with the cultivators I roughly estimated their yield generally as eighty lbs. of seed cotton to the acre. The cultivators are selling forward at present for fear of losing the price. In an ordinary season they keep to their contracts with Mr. Purshottamdas as Thakurdas' agent. I distribute the amount realized from the cotton to the cultivators according to the quantity they bring in. I do this three or four times in the season. I am assisted by one clerk who is a fieldman and one peon. The clerk has to keep all the accounts, to go round the villages, if there is any necessity for doing so, and to assist me at the time of ginning. The villages are close together within a radius of five miles. I had formed another group but I got ill at that time; those people wanted some money and they did not get it in time and so the group broke up but I intend to form it again this year. It is a slow process; my contention is that if it were proved beyond doubt that the quality was good; and if there were no deficiency in the yield per acre and if Government or the revenue people were to

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help us a little, we could push forward much faster. There is no doubt that the crop pays the cultivator better. I charge one or two annas more per *kachha* maund of forty pounds for seed. I did not suffer any loss by the sale of seed : on the contrary I made Rs. 30 to Rs. 40. We deduct the carting charge and the charge for picking. I charge equal rates for carting and picking to all the cultivators. If heavy rates were charged, the cultivators would sow ordinary Broach cotton. I do not charge the cultivators anything for the fieldman, for my assistance or even for the peon. But in case some more associations are formed, the cultivators would then have to be trained, as they do not know the cotton business themselves, e.g., in regard to the time at which they should sell and several other things. One man is quite enough to guide them and they could keep their own secretary say on Rs. 20 a month. They could get an educated man if they got about Rs. 20 more from the trades people. I am prepared to hand over the work to the Co-operative Department if it would take over the management and to give any assistance. This year Mr. Ewbank, Registrar of Co-operative Credit Societies, has started co-operative sale societies and I am trying to supply him with seed. Mr. Purushottamdas requires a guarantee that the produce is pure; otherwise he would not pay as premium. I do not know whether it would be possible for the cultivators to get a premium if the business were run on co-operative lines. That would depend upon Mr. Purushottamdas and the man who guides the work.

1812. There is no control over the seed in the tracts in which cotton is being pushed. The cultivators there are settlers from Broach and Surat. They get their seed from Kanam. They get a mixture of Broach *deshi* and *goghari*. Depôts would do good but I do not think that the whole tract would take seed from depôts unless there were legislation. There is no Khandesh cotton coming in. If there is heavy rainfall, Khandesh dies of its own account. But it is necessary for the cultivators that it should be separated and kept separate.

1813. All the Gujarat cottons are practically similar in appearance they differ a good deal in ginning percentage and in staple. I could not define exactly the various types in the growing stages. I doubt if a botanist could do so until the bolls were formed. I do not know whether *goghari* is a cross or pure. Nobody has traced its history. A good deal of botanical work is necessary. The new types are being tested on the Surat farm. The whole area under improved seed was under three varieties until two years ago. Now the areas under 1018 P. G. and 1027 A.L.F. are being curtailed but the types are being kept up so that we may not lose the strain. It has yet to be seen whether Broach *deshi* yields more than *goghari*. Up till now Broach *deshi* yields a little more on the Surat farm but on the Broach farm it has yielded about fifteen lbs. less. The question of the yield is very doubtful and so the uncontrolled extension of *goghari* is very risky. It should be stopped if Government wish it. It does not pay the cultivators. They have been induced by the ginners and petty merchants to grow it. Any profit there is on it goes to the petty merchants. The cultivators gets very little of it. Rs. 5 per *bhar* is no gain to the cultivator, compared with the high ginning percentage of *goghari*. We have no means of checking it. The same thing is happening in Surat. Two ginners knowingly gave out *goghari* seed to the cultivators in the hope that they would get a higher ginning cotton in consequence and that their profits would be enhanced. It is not the cultivators who mix cotton but it is the gin owners who are primarily interested in getting big profits. The whole thing should be controlled through the ginning factories. Today the difference between the price of the Broach and Navsari is about Rs. 120. This difference will bring the cultivators to their senses. If the trade were to quote for five or ten years the rate for pure *goghari* instead of quoting rates for good Broach or Broach *deshi* as they are doing today, the eventual losers would be the cultivators and not the ginners and they would not grow it any longer as the difference would be so great. But by that time there will be no remedy. If factories were licensed, or depôts were opened or there were legislation that only the seed of Broach cotton should be given to the cultivators and if the license of any ginnery found to give out other seed were taken away and the factory closed for a term of years, that would stop it. We have no authority to compel the cultivators to do any thing. The personal influence of the Department only works in small areas. Now-a-days the people are very sophisticated, they stick to their own wishes and it is very difficult to get things done according to the wishes of the Department.

1814. There should be a single farm in each of the different cotton growing tracts. There is no experimental farm in the Ahmadabad district. All the other districts of Gujarat have got one for each district. To make up the deficit for the Ahmadabad district, a small plot has been started in the Sanand State which is situate in the Ahmadabad district. The plot at Sanand will be run at the State cost but under the supervision of the Agricultural Department.

1815. I have some experience of Sind. When I was there, I think it was about 1905, the Jamrao canal was running all right. We tried several experiments on the canal in growing Egyptian cotton. From my experience I can say that, with good cultivation, American cotton was likely to succeed best but it wanted good cultivation and, in the beginning, a good market. The system of fallows in Sind is not conducive to good cultivation. The people have become slack as the conditions under which they work are inimical to good cultivation. I have no reasons to suppose that the land will not stand very heavy cropping. Most of the land is very good.

1816. (Mr. Wadia.) I knew about the arrangements with the Bombay Syndicate. The arrangement was with Messrs. Greaves, Cotton and Company and was that they should pay five per cent. more than the market rate for the cotton. The complaint of the Syndicate was that cotton was brought in in a mixed state. This may have been due to the jealousy of other merchants, who did not like the business conducted by Government. It was not a justifiable complaint so far as I can see. I do not know if the Syndicate sent the Cotton for valuation to the Bombay Cotton Trade Association. The cotton was stocked in the godowns. That was Mr. Greaves' first mistake. Instead of selling the cotton the very day he bought it, he went on collecting it on his own account until the market fell from Rs. 145 to about Rs. 110 per *bhar* within a month or so. The whole loss fell on the Syndicate which eventually gave up operations. The cotton tendered to the Syndicate was, in my opinion, five per cent. better in value than the ordinary Surat cotton. If I remember correctly, cotton which was sent to Mr. Greaves and which was eventually sold by auction at Colaba fetched Rs. 30 more per *khandi* than the Surat cotton. Had he auctioned the whole lot, the Syndicate might have made a big profit instead of a loss.

1817. We could produce enough seed of improved varieties within three years to distribute over the whole of the Broach tract. At present, we are growing only as much as we want. If we were to engage seed growers as in Khandesh, we could produce enough seed in three years. The Department should produce and distribute a part but not the whole. It is the work of the Department to produce and distribute only if there is no

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available agency to do the work. The staff should be increased for the purpose. The only way to increase long staple cotton is to distribute pure seed and to get it sown.

1818. I have already suggested that only those factories, which are licensed, should be allowed to sell seed to cultivators. I have suggested the prohibition of the transport of seed of cotton from one tract to another. I agree that it would be a difficult job for Government to supervise this and a number of Inspectors would have to be appointed. To safeguard the cotton industry to the fullest extent, transport should even be prohibited by carts because cotton can be moved by carts up to thirty miles for mixing. There is no short staple area within thirty miles of the Broach tract except that in which *mathio* is grown. If transport by rail were stopped, we should be able to extend selection I-A easily as well as 1027 A.L.F. To prevent mixing I have suggested that all ginneries should be licensed. If a ginnery was found to be mixing the license should be taken away and the name of the ginnery should be published in a trade list which would be something like a black list.

1819. Hand weaving is not done by cultivators in this tract. It is done by *Dheds*, a low caste which generally does village service for Government or weaving or selling of fruits, etc. They are also domestic servants to European Officers. It is also done by a Mohammadan caste called *Tais*, who are a special sect of Mohammadans who mainly live upon hand weaving and rarely on agriculture combined with weaving.

1820. At Surat, in ordinary years they charge Rs. 3 to Rs. 3-8 per *bhar* of 924 lbs. of seed cotton for ginning. When there is a pool, it charges Rs. 6 to Rs. 9 per *bhar* for the same quantity. There is another pool for pressing. The usual cost was Rs. 2 to Rs. 2-8. Rs. 2-8 was the maximum. If there is a pool, they charge about Rs. 5. There are nearly double the factories that are actually necessary in my Division. In my opinion the prices charged by pools are very high. If licensing were resorted to, I would suggest that maximum prices should be fixed so that no exorbitant charges might be made. I would not object to a profit of seven per cent. but I would not allow more than that.

1821. The weigh-bridges are tampered with in some cases. I have come across instances of this. To-day the bazaar price is Rs. 300 per *bhar*, but if it fell to Rs. 250 or so, the ginneries would have to make good their loss and there is no other way to do so than by taking more weight from the cultivators by tampering with the weigh-bridges, the workings of which the cultivators do not understand. They get quite a maund or two of seed cotton that way. Weigh-bridges should therefore be subject to Government inspection. Weighments are made here by weigh-bridges in almost all cases and there are no weights or scale in this district.

1822. The study of the cotton plant has been taken up in my districts since 1901 but I venture to think that more might be done. The staff should be increased for the purpose. I-A is the result of selection. It is not a cross or a hybrid. It is only a selection which is better than anything else.

1823. There are buying agencies at Surat and at Broach. They are agents for the Surat, Ahmadabad and Bombay mills and for exporters. The buying agents should be licensed and if they are found to adulterate, or tamper with cotton, their licenses should be taken away and they should not be allowed to enter the market.

1824. There is no marketing system here, as in Berar. I doubt very much whether the cultivators of sutrat and Broach would bring their cotton into markets unless they saw a good prospect of gain in doing so.

1825. The cultivators of Surat started two or three ginneries amongst themselves in order to break up the pool system. That had some effect for a time but they had to sell their factories as they could not work them properly. If there were legislation, the Collector might be empowered to see whether a factory was necessary at a particular place and if there was no real demand for it, he might refuse to allow a factory to be erected in an undesirable place. On account of the war, the pools are being broken up but that will not last for a long time. In order to secure that factory owners should not enter into pools, my suggestion is that before any man is allowed to erect a factory, he must take the permission of the District Magistrate or Collector.

1826. (Mr. Hodgkinson.) We are giving out only selection I-A now, as we found it difficult to keep the others pure. This year we had only 25 per cent. of the seed required owing to the heavy and abnormal rainfall. People had to sow three or four times so we had to give out some seed of the other varieties. On the farm, we have three or four plots of the other varieties in order not to lose the strains.

1827. Artificial manures on the farm have mostly proved a failure. As for other improvements in cultivation, we are trying to show the cultivator the method of sowing in squares and the advantages of green manure. There is a deficiency of farm-yard manure. The results have not been good.

1828. The full cart is weighed in the beginning as soon as it comes from the cultivator. After the cart has been emptied, it is weighed and the tare is deducted. So far as the cultivator is concerned, once the cart is emptied and the cotton has been thrown into a big heap, he cannot take it back. He knows the figures for the empty cart as weighed. If he raises any objection after the cotton has been weighed, he has no remedy but to accept the weight of the ginners. There is no tampering with the weight of it. The cultivators have become too clever for that.

1829. (President.) *Goghari* seed for 100 acres has been given out to a single cultivator. Nothing will happen in regard to it and it will simply go to the factories. We are not going to repurchase it. We gave it out as we wanted to see whether the yield on a field scale tallied with our experiments. The Deputy Director, Mr. Patel, sanctioned it. The issue of such seed dates from Mr. Main's time. It is not yet settled whether this is the strain that we wanted to push. I am quite certain that this seed will not get out on its own. I do not know whether the seed will be fed to the cattle, crushed, or used for sowing. I could stop its being used for seed by asking the cultivators who is growing it not to give it to any body, and he has been asked not to give it to anyone else.

1830. (Mr. Wadia.) With reference to the transactions that took place in 1912-13 with Messrs. Greaves, Cotton and Co., I may say that the area in 1912-13 was altogether about 17,000 acres. The work was under my care. In 1911-12, the area was 11,452 acres. We increased the area by about 6,000 acres in 1912-13. I had four different groups and there was one fieldman for each group plus the Baroda territory with its own staff. I did not supervise the area within the Baroda territory. I think I have got my figures quite correct. In 1912-13, the exact acreage was 17,945 acres including 7,000 acres in the Baroda State. I cannot account for Mr. Mains' statement that the acreage under our supervision was 15,000 acres in addition to 9,000 acres in the Baroda State. In 1911-12, the area was, as I have said, 11,452 acres, all under my supervision. I do not remember whether there was any in the Baroda State that year. One man was added to my office staff in 1912-13. So there were four men in the first year and five men in the second year. The

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Mr. M. L. PATEL.

Mr. M. L. PATEL, Cotton Fieldman, Surat.

EXAMINED AT BROACH ON FEBRUARY 11TH, 1918 AND AT SURAT ON FEBRUARY 12TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

1833. (2) and (11) Varieties.—The varieties grown in Gujarat are :—

- (1) *Nausari local* grown in Chikli and Jalalpur Talukas of Surat District. This is not a different variety but similar to No. 2. This is the longest stapled cotton of Gujarat. Now-a-days, a slight mixture of *goghari* from Broach District is seen.
- (2) *Surat cotton*.—Grown in Olpad, Chorasi, Bardoli, Mandwi and Valod Talukas of Surat District; Hansot Mahal of Broach and Nawapur Peta of West Khandesh. This is a long-stapled cotton. Now-a-days mixture of *goghari* from Broach District is taking place specially in Olpad Taluka. But in this district yields low.
- (3) *Local cotton of Broach District*.—It is a mixture of acclimatized *Surtee Broach* and *goghari*. The percentage of the latter is from forty to seventy. The former is a long stapled cotton and the latter is a short, coarse, brittle and white-stapled cotton. It has a higher ginning out-turn. It does not yield more than its components and had got no advantage over any other. It is particularly inferior in staple in bad seasons. When the mixture percentage of *goghari* is high it is called *kanvi*. *Kanvi* is grown in the tract known as Kanam.
- (4) *Kanvi grown in Kaira District*.—This is the same as the above and is grown (to a large extent in Thasra, Kapadwanj, Matar, Memedabad and half of Nadiad) in Kaira and the western part of the Panch Mahals, particularly Halol Taluka. The usual seed supply is from Palej side. In this part, the system of picking bolls bodily from the plant or picking seed cotton at short intervals, makes the produce dirty, weak and damp. In Borsad, Nadiad and Anand Talukas of Kaira, a perennial variety of cotton called *rozi* is grown as a subordinate row crop with cereals. It is intrinsically a long-stapled cotton, but as it is invariably picked at intervals of three or four days and as bolls are bodily picked from plants, the cotton is dirty, damp and brittle. This is ginned along with *kanvi* by the merchants.
- (5) *Wagad*.—This variety occupies by far the largest area under cotton in Ahmadabad and Kathiawar. It is grown in slightly saltish, loamy soils or on saltish black lands, in Viramgam, Dholka, Sanand, Dhanduka and South Daskroi of Ahmadabad. The bolls of this cotton do not open and they are picked bodily from the plants and also sold as such. This is a long-stapled bulky cotton but dirty owing to bad opening.
- (6) *Lalio*.—It is similar to cotton grown in Broach District, but the proportion of *goghari* varies. It is grown mainly in sandy loam or sweet black lands in Dhanduka, Dholka and north and south Daskroi of Ahmadabad District. It is irrigated at times in winter. The cultivators generally pick this variety in fields, but at times pick the bolls bodily from the plants and then the cotton is dirty.
- (7) *Mathio*.—This is similar to Khandesh cotton and contains varying proportion of *varadi* (i.e., white-flowered *neglectum*). This is a short-staple cotton, but is superior to that of Khandesh. This is mainly grown in Dhanduka and Ghogha Talukas of Ahmadabad district and Bhavnagar and Jasdan States of Kathiawar.
- (8) No exotic cotton is grown in Gujarat. New Orleans exists as a mixture in *mathio* and *Cambodia* in *lalio* and in *kanvi*.

1834. (2) and (12) Size of holdings.—The following tables shows the average size of holdings and the proportion under cotton :—

Name of the Taluka.	Average size of the holding in each taluka, in acres.	Percentage of the holding under cotton.	Approximate area cultivated per pair of cattle (dry crop).
SURAT—			
Chorasi	6.9	28	}
Olpad	8.7	32	
Bardoli	8.7	28	
Jalalpur	6.2	19	
Chikli	10.9	9	
Mandwi	9.5	16	}
BROACH—			
Broach	13.2	48	}
Ankleshwar	9.9	44	
Vaghra*	16.7	33	
Amod	18.5	49	
Jambusar	10.6	55	
AHMADABAD—			
Daskroi	7	11	}
Sanand	11.4	25	
Viramgam	21.1	58	
Dholka	10.9	39	
Dhanduka	22.2	40	

* The system of total bare fallow is prevalent to an extent of eight per cent.
 N.B.—Kaira and Panch Mahals are not included as the area under cotton is comparatively small.

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1835. (4) and (13) Yields and profits.—The following table shows the average yields and profits per acre of different varieties of cotton :—

Variety of cotton.	Name of District.	Average yield of seed cotton per acre.	Average gross profit per acre.
		lbs.	Rs.
Nausari local	Surat	320	55.3
Surtee Broach	Do.	360	61.3
Deshi containing 40 to 70 per cent. of Goghari	Broach	400	70.
Lalio	Ahmadabad	400	58.6
Wagad	Do.	440	67.6
Mathio	Do.	480	67.2*
Kanvi	Kaira	500	70.2
Rozi	Do.	150	15*
Kanvi	Panch Mahals	400	70

1836. (5) and (14) Rotations and manures.—In the Surat district, *juar* rotation is generally followed. The rotation of *til*, *tur* is hardly ever taken. In Bardoli Taluka, cotton is taken without any rotation to some extent. In Olpad, the rotation of wheat is slightly observed.(2) In Broach District, *rabi juar* and *lang* are generally taken. In saltish coastal lands, wheat is taken. Cotton is grown without rotation in partial fallow system, and it is grown after bare fallow to one to five per cent.

(3) In new lands of Kaira and Panch Mahals, cotton is grown without any rotation on partial fallow system. In Mehmedabad, Nadiad and Anand, it is rotated with some garden crop.

(4) In Ahmedabad District, the usual rotation is *juar* and wheat and of *bajra* on light lands.

(5) The only manure in use for cotton is farmyard manure. Manure is scarcely applied in the talukas of Surat District where there are rice and garden lands. In the Olpad and Mandwi Talukas, it is applied once in five to six years at ten cart loads per acre. In the Broach District, it is applied to lands near the villages at times. In Ahmadabad, it is applied at intervals of three to four years at ten cart loads per acre in Kaira and Panch Mahals, no manure is applied.

1837. (6) and (13) Comparative returns.—In Surat District, the improved long-stapled cotton when grown by the cultivators, gives Rs. 3 more per acre due to superior quality and percentage. To this if we add the price of thirty lbs. of seed cotton due to high yield—Rs. 4—it will give Rs. 7 per acre.

Year	Average yield of seed cotton of local cotton according to crop tests.	Average yield of seed cotton of improved cotton of the cultivators.
	lbs.	lbs.
1914-15	358	380
1915-16	225	294
1916-17	347½	359
AVERAGE	310	344.3

(2) In the Broach District in 1912-13, Surat improved cotton seed was distributed, but as the merchants did not appreciate the quality and offered lower prices for *kapas* than the local (due to low percentage of the former), the plan had to be dropped. The experiments were undertaken to improve the ginning percentage, at the same time looking to the quality. Here the improved cottons are under experimental trials. The short-stapled variety *goghari*, which exists as a mixture to an extent of forty to seventy per cent. with the acclimatized *Surtee-desi* cotton, yields equal to it. The local cotton gins 36 per cent. of lint. Due to this, the *kapas* fetches four per cent. higher price than it used to do while, due to high mixture, the lint fetches now-a-days Rs. 20 less per *khandi* than it fetched in 1908 for inferior staples. Thus there is an advantage of two per cent. for *desi* mixed cotton over the long-stapled pure cotton. In this district, the mixture of *goghari* is increasing due to the supply of high ginning seed by the merchants and the cultivators appreciate it.

(3) The exotic cotton tried and grown as a dry crop is *Cambodia* in place of *lalio* in Ahmadabad and Kaira districts. It deteriorates much in ginning percentage and the yield depends on exigencies of season and insect attack, hence it is not taken up by cultivators.

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(4) The following table shows the comparative gross receipts and expenses of the crops rotated in cotton tracts :—

Name of District.	Name of the Crop.	Gross receipts in Rupees per acre.	Cost of cultivation including assessment.
		Rs.	Rs.
Surat	Cotton	61.2	17
	Juar	41.0	19
Broach	Cotton	70.0	17
	Juar	39.0	19
	Lang	45.0	21
	Wheat	38.0	18
	Lalio	58.6	16
Ahmadabad	Wagud	67.6	16
	Mathio	67.2	20
	Wheat	38.0	15
	Juar	41.0	20
	Bajra mixture	40	22
Kaira	Cereal and mixture	45.0	20
	Cotton	70.0	22

1838. (7) and (15) Conditions affecting increase in area.—Only in Ahmadabad District, a short stapled variety called *mathio* is grown separately by itself. The area under it does not fluctuate much but if there be good rains in the preceding years, the area under it decreases. In Broach and Kaira districts within a few years the whole cotton will be *goghari* instead of the present mixture *deshi* of *kanvi* cotton, as the merchants care for high ginning. If the difference in prices between short and long staples (i.e., *goghari* and acclimatized Surtee Broach, the *deshi* of Broach) be about Rs. 80 per *khandi*, then *goghari* will get a check. In Surat District also, *goghari* is coming in but it has got a slight set back last year as the merchants feel it difficult to pass it off as Surat cotton. Moreover, it yields lower than the local cotton, hence it will not be advantageous for the cultivators.

(2) In the Surat District, a superior stapled cotton cross 1027 A. L. F. can be introduced, if quality be fully appreciated and if long stapled cottons fetch higher prices proportionately than what they do now. The question of extension of area under cotton is an economic one. An increase in price will always bring about a corresponding increase in area and every care is necessary to avoid an ultimate heavy slump in price, which may seriously discourage the grower. The statistics of the area grown by the cultivators in 1917-18 of Athwa, Umra and Bharthana reveal that they have grown cotton without rotation to an extent of thirty to 43 per cent.

(3) The minor causes affecting the cotton area are—

- the characteristics of seasons, e.g., favourable early rains increase the area. If there be famine in the previous year, the area decreases. Insect attack on rotated crops increases the attack.
- If bulky organic manures be made easily and cheaply available, the necessity of rotation in Surat District will be less felt.
- The distribution of gins and presses is very irregular; this curtails the profits of cultivators to a great extent. In the Kaira District, there is a want of ginning factories, acting the same way. In Ahmadabad District, there is want of even distribution of presses and general want of presses which has a similar effect.

1839. (8) and (18) Uses of seed and seed selection.—Cotton seed is put to three uses—

- seed purposes, (2) for feeding cattle, (3) for extracting oil.

(2) Seed is obtained by the cultivators from the gins, generally by well-to-do cultivators, while returning after sale of *kapas*. Thus they get superior seed, while the poor cultivators buy the seed from *sahukars* of whatever quality it may be. (Part of the seed may be even of last picking). In the Surat District, a few merchants keep the seed out of seed cotton of second picking. In the Broach District, seed out of seed cotton ginning very high is kept separate for seed purposes. The seed from Palej side goes to Kaira District and partly to Ahmadabad. In Kaira District, *rozi kapas* is separately ginned for seed purposes. In Ahmadabad District, *lallo* and *wagud* are separately ginned for seed purposes. The seed is not specially hand ginned.

1840. Work of the Agricultural Department on cotton.—In Surat and Broach district, selection is carried out and the principle observed is "selection of the best plant out of the best strain." Unit selection is carried out in selecting, picking, ginning and sowing unit plants individually. The plants having the greatest number of bolls are marked out. Out of the marked plants, one or more of the best plants which are superior in all respect, i.e., yield, ginning percentage and quality are finally selected for continuing selection work, while the second best plants in each strain or several similar strains are put out on a large scale and tried against the original improved variety from which the individual plant was originally selected. The yield of the progeny of the unit strains and the weight of seed is also noted. The original improved varieties on the Surat Farm have been obtained by continuous mass selection, the mass selected seed is used for the next year's work, while the remaining seed is given for the farm area, from which the seed is supplied in the district. In Broach District, the *goghari* variety has been studied as to the shape and size of the bolls for the last three seasons. In Surat District, similar study has now begun. The habit of growth of a plant is also studied now.

1841. (9) and (19) General economic conditions.—In all cotton growing districts generally, less cattle are kept. Labour is dear, particularly so in some seasons and at particular occasions. The credit of the cultivators of cotton tracts is improving. This can be judged from the rate of interest, which they have to pay. They are also spending money towards permanent improvement in lands. Their condition is improving. They have got almost no subsidiary industry.

1842. (17) Prevention of mixing of different varieties.—In Gujarat, the system quoted below will help in establishing the improved cottons in the district and thus tend to make the crop pure. In this way the impurity in the fields due to seed supply can be minimised. In a limited tract of a district, the ger-

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minating capacity of seed may be destroyed by some chemical substance. This may be used for feeding purposes in the limited tract while sufficient improved seed of the farm grown crop or of the villages growing farm cotton may be supplied from the stores kept at convenient centres at reasonable rates or a monopolized agency may be established for the same purpose. In this way the monopolized area for the supply of cotton seed for sowing may be increased according to the availability of seed for sowing till the improved variety covers the whole district. The arrangements for the purchase of produce at some premium should be made for the first few years to increase the seed supply. For first few years, extreme care will have to be taken in seeing that the produce used for seed is pure.

(2) In Gujarat (including Kathiawar), the area under cotton in Native States is about two-thirds of the whole area. These Natives States are much intermixed with the Government villages. Hence if arrangements for the purity of the crop be made simultaneously in the States, the plan will be successful.

(3) Fraudulent adulteration of cotton in gins and presses is a matter which should be left off to the natural operation of commerce. This can be checked if the Associations like the Cotton Trades Association of Bombay take a review in their Annual Report of the quality of cotton coming from various stations, so that the *mofussil* merchants of various stations may compete for earning good name.

II.—COMMERCIAL ASPECT.

1843. (30) Local trade customs.—In the Surat District, the petty merchants and big merchants purchase seed cotton through *dalals* either in advance or when the crop is ready. The seed cotton merchants get money advances from the gin owners (if they are not the owners) or from commissioned insurance agents. Many a time the factories are taken on rent for a season by the merchants. They sell lint in handpressed bales to the agents of the mills or of exporting firms who examine and approve them. They look more to the *rap* (yellow stained cotton) and dirt in cottons than the staple. They (*kapas* merchants) hardly ever get the bales full pressed for selling at Bombay. The mill-owners hardly ever keep seed cotton merchants as their agents, by supplying capital and paying commission.

(2) In the Broach District, the system is similar but the lint in handpressed bales is not much examined and approved by the agents but the seed cotton heaps are selected by the agents purchasing lint. These are ginned under their supervision and the lint resulting from them is approved. The gummies and ropes of handpressed bales are generally supplied by the agents purchasing lint and the rent is charged. Generally the price of lint (except Rs. 2-8-0 per bale) is paid off and the whole account is settled, when the transaction is finished. The seed cotton merchants get eighty per cent. of the price of the purchased crop as advances from gin-owners and all transactions are done through the servants and brokers of the gin-owners. Generally the money-lenders are the insurance agents and they lend money to earn insurance commission over and above interest.

(3) In the Ahmadabad District, the gin-owners generally do not advance money to cotton merchants. Money is advanced by commission agents through whom lint is sold by *dalals*. Their functions are (1) to advance money to seed cotton merchants, (2) arrange sales of lint through *dalals*, and (3) to recover the amount of sales from mill-owners. They either live at Ahmadabad or open shops at various centres. They keep godowns for storing bales in Ahmadabad on behalf of merchants. The exporting firms keep agents for purchase at places renowned for good staple. Ahmadabad mill-owners purchase cotton in Bombay,—(1) a monthly paid man from the mills goes to various centres and makes purchases, (2) the seed cotton merchants give samples through commission agents and local brokers to the mills and sell, (3) the samples are supplied to the brokers of the mill who transact the business. Transactions are done in handpressed bales, which are sold to Ahmadabad mill-owners for consumption. The ropes and gummies of handpressed bales are not returned by mill-owners even though their weight is deducted. There is no organization as to the period after which the weightment of handpressed bales should be done after the sample being approved. The weightment and final approval of the bales (according to sample) is deferred till the facilities for hard cash come forth. They are mutually bound for the transaction according to the sample. If within the deferred period, wide fluctuations in prices occur, mixing is done which is connived at. This practice gives a stimulus to mixing. If there be rules like those of the Bombay Cotton Trades Association, they will check the practice to some extent. In the newly opened lands of Kaira and Panch Mahals, the practice is similar to that of Broach. Here there is not as much keen competition in the purchase of *kapas* as there is in the Surat and Broach districts and the cultivators get proportionately lower prices.

1844. (31) Standardization of commercial names.—The following table gives the commercial names of the cottons of Gujarat and Kathiawar :—

Names of grades of cotton.	Commercial names and details.	The areas from which they come.
Navsari	Part of Navsari goes by the name of Navsari good, that of Bilimora by Navsari fine.	Maroli to Bilimora.
Fine Surat	Bardoli cotton is regarded as superior to that of Surat, while Rander and Sayan cotton is regarded as inferior to that of Surat.	Sayan to Chalthan and all the cottons of Tapti Valley Railway up to Navapur and up to Maroli on the main Bombay, Baroda and Central India Railway.
Fine Broach	Broach and <i>goghari</i> mixture, the mixture varying. The northern side produce is regarded as inferior.	Kim to Baroda including Baroda Godhra chord line and all branches within.
Fine Bhavnagar (food staple) or Fine Dhollera or Fine Gujarat.	<i>Lalio</i> and <i>wagud</i> cottons	Ahmadabad, Kathiawar and Kaira district. Superior cottons.
Bhavnagar ordinary	<i>Lalio</i> and <i>wagud</i> cottons but a little dirty.	Ditto Ditto.
Bhavnagar short stapled or <i>mathio</i>	<i>Mathio</i>	Bhavnagar, Jasdan and Dhan-duka.

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1845. (32) **Buying agencies.**—The staple of the cotton of every tract varies in an extraordinary degree with the climatic conditions of each season. The painstaking and honest seed cotton agents test the variety of cotton grown in a minor dozen tracts, the names of which are not published in the returns and select from amongst them, the stations from which he will order that year's consignment. Due to this reason, no definite grading can be fixed for ever for tracts. Due to the abovesaid reasons, the agency of purchases by keeping seed cotton merchants for purchasing seed cotton is the best.

ANNEXURE.

The actual market rates prevalent in May 1917, when I studied the cotton marketing conditions, were as under. These rates I have taken in my calculations for gross profits of different varieties of cottons.

Variety of cotton.	Rate of lint per 784 lbs. in Bombay in F. P. bales including 1½ per cent. discount.	Rate of lint per local weight in H. P. bales in their original homes.	Weight of local unit of weight of lint.	Ginning outturn taken as basis for calculation of rate of kapas by the merchants.	Rate of kapas per local unit of weight.	Weight of local unit of weight of kapas.	Rate of kapas per 40 lbs.	Remarks.
	Rs.	Rs.	Lbs.		Rs.	Lbs.		
Navsari . . .	477	427	800	31.0	159 to 160	924	6.9	
Surtee Broach . .	457	415	800	31.9	157 to 158	924	6.81	
Broach Deshi . .	427	427	884	36.11	179 to 180	1,020	7.0	
Kanvi of Kaira District.	...	386 to 387	884	34.0	138 to 140 or 92 to 93	987 or 658	5.62	This is mainly sold in Broach in H. P. bales.
Rozi	...	354	884	25.0	65	658	3.97	
Wagad	...	19.26	41.14	33.0	6.32	41.14	6.15	
Lalio	...	18.24	41.14	34.0	6.00	41.14	5.86	
Mathio	...	16.00	41.14	35.0	5.75	41.14	5.6	

Mr. M. L. PATEL called and examined.

1846. (President.) I am a cotton fieldman. I am a Graduate of the Poona Agricultural college. I did not specialize in Botany particularly. I was appointed cotton fieldman straight away after I graduated in 1911. I have been working on cotton ever since I left the College. I was trained under Mr. Main and Mr. K. D. Kulkarni, who taught me how to make selections for quality and for high ginning percentage. I learnt hybridization work under them though I knew the principles before. I come to Broach when I have cotton work there. I am stationed on the Surat farm.

1847. I am doing mass selection work with a view to keeping up and improving the original improved varieties and unit-selection is done on the principle of "selection of the best plant out of the best strain." When I joined the Department in 1911, there were four varieties which dated from 1903-04 and before. Out of these four varieties, the two crosses were originally worked out by Mr. Gammie and the other two were derived from one plant selected by Mr. K. D. Kulkarni and worked upon by Messrs. Fletcher, Main, Kulkarni and myself. I am trying to get new strains by selection out of improved varieties.

1848. The work of analysis of commercial varieties of Khandesh and Gujarat cottons on the basis of the samples received from various gins in order to ascertain the percentage of mixture of different varieties is done by me.

1849. Another line of work is the segregation of the types of the local Surtee cotton according to shape and size of bolls. I am also trying the new unit strains (developed by unit selection) on a field scale to see whether they are superior to their original parents. The work of segregation of types of different habits of growth is also being done. All this work is being done on Surat Farm. The work of inspection of the area under improved cottons round the Surat farm as shown by the cultivators, in order to see whether the improved varieties are pure or not, was done by me this season. My work on the Broach farm consists of the segregation of the types in *goghari* and in improving upon them; the trial of unit *goghari* strains out of each type in order to test the yield and the purification of Broach *deshi* to keep out *goghari* plants. Several pure strains have been developed on this farm by unit selection. At Sanand in the Ahmadabad District, I am working on the segregation of types in *wagad* and *lalio* according to the shape and size of bolls and the segregation of the types according to the flowers. Up to two years ago, I used to do some work on Khandesh cottons, when the headquarters of the cotton supervisor were at Surat.

1850. As to the ginning percentage of *goghari* cotton, I got from individual plants, carefully hand ginned up to fifty per cent., i.e., half and half. On a field scale, I got 46 per cent. on the farm; I think that if it were

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put out on the cultivators' fields, it would give a ginning percentage of about 41. Last year I made a tour throughout Gujarat to study the marketing conditions and questions of ginning percentage. I learnt from seed cotton merchants that they take 46 to 47 *dhadis* (51 lbs.) of seed cotton as producing one local *khandi* (884 lbs.) of lint in the case of the mixture of Broach *deshi* and *goghari*. That means a ginning percentage of 36 to 37. I went to Dabhoi in the Baroda State near Jambusar Taluka and there the merchants informed me that to get one local *khandi* of lint, the lowest quantity of *kapas* required is 40 *dhadis* (this *kapas* came from the Mewar State); this is equal to 44 per cent. ginning outturn. Where they grow pure *goghari*, as for example at Varnama, they get practically the same ginning percentage, i.e., 42 as I got from my tests on seed cotton out of the same seed grown on Broach farm without selection. Where *goghari* and Broach *deshi* are mixed, the ginning percentage is 36 to 37.

1851. (Mr. Roberts.) It is said that *lalio* is exactly the same as Broach. I have examined it this year and I think it is a mixture of Broach *deshi* and *goghari*. Broach *deshi* by itself shows variations in the shape and size of the bolls. This we also find in *lalio*. *Lalio* is a local term showing that the cotton opens very widely and hangs down. It means saliva from the mouth. The staple of *goghari* is very weak especially in bad seasons. In 1915-16, which was a bad season, it did not suffer more than Broach *deshi* in yield. It was particularly bad in staple that year but not in yield. Broach *deshi* does not deteriorate in staple so much in a bad season as *goghari*. I got the samples valued through the Imperial Cotton Specialist. Duplicate samples were sent to the Cotton Trades Association in Bombay and to the Secretary of the Mill-owners' Association, Ahmadabad, in 1914-15. No other samples have been sent since then to the Cotton Trades Association or to the Secretary, Ahmadabad Mill-owners' Association, as they always hesitate to take up the work; but they are sent every season to the Imperial Cotton Specialist. Last year, ten bales out of the produce of the mixed seed of the four improved varieties distributed in the District, (the greater part being of Selection I—A) were sent to Lancashire for valuation by the Divisional Inspector of Agriculture. This cotton was from the crop of the cultivators. Ordinary samples of strains are not sent to Liverpool for valuation.

1852. There is some difference between my figures of yield and those given by Mr. Bhimbhai. My figures for yield are based on what the Revenue authorities consider as an average crop for the Surat and Broach Districts. The figures for Ahmadabad are taken from Mr. K. D. Kulkarni who was deputed last year to make a cotton survey of the District. As regards Kaira and Panch Mahals, I have taken the figures from my own experience. They are not the results of the tests made by the Agricultural Department. My figures for the Surat District approximate to the crop tests on the cultivators' fields made by the Agricultural Department. The area under improved cotton in 1916-17 was 1,000 acres. The crop was marketed under the co-operative marketing system. My figures are the average results of crop tests and also the average for the improved cottons on the cultivators' fields. The villages in which the improved cottons are grown, are also the very ones in which the crop tests were taken and so the figures are necessarily reliable. Fields tests have also been made on the farm. The yield per acre of seed cotton (average of 1915-16 and 1916-17, when each of the cottons is compared on the two row alternate system with the *deshi* variety) of Selection II on the Surat Farm is 433 lbs. as compared to *deshi* 374 lbs., that of selection I—A 381 lbs. and of 1027 A.L.F. 348 lbs. We are not giving out selection II as it is not superior in staple to the *deshi* cotton. The tests were carried out on half an acre of each in two lines. The number of series differs with the year according to the size of the plots. I do not think that it would be safer to carry out field tests on bigger areas because I think the variation in the soil and other things would have more effect.

1853. Our improved cottons are not spreading more because it is a question of the confidence of the District people; i.e., they should have confidence in regard to getting higher prices. The cultivators can get a premium of Rs. 5 an acre more as the result of ordinary fluctuations in prices of *kapas*. An improvement of 30 lbs. an acre in yield is not a convincing thing; it is such a small margin that the cultivator cannot be induced to believe that it is due to improved cotton seed and not due to differences in soil, situation and cleanliness of the parts of the fields. On an average of the season, the difference between Broach and Surat was Rs. 10 before 1910, Rs. 20 to 35 from 1910 to 1914, Rs. 35 in 1916-17 and Rs. 50 in 1917-18. The increase in difference is due to the rise of prices and the deterioration of the Broach cotton due to increasing mixture of *goghari*. The difference between Broach and Navsari in 1917-18, 1917, and 1915-16 was Rs. 90, 67, and 52 respectively. This indicates that the price of different varieties of cottons do not move in the same ratio as the rise or fall in the prices of cottons in general. Thus when the prices of cottons rise, the higher ginning *kapas* fetches proportionately higher price than when the prices of cotton are low. The cultivator will get a lower price for *goghari* mixture *kapas* than for Surat by 3.3 per cent. roughly when the rate of lint for *goghari* mixture is Rs. 400 per *khandi* of 784 lbs. with *kapas* giving the ginning percentage of lint of 36.6 and the rate of Surat cotton is Rs. 460 per *khandi* with a ginning percentage of lint of 31.9. On my calculations, the cultivator gains at least six per cent. by growing *goghari* mixture when the rate of lint per *khandi* for *goghari* mixture and for Surat are Rs. 640 and 675 respectively with the ginning percentage for both of them as shown above. When the difference between Surat and *goghari* pure (but unselected) is Rs. 80, i.e., if the rate of lint per *khandi* and the ginning percentage for the former are Rs. 480 and 31.9 and for the latter Rs. 400 and 40, respectively, it will not pay the cultivator to grow *goghari* unless he can secure a better yield.

1854. As to mass selection, I go over the plots plant by plant to see whether they are uniform in regard to the shape and size of the bolls; then I count out the bolls of one or two lines and strike an average number of bolls per plant. Only those plants which have bolls above the average number are selected. They are examined for quality, i.e., for better staple and for high ginning percentage. These plants are collected and kept for next year's sowing and for selection. For unit selection, all the individual lines are gone through to see whether the plants are uniform as to shape and size of bolls, and if they are not superior in quality they are rejected; if they are uniform, the plants with the highest number of bolls are selected, they are again examined and those that stand the test for quality and high ginning percentage are picked out individually and ginned separately. Three or four plants are selected from each selected strain; I weigh the seed and count the number of seeds per *tola*. The object of weighing and counting the number of seeds per *tola* is that the ginning percentage should not increase at the expense of the weight of the seed. I have been covering the plants in a few cases this year, in order that they may self fertilize. Out of the selected plants in the field, those which stand the test for high yield of lint and heavy weight of seed are finally selected from each strain and sown separately next year. The seeds of each plant are sown in each row. The strains thus developed are fairly constant now, but at times we find a difference in the quality, ginning percentage and yield.

Bombay.]

Mr. M. L. PATEL.

[Continued.]

1855. At Surat, I have tried an *experiment with Surtee Broach and goghari* (the seed of *goghari* was pure seed of the *district Broach*) in separate plots. The yield of *goghari* was lower than of Surtee Broach. *At Broach, the yield of goghari* is almost equal to that of Broach *deshi*. In years of drought, *goghari* is inferior in staple but the yield is equal to Broach *deshi*. I do not think there is any prospect of *goghari* disappearing gradually in years of good rainfall. In Khandesh the yellow flowered *neglectums* revive better after late rains than the white flowered *neglectums*; while the *herbaceums* in Gujarat are not affected as there is no flowering at the time. If cotton seed were treated with an excess dose of carbon bisulphide, it would lose its germinating capacity and the cultivators would be forced to take the seed which we had monopolised.

1856. (Mr Wadia.) As to the difference between the figures of yield and rates of *kapas* given by me and by Mr. Bhimbhai, I have taken the rates of *kapas* prevailing last year in my calculations as I submitted my report very early. I have taken the yield of Navsari at 320 lbs. per acre; whereas Mr. Bhimbhai takes it as 360 lbs. I take the yield for *kanvi* of Kaira District as 500 lbs. per acre whereas Mr. Bhimbhai takes it as 400. What I have taken for *kanvi* is the yield after garden crops in Borsad, Nadiad and Anand Talukas. As regards *wagad*, I have taken the yield per acre as 440 lbs, whereas Mr. Bhimbhai takes it as 360. My figures are based on those of Mr. K. D. Kulkarni, the Cotton Supervisor, who was deputed last year to make a cotton survey. He mentions that *wagad* yields better than *lalio* as a dry crop. I stick to my figures. Mr. Bhimbhai does not take the ginning outturn in calculating the rate of seed cotton. He mentions merely the difference in the price of lint, i.e., the difference between Rs. 800 and Rs. 700 between Surat and *goghari* mixture. This is what I presume.

1857. The Agricultural Department distributed Surat improved seed in the Broach District in 1912-13 but as the *kapas* was sold at a lower rate than the *deshi kapas* owing to lower ginning percentage, the cultivators made a row and asked for the damages from the Agricultural Department. The price of *kapas* of Broach District, i.e., *goghari* mixture will not be lower than the price of *kapas* of Navsari cotton at Navsari. Navsari *kapas* works out at Rs. 11-8-0 per maund of 40 lbs. at Navsari and Broach at Rs. 10-8-0 at Broach, if the rate of lint per *khandi* of 784 lbs. be Rs. 780 and 636 respectively. According to this, the profit from Navsari cotton at Navsari will be more than from *goghari* mixture in the Broach District, if we do not take into account the low yield of the Navsari variety. When the prices of cotton in general rise, the difference between various growths should rise proportionately. Your calculations are based on a price of Navsari cotton in Bombay of Rs. 780 per *khandi* and of Broach cotton at Rs. 636. This difference is very high and the average of the season will be much lower. I do not agree that calculating on these figures, the price per maund of Navsari *kapas* at Navsari works out at Rs. 12-1-0 and of Broach at Rs. 8-3-0. I agree to the figures of expenses being put at Rs. 22 at Navsari and Rs. 32 for Broach at Broach, taking into account that the seed cotton merchants (i.e., ginners) at Navsari have got their own factories or take them on rent, while at Broach they are paying ginning charges to the gin-owners and thus the margin of profit of gin-owners is greater at Broach than at Navsari.

1858. Pools are means of curtailing the profits of the cultivators to a great extent. When the gin-owners make a pool, they charge higher rate for ginning charges. When the seed cotton merchants and the gin-owners are the same, they do not calculate the profit which they might get in ginning, i.e., ginning expenses. Besides when there are no pools, the gin-owners charge the rate for ginning according to the quantity of *kapas* ginned by each merchant. The greater the quantity, the less the charge. Thus the merchants try to purchase a large quantity of *kapas* in order to reduce the expenses. These factors increase competition in the purchase of *kapas* and result in the favour of the cultivators. I suggest that pools should not be allowed.

1859. I have already said in my written statement that the prevention of fraudulent adulteration of cotton is a matter which should be left to the natural operation of commerce, e.g., two or three years ago Viramgam had a bad reputation for cotton and the *wagad* from Viramgam used to fetch lower prices. The merchants passed a resolution not to gin any *kapas* from outside. They were not compelled to make a combination or to pass such a resolution. Therefore if once the name of cotton goes down to such an extent that the merchants feel the pinch of lower prices, then they themselves will understand the importance of not mixing.

1860. Another thing that I have mentioned is that the Cotton Trade Association should take a review of the bales coming in the Bombay market regarding quality. When the difference in various growths of cottons sown in the same *taluka* is not very wide in quality, the slightly inferior one can be passed as superior. It is a fact that, in Viramgam, there are a few buyers whereas here there is a great number of buyers and they could not combine as easily as in Viramgam. Supervision by Government will be a matter of great difficulty. Some seed cotton merchants will say that they have not mixed and what authentic proof will the supervisor have that they have mixed when the difference in various growths of cottons is not very wide and when they are grown in the same *taluka*. Of course, in a few cases the cotton seed will reveal the varieties mixed, if the ginners keep the seed-heaps for inspection.

1861. (Mr. Hodgkinson.) In this District, it is only in the Bardoli Taluka that cotton follows cotton in rotation materially. The general rotation is cotton and *juar*. Sometimes *til* and *tur* mixed are introduced into the rotation. Now the price of *kapas* is so high that the cultivators are likely to be led away to grow cotton after cotton. It is not a part of my work to advise the cultivators as to the rotation of crops. My work is mostly breeding work. It is the duty of the District staff who are touring in the district to advise the cultivators in matters of Agriculture. It is done by Mr. Bhimbhai and the district overseer.

1862. I would sum up the points in favour of and against *goghari* as follows:—

Points in favour of *goghari* :—

1. Higher ginning outturn.
2. Superior feel of the best pure selected strain of *goghari* to Broach *deshi*.
3. Superior colour of *goghari* to Broach *deshi*.
4. Increase production of lint by nearly twenty per cent.
5. In spinning, though *goghari* is inferior in staple, still it is more uniform than the present mixture.

Points against *goghari* :—

1. Inferior staple.
2. Especially weak staple in bad years but such years are rather infrequent in the Broach District.

Bombay.]

Mr. M. L. PATEL.

[Continued.]

ANNEXURE I.

Statements showing the rates of Surat, Broach and Navsari cottons as valued by Messrs. Ralli Brothers, by the Bombay Cotton Trade Association and Messrs. Tata Sons and Company per 784 lbs. in full pressed bales.

Year.	MESSRS. RALLI BROTHERS.			COTTON TRADE ASSOCIATION.			MESSRS. TATA SONS & CO.		
	Broach.	Surat.	Navsari.	Broach.	Surat.	Navsari.	Broach.	Surat.	Navsari.
1878	200	210	225						
1888	240	250	265						
1898	168	178	193						
1908	256	266	281						
1909				265	275	285	265	280	300
1910				330	350	360	330	345	360
1911							360	380	400
1912							285	320	340
1913				320	...	345	292	320	...
1913				300	315	325	290	...	340
1913							305	330	345
1914				300	325	340	290	315	335
1915							220	240	265
1916							285	360	375
1917							520	550	...
1917							415	445	465

ANNEXURE II.

Statement showing the actual prices for Navsari and Broach cottons according to sales in their original localities per local *khandi* of 800 lbs. and 884 lbs. respectively.

Date and year.	PRICES PER LOCAL KHANDI FOR		REMARKS.
	Broach <i>khandi</i> (884 lbs.)	Surat <i>khandi</i> (800 lbs.)	
	Rs.	Rs.	
28th April 1915	230	265	
16th April 1915	239	256	
8th April 1915	238	246	
23rd March 1915	225	238	
19th March 1915	205	228	
16th March 1915	208	233	
6th March 1915	205	231	
27th February 1915	206	230	
23rd February 1915	219	230	
17th February 1915	206	222	
11th February 1915	210	221	
24th February 1916	280	330	
3rd March 1916	296	332	
13th March 1916	294	335	
22nd March 1918	288	340	
30th March 1916	285	340	
4th April 1916	278	340	
AVERAGE	242 =	271 =	
	219 per 800 lbs.	23 per cent. (roughly) higher price for Navsari over Broach.	
5th February 1917	400	448	
11th March 1917	410	446	
17th March 1917	407	443	
24th March 1917	412	430	
29th March 1917	416	434	
2nd April 1917	420	447	
13th April 1917	426	445	
22nd April 1917	424	440	
AVERAGE	414 =	441 =	
	374 per 800 lbs.	18 per cent. over Broach.	
1918 AVERAGE	650 per 800 lbs.	740 = 13 per cent. roughly over Broach.	

This shows that the increase in prices for different cottons is not in the same ratio. When the prices of cotton rise the inferior cottons fetch comparatively better prices.

Bombay.]

Mr. CHANBASAPPA MADKI.

Mr. CHANBASAPPA MADKI, Merchant and Agriculturist, Sholapur.

EXAMINED AT BIJAPUR, FEBRUARY 16TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short-staple cotton.

1863. (1) **Experience.**—I am a resident of Sholapur and have been in touch with cotton cultivation nearly for the last twenty years during which period I have devoted myself to the study of the same and am fully acquainted and in touch with agriculturists to a great extent.

1864. (2) **Varieties.**—I am one of the executors of the late Rao Bahadur Warad's estates. The cultivation of cotton on that estate is carried on under my supervision. Irrigated and dry cotton is grown on the Warad's estate situate at Hipparga, Bhogaon and Bala in the Sholapur taluka and in certain places of the Akalkot State. So also *gaorani deshi* cotton is grown at Ainapurwadi in the Nizam's Dominions near Barsi town. The *deshi* cotton is a mixture of three or four varieties, viz., *karkeli*, *roscum*, *kumpla* and Upland Georgian. Recently the Agricultural Department has introduced N. R. (*neglectum roseum*) cotton (white flower and narrow lobed) and it is successfully grown in all the above places.

1865. (3) **Size of holdings.**—The total area under cultivation belonging to the late Rao Bahadur Warad is nearly 4,000 acres under my supervision, of which 1,200 acres is under irrigation and the rest is dry. Of this, 500 acres are under cotton cultivation, viz., 200 acres under irrigation and 300 acres dry.

(2) An average holding of a cultivator is about fifty to one hundred acres, and the proportion of the holding under cotton is about twenty to twenty-five per cent.

1866. (4) **Yields and profits.**—The yield of cotton in good black dry soil is about 500 lbs. per acre, while in light soil it is 200 lbs. per acre. If cotton is sown under irrigation and applied with sufficient farm-yard manure, it yields about 1,000 to 1,500 lbs. per acre. If cotton is sown after the rotation of sugarcane, it gives a very high yield. If the rainfall is normal, the yield of cotton is better, provided there is no crop disease. If the rainfall is abnormal, naturally the crop fails and yields less. The profit depends upon the market rate. Now-a-days the cotton market is very high. In the ordinary course, in my opinion, the profit per acre will be Rs. 50 only if it is sown under irrigation. If the cotton is sown in dry fields, the average profit per acre will be Rs. 25 only.

1867. (5) **Rotations and manures.**—Generally rotations of *bajra* and *juar* are followed. *Juar* rotation is specially preferred. In case of irrigated lands, rotations of sugarcane, groundnut and chillies are followed. Farm-yard manure is applied at the rate of ten to twenty cart-loads per acre. It is applied if there is no good rotation. The rotation of cotton is very suitable for *juar* crop.

1868. (6) **Comparative returns.**—*Deshi* long-staple cotton and exotic cottons are not grown in this part, so I cannot compare with *deshi* short-staple. I can say that the lint percentage of N. R. cotton is 35 to 40, while that of the *gaorani deshi* cotton is 25 to 30.

1869. (7) **Conditions effecting increase in area.**—In this part of our country, the short-staple cottons grows well. The Broach and other varieties were tried by me several times, but I found them quite a failure owing to some diseases. There is not certainty of early rains, so the short-staple variety is grown in *kharij* season. Cotton is not grown here in the *rabi* season. In these markets, the prices of both long and short-stapled cotton are almost generally very close to each other. The cultivation of long-staple cotton cannot be increased or encouraged unless some guarantee by way of assurance is offered to the cultivators that they can secure higher prices according to the quality in the market. It should be brought to the notice of the cultivators that the variety can be successfully grown without any disease and the yield must not be less than the present variety.

1870. (8) **Uses of seed and seed selection.**—Cotton-seed is used as cattle food in this part of the country and the surplus, if any, is exported to Bombay and Madras.

(2) Selection of seed was not in vogue in this part of the country, but now I have been importing about 2,500 lbs. of N. R. seed from the Jalgaon Farm through the Agricultural Department and I sow it separately and get the cotton ginned by, and supply the pure seed to, the Agricultural Department at moderate rates for distribution purposes in this district. Hand gins are not in use in this part. Seed ginned by machine is generally used for sowing purposes.

1871. (9) **General economic conditions.**—To encourage and introduce the cultivation of long-stapled cotton in this part of the country, there are in my opinion two things which ought to be done, viz., that the Government Agricultural Department should import such seed as would be congenial to the soil and distribute it among cultivators and show them that it is profitable to do so, and secondly, that there should be an agency to purchase the produce at profitable rates.

1872. **Effect of manure and irrigation.**—I this year tried oil-cake and poudrette as manure to the cotton crop. The manure mixed as above was applied to the crop when it was 1½ months' old. The crop was very vigorous and successful, but the continuous and heavy rainfall damaged it to a certain extent. Still the yield of this plot was rather more than of the ordinary cotton crop.

(2) N. R. cotton should be sown in early June. The crop should be heavily manured with farm-yard manure. The crop thus sown will be harvested before the end of January. After the harvest in January, I tried irrigating the same crop twice, or thrice at the interval of a fortnight. It was again full of flowers and bolls and gave a small yield of 100 to 150 lbs. cotton per acre. It is therefore hoped that this variety is suitable for dry and irrigated land of this side. In my opinion, the N. R. variety should be continued until a suitable long-staple cotton is tried and found successful.

Mr. CHANBASAPPA MADKI called and examined.

1873. (President.) I am a cotton merchant and an agriculturist. I grow about one hundred acres of cotton under irrigation. I grow *roseum* cotton, the staple of which is, I think, about half an inch. I planted it in the beginning of June and up to the middle of July. The first picking commenced in the middle of November and picking was finished by the end of January. The cotton is under irrigation. I have tried the better cottons under irrigation. I have tried Broach but the bolls did not open properly even after ten months.

Bombay.]

Mr. D. H. TAGARE.

I do not know whether this was due to disease but no cotton was picked. The Agricultural Department supplied the seed saying it was Broach. I have tried Cambodia under irrigation; but that also got some disease. The leaves became reddish like copper and the bolls did not open. So I gave it up. The irrigation is from a perennial canal from the Ekruk tank. For the present, we are getting a good outturn out of the Berar cotton, no disease and a high percentage of lint. It pays us better to go on with the local varieties. They stand a dry climate better as well as heavier rain.

1874. As a cotton merchant, I used to buy cotton for the mills. I used to have twenty gins but now they are not working. I have not heard of any case in which the cotton from Sholapur was sent to Dharwar to be mixed with Dharwar cotton. Most of the cotton is consumed by the Sholapur mills. There is a break of guage between Sholapur and Dharwar.

1875. I have tried experiments with manure but was defeated this year by excessive rainfall. I shall continue them the next year. I expect a very good crop of cotton, about 1,000 to 1,500 lbs. per acre, and the merchants also offer a very good price for that *kapas* as it has a high ginning percentage. The bolls open wider and picking is easier. For the present, there is no long-staple cotton in the neighbourhood of Sholapur. A good deal of experiment at work would be necessary before any one would take it up.

1876. (Mr. Wadia.) I used to buy a lot of cotton from the Nizam's Dominions—from Karkeli, Nander and other places for the Narsinghi Mills at Sholapur. I tried some of the seed of that cotton in our fields but it did not give as satisfactory results as we obtained from *roseum*; it could not stand the low rainfall. It requires twenty inches to thirty inches of rain but here we only get about fifteen to twenty inches which is not sufficient for long staple cotton. In my irrigated land, it did not give as satisfactory results as *roseum*. The outturn was about only 500 to 600 lbs. of *kapas* whereas the outturn of *roseum* is from 1,000 to 1,500 lbs. The ginning percentage of the long staple cotton was only thirty against forty for *roseum*. The merchants offer more for the short staple cotton than for the long owing to its higher ginning outturn and so cultivators are induced to go for the short staple cotton.

1877. (Mr. Hodgkinson.) The *roseum* cotton I have grown was from seed distributed by the Agricultural Department. I got it from Mr. Tagare, who ordered it from Jalgaon. That is the only sort of seed that the Agricultural Department is distributing. We have tried other varieties and are willing to try again if satisfactory kinds of seed are found. Up to the present, long staple cotton has not been successful.

1878. (Mr. Roberts.) I sell cotton for the cultivators. I sell it in the bazaar at Sholapur. I sell it in the open market in the form of *kapas* and also sell it to millowners. I do not gin it. I simply act as an *aratya* and sell it on commission to the mill owners who get it ginned. It is sold in *bhojas* of eight maunds of twelve seers each. The *bhoja* is the same everywhere in the Sholapur and Bijapur districts. We do not take a sample and hand gin it before settling the price in order to ascertain the ginning percentage. We just guess at it.

Mr. D. H. TAGARE, Divisional Superintendent of Agriculture, Southern Division, Sholapur.

EXAMINED AT BIJAPUR, FEBRUARY 16TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

1879. **Cotton cultivation in the Sholapur District.**—Cotton is not an important crop in the Sholapur District as compared with *juar*. The total cultivated area in this district is 1,980,000 acres. In 1892-93, the area under cotton was only 6,446 acres of which Karmala Taluka grew 4,134 acres. Since then the area is increasing; in 1914-15, the area under cotton was 117,840 acres. In that year, the area was distributed as under:—

	Acre.
Sholapur Taluka	9,417
Barsi Taluka	7,509
Karmala Taluka	52,710
Madha Taluka	25,884
Sangola Taluka	2,493
Pandharpur Taluka	11,792
Malshiras Taluka	8,035

Barsi is the largest centre for cotton. But it grows very little.

1880. (2) **Varieties.**—All other cotton-growing tracts have a separate variety of their own, while this district grows a mixture. The mixture contains the following varieties:—

(1) *Waradi*. (2) *Kumpla*. (3) *American*.

(2) The following is an analysis of cotton grown in different Talukas:—

Name of Taluka.	Waradi per cent.	Kumpla per cent.	American per cent.
Sholapur	96	0	4
Pandharpur	82	0	18
Malshiras	75	3	22
Sangola	68	2	30
Madha	90	0	10
Karmala	95	4	1
Barsi	88	8	4

Waradi cotton contains both types, yellow and white flower—*roseum*.

Bombay.]

Mr. D. H. TAGARE.

[Continued.]

1881. *Cultivation of cotton*.—Cotton is generally grown after *juar*. Land for cotton is not ploughed. It is harrowed twice or thrice in the summer. Land after cotton is generally ploughed. When there is sufficient rainfall, cotton is sown from the middle of June to the middle of July. The seed rate is from eight lbs. to twelve lbs. per acre. It is sown with the three coultered drill. The distance between two rows is one foot. It is generally weeded and hoed once. Picking commences from the middle of October and lasts till the end of November. In all, cotton is picked four times. The yield of seed cotton per acre is 500 lbs. to 600 lbs.

1882. *Cotton under irrigation*.—Rainfall in Sholapur District is not certain and regular. Cultivators are now growing cotton under irrigation. The area is very limited, for the present about 1,500 acres. It is only grown in some villages in the Madha and Sholapur Talukas. The land is prepared and ridges are made 18 inches to 24 inches apart. Seed is dibbled on both sides of the ridges, at the beginning of June. If there is rain, no irrigation is given. If there be no rain, the field is irrigated. Further cultivation consists in weeding the field twice or thrice. If there is scarcity of rainfall, the crop is irrigated every fortnight. If there is regular rainfall, the crop is not required to be irrigated. The yield varies from 1,000 lbs. to 1,500 lbs. per acre, according to the condition of the land. In this precarious tract it is better to protect the crop by irrigation. As it is sown early with irrigation, it is not spoiled by the late rains.

(2) Round about Sholapur cotton is grown under canal irrigation. On the estate of Rao Bahadur Warad, cotton grown under irrigation gave an average yield of 1,500 lbs. in a lot of ninety acres. There is much scope for extending the cultivation of cotton under irrigation. Cotton requires three or four waterings. One watering in December increases the yield by one-fourth. Irrigation increases the quantity but deteriorates the quality.

1883. *American cotton*.—American cotton (Upland Georgian) is grown in the crop of chillies in Malshiras, Sangola, Pandharpur and Madha Talukas. The area is very small. When cotton is sown along with chillies the yield of chillies is less and the yield of cotton is not sure. It is always attacked by some disease. Chillies, are planted in ridges 18 inches to 24 inches apart and cotton seed is dibbled on the opposite side of the chillies. The cotton plants receive all the operations such as weeding and irrigation along with the chillies. Irrigation is stopped after chillies are harvested. The yield of cotton varies from 300 lbs. to 400 per acre.

1884. *General*.—Cotton grown in this district is short stapled. It is used in mixing. The variety grown here is *waradi* (*roseum*). In this district it is not grown to a great extent. Several villages do not grow it at all. The total proportion is one to nineteen. Only Karmala grows one-sixth of the whole cultivable area. Madha grows one-tenth.

1885. (3) *Size of holdings*.—The average holding of a cultivator in this district is forty acres. In Karmala, one-third is grown under cotton. In other *talukas*, one-eighth area is put under cotton. Several cultivators do not grow cotton at all.

1886. (4) *Yields and profits*.—The average yield of cotton is 500 lbs. per acre. In ordinary years, the value is Rs. 50. The cost of production is Rs. 20.

1887. (5) *Rotations and manures*.—In the dry cultivation, *juar* is grown in rotation with cotton. In the irrigated cultivation, no special rotation is practised. Generally cotton is not manured. In case it is manured, the manure used is farmyard manure. No special manures are used.

1888. (6) *Comparative returns*.—Only *waradi* cotton is grown. The yield compares as under :—

Crop.	Yield.	Value.	Cost.	Profit.
	lbs.	Rs.	Rs.	Rs.
Cotton	500	50	20	* 30
Juar	600	30	15	15

1889. (7) *Conditions affecting increase in area*.—No exotic or long staple cotton is grown. The area under cotton fluctuates to a great extent in this district. This chiefly depends upon the following :—

(1) Price of cotton and (2) Early rains.

High prices for cotton are prevailing and the cultivation of cotton is naturally increasing.

1890. (8) *Uses of seed and seed selection*.—There is no other use made of cotton-seed except feeding to cattle. No seed is selected for sowing. The Agricultural Department has now taken up the subject and arrangements are now being made to supply pure *roseum* seed.

Mr. D. H. TAGARE called and examined.

1891. (President.) I am the Divisional Superintendent of Agriculture, Southern Division. I passed out of the Baroda College in 1895. I took the diploma in agriculture as there was no degree examination then. I was then appointed to the Poona Farm where I worked for three years. After that I went to the Nadiad Farm in Gujarat of which I was Superintendent for twelve years. Then I was transferred to Sholapur as Divisional Superintendent. My duty is to tour in the districts to induce the cultivators to take up the improvements recommended by the Department as worked out at Poona and Dharwar. I have two districts in my charge, Sholapur and Satara. The main crops in Sholapur are *juar* and cotton. *Juar* is much the more important of the two. The three varieties of cotton that are grown here are *waradi*, *kumpta* and American. Sangola adjoins Satara district.

1892. In Sangola, Malshiras and Pandharpur Talukas, American cotton is grown mixed with chillies as an irrigated crop. That is the reason why so much American is grown there. There is no hand ginning done in these districts but in some of the villages there is hand weaving. American cotton is always attacked by red leaf blight. That has been my invariable experience. But the great difficulty is to get the proper value of the American cotton. Even in Sangola, Malshiras and Pandharpur where they grow American cotton, the cultivators only get the price of ordinary cotton. There must be some buying agency to buy even the smallest quantity. These three districts are large cattle breeding districts.

1893. (Mr. Roberts.) The type of American cotton grown in these districts is Upland Georgian, the same as Dharwar American. No work has been done on it. There is no buying agency. Where it is grown, it is grown pure and is not mixed with *waradi*. *Waradi* cotton is a Khandesh mixture. It is *neglectum roseum* both yellow flowered and white flowered. It contains broad lobed and narrow lobed types. If the cotton is grown from seed bought in the bazaar, there is some American in it. The American cotton grown in the district is sold to the gins where it is mixed with other cotton and so we get mixed seed. We get *roseum*

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seed from Jalgaon for distribution. In order to ascertain the proportion of the different varieties in the mixture, what I did was to purchase bazaar seed from various bazaars in the different *talukas* to sow it in plots, and then to count the number of plants of each variety and strike an average. I have not got any complete analysis taluk by taluk of *waradi* cotton. The Khandesh mixture in the cultivators' fields contains several types. One of these types is the same as Upland Georgian and the proportion of it in the mixture varies from three to twenty per cent.

1894. *Roseum* has been given out without any field tests. I am putting out *roseum* seed from the Dhulia Farm. During the last two years 20,000 lbs. of N. R. seed have been imported from Dhulia farm sufficient for 2,000 acres. We shall have the same area next year. We cannot proceed regularly unless we have our own farm. Mr. Gammie has experimented with Sindewahi cross on cultivators' fields at Sholapur. It was spoilt by rain. Up till now I used to get seed from Khandesh. As they cannot spare such a large quantity, I have now to reserve fields for selection of seed when the fields have been selected, then I uproot the other useless plants and get the cotton ginned separately. I have no staff except one non-graduate fieldman. So there are only two of us.

1895. There is not much prospect of increasing irrigation here. There is one tank at Sholapur. The water from that cannot be spared as Sholapur town and the mill industry depend upon it. The only irrigation that can be done is from wells. The Nira right bank canal is going right down to Bijapur. There are possibilities of irrigating cotton in that tract. The following are the irrigation works in the Sholapur District :—

Rajewadi canal, Ashti tank, Pathri tank and Ekrukh tank.

1896. (Mr. Wadia.) We only give out *roseum* seed. We are not trying anything else. We are giving out *roseum* seed because it is the most profitable variety. *Roseum* is a type of *waradi* and is the chief variety grown in Sholapur. It is the white flowered *roseum* which has been found suitable. It has been found by experience that it gives a high yield and high ginning percentage. Though I have not got a farm, I get experiments made in the cultivators' fields. I am making arrangements to produce my own seed from this year.

Mr. KRISHNA RADDI B. BHADRAPUR, M.A., Provincial Civil Service, Assistant Registrar, Co-operative Societies, Southern Division, Dharwar.

EXAMINED AT DHARWAR, FEBRUARY 18TH, 1918.

Written statement.

1897. *Preamble*.—I have been in actual touch with cultivators in the three districts of Belgaum, Bijapur and Dharwar, where cotton is cultivated extensively and is held to be the crop *par excellence*. My evidence may be conveniently divided into the three following heads :—

- I.—Cultivation of cotton.
- II.—Financing cotton-growers.
- III.—Trade in cotton.

1898. *Cultivation of cotton*.—(1) The two kinds of cotton grown largely in the three districts are *kumpta* and the Dharwar-American. The first is an indigenous variety known among the cultivators as *jowari* (*deshi*). It derives its commercial name *kumpta* from the Kumpta Harbour in the North Kanara District, wherefrom it was exported before the introduction of railways. The Dharwar-American is known among the cultivators as *vilayati* (English) and is a foreign variety introduced from America in the days of the East India Company. Lately, two new varieties, Broach and Cambodia, have been introduced by the Agricultural Department. Some of the more progressive and enterprising cultivators have taken to the cultivation of these on a moderate scale. Cambodia seems to be a good substitute for Dharwar-American. It is whiter in appearance and more silky to the touch and has fetched a distinctly higher price at the auctions than Dharwar-American which it is replacing. Its yield, if not more, is equal to that of Dharwar-American. Its superiority in quality realizes for the cultivator a higher price. All things considered, the cultivation of Cambodia promises to advance rapidly and more seed of the first class *kapas* should be made available to agriculturists. It also needs to be widely popularised among cultivators, most of whom are still ignorant of its superiority in quality and its high prices. The public auctions organised by the Cotton Sale Societies are bringing home to many an apathetic *ryot* the decided advantages of its cultivation. The seed of the "special" and the "first class" cotton, as classified for auction purposes, is purchased by the Gadag-Betgeri Seed Society and a few intelligent cultivators. But the quantity of the seed is not sufficient to satisfy the demands of the cultivator. Hence, the Agricultural Department may step in to produce superior strains of this seed, the distribution of which may be left to the village credit and seed societies. Broach cotton is grown on a small scale in certain tracts, where *kumpta* is cultivated. But its cultivation has not caught on to the same extent as Cambodia, the reason probably being that it requires a heavier rainfall and that it exhausts the soil to a greater degree, as it takes a longer time to ripen and its roots shoot far into the soil. None of the above varieties—both old and new—are irrigated crops in the tract.

(2) The cultivation of *kumpta* and Dharwar-American cottons stands to be improved most in the matter of seed. Formerly the *kapas* was hand-ginned in villages and the *ryots* used the seed for sowing. But now that practice has wholly disappeared. The *ryot* supplies himself with seed from the gineries, where cotton of all kinds is mixed up. The seed is damaged, soiled and adulterated with dirt and inferior seed. The *ryots* buy this seed for cattle-feed and also uses a part of it for sowing. The result of using the adulterated and inferior seed is that the cotton crop will not be even and the outturn will be less. Besides, instead of growing one variety of cotton in one piece of land, he grows several varieties mixed up. When he takes the produce to the market for sale, it is found by the merchants not to belong to any of the recognised varieties. The purchaser that wants the *kumpta* variety rejects it as belonging to the Dharwar-American and the buyer of the Dharwar-American does the same, as he thinks it belongs to the *kumpta* variety. Thus rejected by both the purchasers, the mixed cotton generally brings a low price to the cultivator. The ignorant cultivator is not aware of the true causes of the low price. He fancies that his cotton, by some misfortune or deceit at the hands of his *dalal*, is sold at a lower rate than that of his neighbour, who had grown pure cotton. The remedy lies in educating the *ryot* to the commercial side of cotton cultivation. He should know what the requirements

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of the buyers are, what kind and quality of cotton is superior or inferior. In fact, now he knows nothing of discriminating between good and bad cotton. He thinks that any cotton is as good as any other. Few cultivators understand of what advantage pure and long staple cotton is to the consumer of cotton, viz., the mill-owner. Cotton sale societies are, in my opinion, the best agents to teach the cultivators the commercial side of cotton. When they themselves become sellers through co-operative societies, they will come to know of the requirements of consumers of cotton, and as they produce only to sell, they will begin to produce that which fetches the highest price. The loss to the cultivator in using bad seed is enormous and the only way to prevent it is to provide him with good seed. He is not averse to using pure seed, but the fact is, he cannot get it in the market. Two agencies can come to his help in this matter and they are the Agricultural Department and co-operative societies. The former can grow pure seed by setting up seed farms and the latter can easily undertake its distribution. The establishing of seed farms is, I submit, one of the most important of all the measures that can be adopted to improve the cultivation of cotton. Co-operative seed societies, too, can do something to procure good seed for their members, independently of seed farms, and that is, by arranging with local cultivators to grow seed specially for them, which they purchase and sell to their members. But the success hitherto achieved in thus meeting the problem of the supply of good seed has not been very hopeful, and hence the paramount necessity of establishing by Government seed producing farms, upon which distributing agencies and cultivators can rely for their supply of pure seed of all varieties.

(3) The cultivator now pays little or no attention to clean picking. The *kapas* is gathered by three or four pickings at intervals. Picking generally begins at about 10 A.M. and goes on all the remaining part of the day. The *kapas* as it is picked is heaped on the bare ground without any protection from the wind. It is this method of picking that is responsible for the mixture of cotton with dry leaf, dirt and earth. The measure that I would advocate for clean picking is, that it should always be done in the cool hours of the morning and day by day as bolls open. The *kapas*, as it is picked, should be kept in large bamboo baskets. The dry leaf of *kumpla* is very brittle and gets easily mixed up with the *kapas*, if pickings are done during the hot hours of the day. If the *kapas* is gathered in the way I advocate, there would follow another great benefit in its train. It is a fact that the supply of labour in rural districts falls far short of the demand at the time of harvesting. In years of plenty, the dearth of labour becomes so acute that crops cannot be gathered in time and are damaged by the early rains and storms and the cotton crop is peculiarly liable to damage from this cause. Many a cotton crop, with the bolls fully open and the *kapas* hanging loose from the pods at the mercy of even small gusts of wind, are spoiled entirely by hot weather rains, which are usually accompanied by heavy winds. If picking is practised continuously day by day, not only is clean picking ensured thereby, but even the crop will be immune from the damage of early rains. The available quantity of labour being well distributed all over the season, the evils and inconveniences attendant upon the insufficiency of field labourers will be greatly mitigated.

1899. *Financing of cotton-growers.*—Financing cotton cultivators is a problem which is intimately connected with the cultivation of cotton. Provision of cheap agricultural credit has an importance—all its own—in this country where the peasantry is known to be heavily debt-ridden. The cultivator has to approach the door of the *sahukar* and the *dadal* for being financed at every step and stage of his industry. With the usual high rates of interest which these people extort from him, it is impossible that farming will be remunerative to him. Hence the provision of cheap credit is essential and the best means of doing it is to encourage the peasantry to establish co-operative credit organisations. I do not advocate agricultural banks side by side with co-operative societies. I can say, from my experience of village conditions, that a cultivator who is independent of the *sahukar* for his finance maintains good bullocks, furnishes himself with efficient implements, tills his land better, keeps it free from weeds, maintains it in an entire state of repairs, gives it more manure and uses better seed. The result of all this is that he gets a greater outturn than his neighbour, whose economic condition is not so good as his. This is the difference between cultivation which is fed with adequate capital and that which is starved for it. In my own village, I observe that several cotton fields give but a poor crop, for no other reason than that the cultivator cannot afford money to remove the grass from the crop. All these and other sundry difficulties are sure to disappear by a net work of well managed co-operative societies.

1900. *Trade in cotton.*—(a) *Co-operative cotton sale societies.*—Many of the corrupt practices to which the cotton trade is now exposed, can be removed by a closer connection between the producer and the consumer. In my opinion, the cotton trade has suffered more than any other by the intervention of unnecessary middlemen. Cotton sale societies are, therefore, to be welcomed, as they serve to bring the cultivator and the mill-owner face to face and create a better and healthy understanding between them. The ryot will be educated to the commercial side of the cotton industry and this knowledge is sure to have a wholesome and civilizing influence on his ways and methods of cotton cultivation. Herein lies the great importance of cotton sale societies. The second advantage which the societies confer on the ryot is that he gets fair prices and honest weighments, which it is not often his lot to get in the present state of market. His cotton is also disposed of more economically through sale societies, as the rate of commission charged by them is less and he is not mulcted of his profits by way of unreasonable market cesses. The working of these societies has been admirably described by the Registrar, Co-operative Societies, in his evidence, and hence I do not propose to deal with it here at all. I would only add a few suggestions on State and other aid which may be beneficially extended to them :—

1. Municipalities and Government should assist them in procuring sites in the cotton green and erecting godowns, etc.
2. The publication of Bombay prices at these societies has proved very beneficial and it should be continued as now at the cost of Government.
3. A special officer to supervise and develop the existing societies and start new ones in favourable centres should be appointed.
4. The railways should be asked to give concessionary rates for the carriage of cotton, to be sold through sale societies.

(2) (b) *Auction sales.*—Two of the four societies sold last year Broach and Cambodia cotton by public auction. By this, the cultivator realized higher prices than he could have done if he had sold his cotton by private treaty. If this method of selling cotton is extended to *kumpla* and Dharwar-American, it is believed that the ryots might be benefited.

3(c) *Difficulties of cotton sale societies.*—The working of these societies and making them a success is attended with very great difficulties. On the one hand, we have to face the opposition of established *dadals*

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with great business ability and command of resources, and, on the other hand, we have to overcome the apathy of the cultivator. He has long been used to the *dadal* system and it is not the least difficult part of our work to wean him from it. Even the slightest irregularity in the sale society is likely to alienate his sympathies and he is too ignorant to realize that the sale society is his own institution and that it requires some time to get over the initial difficulties. He at once institutes comparison between the *dadal* and the society, and by some apparent advantage which he gets from the former, he draws conclusions of his own adverse to the society. I am inclined to believe that much strenuous and up-hill work lies before us in educating the ryot and convincing him of the benefits of the sale societies. I have not the least doubt that these societies will survive the present struggle and become successful institutions; but this optimistic view must not prevent us from realizing the magnitude of our initial difficulties. I take the view that, for a few years to come, the volume of work done by these societies will not be very considerable, as they have to live down the calumny of the interested *dadal* and the ignorance of the cultivator. The importance and urgency of State aid and sympathy to them can hardly be over-rated at their infantile stages, and I hope they will not be starved for it.

Mr. KRISHNA RADDI B. BHADRAPUR called and examined.

1901. (President.) I am in charge of co-operative work in the five districts of Dharwar, Bijapur, Belgaum, Sholapur, and Karwar. Except in Karwar and Sholapur, the main crop is cotton. There are 220 credit societies in the Dharwar District alone. It has got the largest number of societies in the Presidency. The average number of members in each society is about 100. Almost all the members are cultivators. Most of these credit societies are to be found in the cotton growing tract. The chairman and other members of the managing committee are usually cultivators. The secretary is generally the village school master or the *kulkarni* (village accountant). There are about ten societies which are not credit societies, but are sale societies, cotton sale societies or societies for the hire of implements. The seed societies get their supply of seed either from the Dharwar Agricultural Association, from the Dharwar farm or from selected growers. They distribute seed to their members. Selected growers may not necessarily be members of seed societies. The Gadag seed society has been going on for the last six years. It is only during the last two years that the society has been asking its members to grow seed under certain conditions. In previous years, it used to get seed from the Dharwar farm and the Agricultural Association. The liability of the society is unlimited; it raises loans and it also receives deposits from outsiders. There is not much difficulty in getting loans from outside. It can get enough money at the rate of 6½ per cent. per annum. Last year the society bought seed worth about Rs. 2,000. That was paid for by the society as a body and the seed was then sold to the members. The seed is bought at the market rate which varies. The society may have to pay a higher rate for good seed. For instance, if ordinary cotton seed or wheat seed were selling at five seers per rupee, the society might have to buy good seed at four seers per rupee. It has to sell it at a small profit, as the seed has to be cleaned and stored which means expense, so that seed bought at four seers per rupee might be sold by the society to members at 3½ seers. The seed societies do not advance money; they only advance seed. They fix the value when the seed is issued. The Gadag society employs a supervisor to see that the members' fields are sown with the seed supplied, but this is not possible in the case of all societies. The profit is carried to the reserve fund.

1902. There are three seed societies at Hubli, Dharwar and Gadag. The Hubli seed society sold cotton seed to its members worth about Rs. 5,000. We have four cotton sale societies at Dharwar, Hubli, Gadag and Annigeri. They commenced work only last year. The Dharwar sale society sold 129,566 pounds of *kapas* by private treaty and 398,804 pounds by auction. The Hubli Society sold 2,34,514 pounds, all by private treaty. The Annigeri society sold 545,420 pounds, all by private treaty. The Gadag society sold 213,780 pounds by auction and 595,259 pounds by private treaty. These societies collect their capital by way of stores and deposits, but they do not require much money. They charge a varying rate of commission, which goes to their general funds. The rate of commission differs in different societies.

1903. I think that the development of co-operative work in cotton sale is of sufficient importance to justify an officer being placed on special duty for that alone. If that were done, cotton sale societies would go ahead. The cotton is graded for auction purposes by one of the Agricultural Overseers and by the Agricultural Organizer who is working under me. The Agricultural Organizer is permanently attached to me and belongs to the Co-operative Department. The Overseer and the Organizer do not watch the fields to see whether the seed is kept pure.

1904. (Mr. Roberts.) The cotton sold by the Dharwar society was *kumpla* and Broach. The *kumpla* was sold as it came to the society day by day for three months, but the Broach cotton was all sold by auction on one day. As soon as the cotton arrives in the society's cotton godown, merchants are called in and the cotton is sold. We do not classify it. We classify only for auctions but not for sale by private treaty. The cultivator gets honest weighments and he also gets fair prices, as the societies' officials know the Bombay prices by wire. The chairman of the Dharwar sale society informs me that he got on an average Rs. 2 per *nag* above the ordinary prices. The rates of commission differ in different places. The Dharwar and Hubli societies charge twelve annas per *nag*; the Gadag society charges four annas. The ordinary bazaar rate of commission is twelve annas per *nag*. The advantages of selling through the societies are honest weighments and better prices. At the auctions, the Agricultural Overseer and the Agricultural Organizer classify the cotton on ginning percentage, cleanliness and colour. All the *kapas* that was sold by auction at Dharwar was Broach. We advertise the date of the auction sale and the cotton comes day by day for about two weeks before the auction. It takes a few days to make everything ready for the auction. The cultivators empty their carts and return home after receiving a receipt for the weight. Some of them are present when the auction is held. Payment to the cultivators is made on the basis of actual weight shown in the receipt. The cotton belonging to each cultivator is not kept separately. I do not think that the weight goes down very much, even though the cotton is kept for some days before the auction. We always deduct two pounds for shrinkage from the original weight and fourteen pounds for weight of gunnies. This is per quarter *nag*. The officials of the society conduct the sales with the help of the agricultural officers. The Collector sometimes attends the auction on request being made by the societies' officials. The society advertises its auction sales by publishing notices in the newspaper and by distribution of hand bills all over its area of operations. In addition to the commission fee per *nag*, the society charges insurance fees; the cotton is not insured to its full value. If the total value were Rs. 75,000, the society would insure for about Rs. 40,000. There is no inspection in the field of Broach cotton. We simply trace the Broach cotton as Broach by taking the ginning percentage.

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1905. (Mr. Wadia.) I have had no agricultural experience except as a born cultivator. I would advocate the distribution of pure seed and the establishment of more seed farms. The societies have not sufficient experience in the matter of growing seed themselves but they can help in the way of distribution. I want the Agricultural Department to grow pure seed in the first instance. A sufficient staff should be maintained by the Agricultural Department and not by the Co-operative Department. When the Agricultural Department wants to extend operations it should select more growers and get their seed as well. The cultivator must be made to know by means of auctions and sale societies that clean cotton brings higher price. Then he will make efforts to pick cotton more cleanly. I would educate him by holding auction sales, and when he sees that clean cotton brings a few rupees per *nag* above the ordinary price, he will understand the reason. He will be taught a practical lesson and will try to pick his cotton more cleanly. There is no doubt that auctions have an educative effect. At our auctions, cultivators discuss why one man's cotton went into the first class, another's into the second, and so on.

1906. Cotton picking coolies are paid by being given a share of the cotton picked, one-eighth or one-sixteenth or something like that, so that if cotton gets a better price owing to being picked clean, they would also share in the benefit. It is when they are paid by weight, as in Dharwar and Hubli towns, that they mix pods and dirt with *kapas*. Cotton is not picked every day. There are three or four pickings in the season. If cultivators want to pick cotton cleanly a small number of coolies should be permanently engaged to pick it, as pods open.

1907. *Baniyas* in this district advance money to cultivators. Sometimes they advance money against standing crop and sometimes on condition that the cotton should be sold through them. The usual rate of interest is one per cent per month. They do not fix the price of cotton at the time they advance money.

1908. The sale societies work in the cotton markets. They have to lease sites and godowns from *dalals*; they have no sites of their own. They require sites for godowns. The Berar system might be tried in one of the markets here. The great thing wanted is that the *dalals* should be under some control.

1909. There is such a scarcity of waggons during the cotton season that cultivators have sometimes to wait for a long time to move their cotton to the market and in the meanwhile prices may go down. Even in ordinary times during the harvest, the railway authorities are not in a position to supply enough waggons to cultivators. *Kapas* is transported by rail from Huveri to Hubli, the distance between which is about sixty miles. It pays to transport *kapas* by rail even this short distance. A lot of cotton is brought by cart too. Merchants and millowners buy *kapas* and get it ginned. Petty merchants buy with a view to resell. They mix different kinds of cotton in order to get a higher ginning percentage, and afterwards sell to bigger merchants.

1910. (Mr. Hodgkinson.) The cotton at the auctions is classified as special, first, second, third and fourth class. It is graded for ginning percentage. We do not grade for staple.

The Honourable Rao Bahadur VENKATESH SHRINIWAS NAIK, Land-owner, Ranebennur, Dharwar District.

EXAMINED AT DHARWAR, FEBRUARY 18TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

1911. (10) Experience.—My native place being Ranebennur which is situated at the southern part of the Dharwar District and on the borders of the Mysore State and the Bellary District of Madras Presidency, and as I have been staying at Ranebennur since my boyhood, I have a knowledge of the cultivation of cotton in the southern part of the district as well as in the adjoining cotton-growing tracts in the Mysore State and Bellary District of the Madras Presidency. I have actual touch with the cotton cultivators. I have myself maintained an agricultural farm and grow cotton in it.

1912. (11) Varieties.—*Kumpla* and Broach varieties of *deshi* long staple cotton are grown in this district. In this part of the district *kumpla* cotton is mostly grown. It is called *javarhatti* literally meaning "local cotton." During recent years, the Broach cotton and *kumpla* cross have been introduced by the Agricultural Department and the former is grown on a considerably larger scale in the northern cotton-growing *talukas* of this district. In the southern *talukas*, it was found in the first place to wither on account of long drought of rain in August which is peculiar to the southern *talukas*, and to grow and be more leafy at the end and therefore it is not grown on a large scale. The yield of cotton on this side of the district is a little later than in the northern and eastern part of the district and Broach cotton, unless it is grown on larger scale, does not find a good sale and the little cotton that is grown here will not be ready for the auction sale held at Dharwar by the Agricultural Association, and this has discouraged the people to try and grow Broach cotton in this side of the district.

1913. (12) Size of holdings.—The holdings in this part of the district vary so much that it is difficult to fix an average. The average size of a field may be taken to be ten acres. All the fields belonging to a holder are not usually situated in compact areas. In most cases they are so very scattered that improvement on large scale cannot be made by an agriculturist, though he holds 100 acres or even more. Generally *deshi* cotton is sown in black soils and half the portion of the holdings is usually under cotton cultivation.

1914. (13) Yields and profits and comparative returns.—The bumper yield of *kumpla* cotton is twenty maunds per acre and fifteen maunds per acre can be taken as an average crop in a year of good season. The profit differs according to the working facilities an agriculturist has usually got with him. There are two classes of agriculturists, viz., actual tillers and those who get their land tilled through servants and labourers. Actual tillers can grow their produce at a much cheaper cost than those who engage labour for tilling the lands and consequently the profit earned by the former class is much greater than the latter. There is no *deshi* short staple cotton on this side, and so I can't give any comparison with it. Broach cotton has been introduced in the district by the Agricultural Department. It has been more successful in the northern *talukas* than in the southern. The climatic conditions, viz., the drought in August and late rains as far

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off as November, December and even in January are not suitable to Broach, as by the drought it withers and by the late rains it grows leafy, does not yield along with other varieties of cotton and is damaged by mango showers in March and April. Though the Broach variety fetches at higher price in this part of the district, the yield of cotton being later than in the northern and eastern, probably due to climatic conditions, it will not be ready to be sent for auction sale arranged in this district by the Agricultural Association. As such, the ryots do not get good value for the crop grown here and this has been one of the causes for dissuading the ryots to grow this variety and so I can't give any comparison as to profits. As compared with other crops, the money value of the cotton crop is apparently always higher, but in reality it can be said to be equal to food-stuffs grown, viz., *juar*, wheat, pulses, etc., taking into consideration the value of fodder and other things got out of these crops. On account of the rotation of crops which every agriculturist will have to make both for proper cultivation and need of fodder, food-grains and cereals required for their living and that of the cattle, cotton is grown in a field every alternate year. As compared to the exotic cotton, grown on this side, viz., Dharwar-American, the yield is about a couple of maunds less per acre, but this variety is usually not susceptible to diseases and the yield is also got in one or two pickings and therefore the agriculturists grow this on a considerable scale. Moreover, this variety does not require so much manure as Dharwar-American and grows better than Dharwar-American in inferior black soil.

1915. (14) Rotations and manures.—The rotation of crops on this side is usually *juar* with minor crops (cereals) and cotton. In some cases, the rotation is wheat or gram and cotton. In the northern and eastern part of the district, the rotation of wheat and cotton is more frequent. Farm-yard manure is applied every second year by an industrious, careful, and well-to-do agriculturist with few lands and a vast quantity of manure or every fourth year by ordinary agriculturists. Manure is applied after taking cotton crop, that is, before sowing *juar*, wheat or gram. Ten cart-loads per acre is a good application of manure, but it much depends upon the ability of the agriculturist to purchase and the quantity available in the locality. The manure produced in the house of an average agriculturist will not usually be sufficient for his holding and there is almost a keen demand for manure, and in some places there is even keen competition for its purchase. Manure is usually not allowed to be taken from one village to the other, though this could not be legally done; if neighbouring villages take manure for their fields, the ryots residing in a place where manure is taken from kick up a row.

1916. (15) Conditions affecting increase in area.—I can't name any special and specific conditions which would affect any increase in the area under cotton cultivation. Generally cotton is sold by the growers as seed cotton and it is the merchants who get it ginned and the growers are not concerned with the length of the ginning season. Cotton is not grown on this side under irrigation. Though to a certain extent climatic conditions affect the growth of cotton, it has not been so very serious as entirely to dissuade the agriculturists to lessen the area under cotton cultivation. Food-crops are grown not for the sake of competition, but for the sheer necessity of rotation of crops and to find food-stuffs for human beings and fodder for cattle living. The limitation of rotation of crops, viz., cotton and food-stuffs, is essential for the proper growth of both cotton and food-stuffs. The question of labour is applicable both to food-stuffs and cotton.

1917. (16) Suitability of existing varieties.—I think that the right type of *deshi* long staple cotton is introduced in this district. Some experiments to improve the local *kumpla* variety should be made in the Government agricultural farms and the crops introduced in the district. The purity of Broach variety and its superiorities might be maintained by importing pure seeds from Broach side. Any other superior variety should first be tried on the Government farms and, if proved successful, it should be introduced in the district. The varieties successful in the north or east, say Dharwar or Gadag sides, cannot be successful in the south as has been the experience in the past with Broach and Cambodia cottons. A farm in the southern part of this district is necessary for these cotton experiments. The climatic condition in the south differs from that in the eastern and northern part of this district. Some auctions sales for the sale of Broach or Cambodia cottons grown in the southern part of the district should be arranged, as the yield on this side is rather late or the auction sale at Dharwar or Gadag should be held in the latter part of June, but on account of the break of the monsoon at Dharwar in the first or second week of June, this suggestion is not practicable at Dharwar.

1918. (17) Prevention of mixing of different varieties.—The mixture of cotton usually found in this district is of the *kumpla* and American varieties. In the first place, pure seeds are not available and the agriculturists do not care after sowing and after the plants have grown sufficiently high, to recognise whether they belong to *kumpla* or American variety, to pick them out and have a yield of one variety of cotton for two reasons, namely, loss of quantity in the yield of cotton if the number of plants are reduced and the deep-rooted sentiment they have that it is a sin to pluck young plants which they have themselves sown. They usually do not understand the value of unmixed and pure cotton, and if such is brought in the market, it does not command a sufficiently higher and better price than the mixed cotton, to induce the agriculturists to shake off the superstition or to compensate the loss in quantity of the yield they will have to forego by picking out the plants. At the time of picking cotton, the agriculturists do not take care to pick out cotton of different varieties grown in a field mixed on account of mixture of seeds as this work of picking is usually done by the coolies, who are paid on the work turned out and consequently who are eager to turn out more work and earn higher wages. The growers also, being in a hurry to bring their produce sooner to their homes on account of climatic conditions, namely, for fear of the yield being damaged by rains as well as on account of the dearth of coolly labour, they do not care to have the cotton grown in one field picked separately and more carefully. The slight variation in the prices of these two varieties is one of the reasons for agriculturists to mix them. The traders also, chiefly the middlemen between the growers and consumers (mill-owners), mix cotton of different varieties both in the factories and outside for the sake of profit. Even for the sake of spinning, I am told, mixture is done in the factories. The blow room waste also is mixed in ginning and pressing factories by the middlemen for the sake of making better profits. When mixed cotton finds a ready sale and the middlemen have no other responsibility or sense of duty to the country except making money by fair or foul means, it is very difficult to suggest any remedy. The middlemen, I am also told, bring inferior varieties of cotton; even short staple ones, from as far off places as Khandesh, Sholapur, etc., to Hubli for the purpose of intentionally mixing it with good cotton and selling the mixture as Hubli cotton in the Bombay and other markets. The only remedy to stop growing mixed cotton by the agriculturists is to supply pure seeds to them by establishing large seed farms at suitable centres, by growing cotton on them suitable to the soil, and by distributing unmixed seeds to the ryots who are ready to pay a little higher price for pure and unmixed seeds and to buy from them only unmixed cotton. To stop the mixture by the middlemen, the mill-owners in India and cotton exporters to foreign countries should, as a rule, not purchase mixed cotton and some prosecutions for deceit, in my opinion, could stop this malpractice.

Bombay.]

The Hon'ble Rao Bahadur VENKATESH SHRINIWAS NAIK.

[Continued.]

1919. (18) **Uses of seed and seed selection.**—The only use to which cotton seed in this part of the country is made is as concentrated food for draught and milch cattle. After providing for local consumption for this purpose, it is exported in large quantities by the exporting European firms, and to the Madras Presidency where cotton is not grown for feeding cattle. It is also exported by the cotton oil-extracting factories in the Central and Northern India. Seed-selection is not at all practised. The ryots usually keep or pick separately the best yield of their crop and sell it to the middleman who purchases their cotton with an understanding that it should be separately ginned and seeds should be sold to them, but the middleman, though he asserts that he does so, not only deceives them in this respect, but, on the other hand, takes from them a much higher price for the seeds he supplies, which is no better than common mixed gin seeds. The deceived agriculturists, when they realise that they have been deceived, do nothing but curse the middleman (their purchaser). No hand-gins are now-a-days used for the purpose of separating seeds for sowing, although it used to be a practice before power-gins were introduced. As the ryots do not get a better or equal price for hand-ginned cotton and as they also do not get in their fields unmixed cotton, this practice of hand-ginning is not in vogue and has been out of date. It is essentially necessary that there should be seed farms in different parts of the district as the seeds from northern and eastern parts of the district do not grow so very well in the south and vice versa. Pure and unmixed seed from America should be imported and grown on those seed farms for a couple of years for being acclimatized to the soil and then they should be distributed to the ryots. Broach *kumpla* and *kumpla* cross, which was recently introduced by the Agricultural Department, should also be grown on a large scale on the seed farms for the purpose of seeds only and after due selection the seeds should be distributed to the ryots who are ever willing to pay and actually do pay higher price for seeds.

1920. (19) **General economic conditions.**—A great deal of deceit is practised in weighing the *kapas* and ginned cotton by the petty dealers in cotton and by the *dalals* in big markets, the former to earn unfair profit and the latter due to a custom which is peculiar to each market, of course, laid down by these *dalals* for the benefit of the big purchasers at the cost of the poor agriculturists, who grow the produce. There are two systems of weightment, viz., loose cotton, maund by maund, with a stone and a country scale, commonly a piece of strong bamboo, say five or six feet in length, with a hole and string in the centre for hanging and two holes at both ends for suspending gunny for weight on one side and for cotton on the other, and on scales with cotton packed as *docras* in gunny bags, say from ten to fifteen maunds. In the former system, each weightment is of one maund (1,040 totals) and at each time the cotton side is always lower and thus the ryot loses a great quantity in weightment both by the dexterity of the weighman, who is always a servant or a partner of the purchaser and therefore watches his master's interest in a greater degree, and the defects in the scales which the purchasers are careful enough to keep in their favour. In the latter system, when cotton is brought in *docras* for sale, fourteen to thirty lbs. is deducted from each *docra* for tare, though the weight of gunny is not more than seven to nine lbs. The fixing of the scale for tare is done without consulting the agriculturists by the *dalals* and purchasers and depends upon rain, moisture in the climate and the rubbing of the bales to the cart wheels when bringing the cotton to the market, etc. In addition to this two to three lbs. is deducted from the weightment of each *docra* as sample. In this way the cultivators are greatly deceived, and as they have no other alternative but to sell their cotton, they suffer great loss. The *dalals* are more inclined towards the purchasers who are mostly rich persons and pay handsome commissions. The remedy for this, I think, is to open, when cotton transaction is conducted on a large scale, an institution for weightment both for loose cotton and in *docras* (packed in gunny) at a nominal or actual cost of such weightment fixed on the weight and to enforce, if necessary even by legislation, that weightments in cotton dealings should take place in these institutions only.

(c) *Exotic cotton.*

1921. (21) **Varieties.**—The only variety of exotic cotton grown in this part of the country is Dharwar American (New Orleans variety) locally called by the name *valayiti*, literally meaning western cotton. It is a long staple cotton, but the staple of this variety is a little shorter than *kumpla*. In this part of the district there are again two classes in this variety of cotton, viz., early variety, called locally *mungari*, and late variety called *hingari*. *Mungari* variety is grown in red loam, alluvial or light soil and *hingari* variety in black soil only. *Mungari* is usually sown in June or early in July and commences to yield from November, whereas *hingari* is sown at the latter part of August or early in September and commences to yield at the end of February. *Mungari* is a little yellow-stained and contains a greater number of dead bolls, whereas *hingari* is white.

(2) Cambodia variety was tried here, but the yield was not so very much as the American variety. Moreover, the full yield of cotton here is usually received later than in the northern and eastern part of the district. Cambodia, unless it is grown on a very large scale, does not find sales. On account of late yield, it cannot be conveniently sent to the auction sale held by the District Agricultural Association at Dharwar and Gadag.

1922. **Soils in which American cotton is grown.**—Generally American cotton is sown in black soils and half the portion of the holding is usually under cotton cultivation. During the last ten years on this side of the district and in bordering Mysore State *talukas*, American cotton is also grown in red loam or light soil. This variety is called *mungari*. It requires to be sown in the early part of June and commences to yield cotton from November onwards.

1923. (23) **Comparative returns.**—The average yield of Dharwar-American cotton on this side of the *taluka* is twenty or twenty-two maunds per acre when there is a bumper crop and fifteen to eighteen maunds when there is an average crop. The profit differs according to the working facilities each agriculturist has. There are two classes of agriculturists, viz., actual tillers of land and those who get their lands cultivated through labourers. The profit with the former sort of people is much higher than the latter. No *deshi* short staple cotton is grown on this side, and so I cannot give any comparison. The only *deshi* long staple cotton here is *kumpla* and Broach. The yield of American cotton is a little greater than *kumpla*, but this variety is more susceptible to many diseases particularly to "red leaves and black pigment." When plants in a field get diseased, the whole crop withers and takes a long time to regain its usual vigour and yield. Sometimes the yield also is affected very seriously. As compared with other crops, the money value of the cotton crop is apparently higher, but in reality it can be said to be equal to food-stuffs grown, viz., *juar*, wheat, pulses, etc., taking into consideration the value of fodder and other things got out of these crops. On account of the rotation of crops which every agriculturist will have to make both for proper cultivation and need of fodder food-grains and cereals required for their living and that of cattle, cotton is grown every alternate year and it is not possible and also inadvisable to grow it oftener, viz., year after year.

Bombay.]

The Hon'ble Rao Bahadur VENKATESH SHRINIWAS NAIK.

[Continued.]

1924. (26) **Suitabilities of existing varieties.**—I think that the right type of exotic cotton has been introduced here. The quality and quantity may be improved by introducing new and pure seeds. The American seed if imported from America does not yield a good crop in the first year, but after one or two years' acclimatization in this soil the yield will be superior. This should be done on Government farms or a premium should be given to those who grow new seeds in the first two years and their cotton should be purchased by Government and utilised for seed purposes. Please see also my answer to question 16 (paragraph 1917).

The Hon'ble Rao Bahadur VENKATESH SHRINIWAS NAIK called and examined.

1925. (President.) I have an agricultural farm of my own. I have experimented only with Dharwar-American, *kumpla* and *kumpla* cross, the seed of which was supplied by the Agricultural Department. It is very difficult to get pure seed. We sell all our cotton and so have to purchase fresh seed every year. Dharwar-American is deteriorating. It does not grow as well as it used to do ten or fifteen years before. It suffers from red leaf blight. Except that it is mixed, *kumpla* has not deteriorated. I have noticed a good deal of mixture in *kumplas*, which is due to the ginning. I have only had experience of *kumpla* cross for the last two years. The yield is a little better than that of ordinary *kumplas*. I do not know about the staple, but it is considered good. The average outturn is fifteen maunds of twenty-eight pounds to the acre.

1926. As to seed distribution, my idea is that in the first place, Government or an association should supply large quantities of seed to selected growers and that the cotton produced from it should be separately ginned which would increase the quantity of pure seed. Government should import good seed and it should be acclimatized at least for one or two years before it is given out to the cultivators. We find that American seed when it goes out at once to the cultivator, does not grow so well.

1927. The mixture grown here consists of only two varieties, *kumpla* and Dharwar-American. The seeds are indiscriminately mixed. About 75 per cent. is *kumpla* and about 25 per cent. Dharwar-American. Ranbenur is in the southern part of the district on the borders of Mysore and Madras; it is eighty miles from here. My suggestion is to have seed farms controlled by Government. The cotton that is grown by certain selected growers should be purchased either by Government or by an association and after seed has been selected from it, it should again be distributed. If it is left to the people to get the cotton ginned, then it will deteriorate. They do not get it ginned carefully and the seeds get mixed.

1928. (Mr. Wadia.) The Agricultural Department give out very little seed compared with the wants of the agriculturist. They give out seed of Cambodia, Broach, *kumpla*, Dharwar-American and *kumpla* cross but the agriculturists want large quantities of seed and it is not stored in different places. It is only those who know about the Department and the farm, who apply for seed and get a very small quantity for themselves. The agriculturists in the mass do not get good seed as they depend entirely upon local seed owners and ginners. If you ask the Agricultural Department for seed for fifteen acres, all you get is seed for one or two acres.

1929. Inferior cotton is brought in from Khandesh, Sholapur and other places and is intentionally mixed with the local cotton. Short staple cotton should not be booked to these places in the south where it is not actually consumed. The Railways should be asked to stop booking except to Bombay or to a mill. If cotton is imported by mill owners, there should be a guarantee that the cotton is taken direct to the mill and not brought to the market. There are only two mills in this district, one at Hubli and the other at Gadag. I think that the ginners mix cotton at the time of ginning and thus the cultivators get mixed seed and produce a mixed crop and that is why the crop is deteriorating.

1930. There are a great many abuses in the weightment of *kapas*. The agriculturist suffers from this particularly in regard to the allowance for tare which varies from fourteen to thirty pounds. If there is slight rainfall, the rate for tare is increased at once. The rate is settled by the *dalals* in consultation with the large purchasers. I suggest the establishment of an institution for weightment, if that is possible. Of course I would suggest central markets in big places throughout the district, but there are poor agriculturists who cannot bring their cotton to such markets. If a weighing institution were introduced at *taluka* headquarters, railway stations or places where there are ginning factories, it would be of great assistance. It is not possible to establish markets at every place. The ginning compound is something like a market. The cultivators bring their cotton to the compound but there is only one purchaser who buys it. The middle men who go to villages and weigh the cotton by hand, can deceive the agriculturists to a great extent.

1931. (Mr. Hodgkinson.) Cotton is not grown on this side under irrigation. Sometimes cotton is sown under wells but it is not a paying proposition as the yield is not commensurate with the expenses. The wells are very deep and the lift is very high, sometimes as much as 100 or 150 feet.

1932. (Mr. Roberts.) The cotton grown round Ranbenur is *kumpla* and Dharwar-American. The proportions are about half and half. *Kumpla* yields a little less; it is not so susceptible to disease and can be grown on an inferior soil. Dharwar-American requires a light soil; it yields about two maunds an acre more than *kumpla* but is more susceptible to disease. *Kumpla* only requires two pickings whereas Dharwar-American requires three to four. I think both suffer if the rain is heavy, but I think that *kumpla* can stand a little drought. As to whether Dharwar-American plants vary, a lot depends upon the soil. Almost all the plants are the same in a season of disease. Of course plants on the border of the field are worse than the plants inside the field.

1933. The Agricultural Department only supplies seed in my tract to those who apply. They have no depot. The *kumpla* cross was only introduced to the few agriculturists, who come into headquarters. There is no regular organization for supplying seed. I think that is necessary. There is no farm in my tract. In the neighbouring *taluka*, there is a vernacular agricultural school where fifteen acres are cultivated, but it is simply meant for teaching. It does not introduce seeds or do anything of that kind. A farm in my tract is necessary, as the climatic conditions in the southern side of the district differ from those in the north. We get drought in August and September which is peculiar to that tract. We sometimes get late rains which make the yield much later than you have got here. This year we had rain in January and the cotton will go on yielding a month later than round Dharwar.

1934. I have no objection to an allowance for tare, but I object to the variations in it. If there is a slight rainfall, a much greater allowance for tare is at once made. It entirely depends on the *dalals*, and as the cultivators are poor people, they cannot take their cotton back but are entirely at the mercy of the *dalals* in the matter.

Bombay.]

Mr. G. L. KOTTUR.

Mr. G. L. KOTTUR, Cotton Supervisor, Dharwar.

EXAMINED AT DHARWAR, FEBRUARY 18TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

1935. (2) **Varieties.**—No *deshi* short-staple cotton grown in the Karnatak except a small area in Bijapur under *jari*.

(b) "Deshi" long staple cotton.

1936. (10) **Experience.**—I have been stationed in Dharwar since 1912, and have been in actual touch with cultivators of Dharwar, Bijapur and Belgaum for the past five years.

1937. (11) **Varieties.**—*Kumpla* and Broach are the only *deshi* long-staple cottons cultivated in the Karnatak. *Kumpla* has an aggregate area of about one million acres in the three districts. Broach is a recent introduction by the Agricultural Department. It is grown in the transition tract receiving early rains on an area of about 2,000 acres.

1938. (12) **Size of holdings.**—The average size of the holding in which cotton is grown is twenty acres of which eight are under cotton.

1939. (13) **Yields and profits and comparative returns.**—The average yield of cotton is 350 lbs. of *kapas* per acre for all varieties cultivated in the tract. This fetches about Rs. 37 in the case of *kumpla* and Dharwar-American (exotic) and Rs. 45 in the case of Broach. The average yield and value of other crops are as under :—

Juar.—Seven hundred lbs. of grain and 1,600 lbs. *kadbi*, value Rs. 30.

Wheat.—Three hundred lbs. of grain and 500 lbs. of chaff, value Rs. 20.

1940. (14) **Rotations and manures.**—The following rotations are common in the cotton growing parts—

(1) Cotton, *juar* two-year rotation.

(2) Cotton, wheat, *juar* three-year rotation.

(2) Farmyard manure is generally applied to the land once in the rotation to the *juar* crop. The quantity given is about five carts equal to 2½ tons. No other manures is in use for dry crops. Cotton thus is generally made to take the advantage of the residual manure. Few cultivators however grow cotton without any rotation. They think it necessary to manure their land every year for cotton.

1941. (15) **Conditions affecting increase in area.**—The following would affect the increase in the area of *deshi* long-staple cotton :—

(i) Necessity of growing a crop for food and fodder. *Juar* is the staple food of the cultivators, whose cattle are also fed almost entirely on its stalks. Many cultivators especially in the villages pay the wages of the workmen in *juar* grain. It is for these reasons that cultivators find it necessary to grow *juar* on large areas.

(ii) **Rotation.**—Cotton is not grown continuously on the same land. Cultivators think that the yield suffers much if cotton follows cotton. Dharwar-American cotton, however, is grown by some cultivators without any rotation.

(iii) **Season.**—The season also plays an important part in limiting the area under cotton. The sowing rains sometimes fail or pour on continuously. In such years, the area under cotton falls considerably.

(2) Cotton is ready for picking in February and goes on bearing till the end of April. Anti-monsoon showers are not uncommon in the whole of the Karnatak during this period. As these showers generally damage the open bolls in the field, all cultivators become anxious to pick them as soon as there are signs of rain and this causes difficulties in the supply of labour. If the area under cotton increases, there is more fear of the crop being spoiled on larger areas.

1942. (16) **Suitability of existing varieties.**—Right varieties of *deshi* long-staple cotton are being pushed in the right districts. The varieties, however, are not the best. Better types can be introduced and work in this connexion is in progress on the Government farms.

1943. (17) **Prevention of mixing of different varieties.**—The mixing of *deshi* long-staple cotton with exotic cotton in the field can be easily prevented by sowing only the heavy seeds of *deshi* cotton that sink in water. Water not only separates all seeds of exotic cotton but holds light seeds of *deshi* cotton which are useless for sowing. The method, therefore, has a double advantage of separating pure and good seeds. Deliberate mixing seems to be done by the merchants in the factory and nothing but legislation can prevent this.

1944. (18) **Uses of seed and seed selection.**—Cotton seed is used in feeding cattle. It is not put to any other uses. Some twenty years ago cultivators were generally keeping *kapas* from the first picking and getting seed by ginning it on the foot roller or hand-gin. Very few cultivators now follow this practice. The *dalals* or gin-owners select some *docras* of good *kapas* at the time of ginning and keep the seed separate. This is sold to cultivators for sowing at higher rate than the bazaar-seed and many buy it as good seed. No selection as such is practiced by cultivators in general.

(c) Exotic cotton.

1945. (28) **Importation of seeds.**—Cotton varieties imported from Egypt and America do not thrive for some years. Some cottons produce almost nothing in the first year of their trial. All foreign varieties, therefore, stand in need of acclimatization. The latter, however, is not easy to accomplish especially when the seed we import is impure producing a number of types in the field. The acclimatized cottons are, no doubt, in danger of deterioration chiefly by natural crossing. And, if this is prevented, they will maintain their characters for any length of time. Under these circumstances, it is desirable to rely on seed grown in India.

1946. **Best organization for handling cotton in the Karnatak.**—Conditions in the Karnatak seem to favouring staple cottons. Short-staple *deshi* forms which are gaining ground in the other parts of the Presidency

Bombay.]

Mr. G. L. KOTTUR.

[Continued.]

cannot be grown here as the climate does not suit them. As regards staple we have two types (1) long-staple, and (2) short-staple in the local *deshi* cotton (*kumpla*). The short-staple type gins slightly better than the long-staple but it being less drought resistant cannot compete with the long-staple type. This indicates that staple claims a prominent place in all considerations of improvement in cotton. By selection we are in possession of three strains which are superior to the ordinary local cotton in all characters. They yield better, gin higher and possess longer-staple. The seed of these is being distributed in the right tracts. Still better types, however, can be produced by selection and crossing and the work is in progress on the Government Farm at Dharwar and Gadag.

(2) It is necessary to have one seed farm for every district. The area of the seed farm should be about 100 acres of which fifty should be under the improved cotton every year. One superintendent with the assistance of a graduate fieldman and clerk should be able to manage the farm. The seed produced on the farm should be distributed to a number of reliable cultivators of one or two adjoining villages in the neighbourhood of the farm. The cultivators selected should grow only the improved cotton and no other variety on their fields. Their *kapas* should be collected and ginned on the departmental factory erected in the village for the purpose. The farm *kapas* should also be ginned in this factory. The ginning and the distribution work should be especially given to the graduate fieldman attached to the seed farm. The services of a fitter and a clerk will be necessary during the ginning season. By this arrangement it will be possible to produce 300,000 lbs. of pure seed of the improved cotton. This quantity should be handed over to the District Staff every year. The latter should distribute the same to a number of co-operative seed societies, who would multiply it in the same way as the seed farm. In the absence of seed societies, the principle of distributing the seed to all the cultivators of as many villages as possible, should be adopted. The villagers in this case should be advised to sell their *kapas* in co-operation by inviting a number of buyers. This system is likely to give the growers all the benefits of growing an improved cotton. When the *kapas* is sold the buyer or buyers should be requested to make arrangements for ginning the *kapas* separate and selling the seed to the depôt. This seed should be of use for general distribution in the tract.

(3) The co-operative sale societies which are just started in this part can arrange to collect a large quantity of improved cotton. But if the buyers do not care for improvements, the societies can do nothing for the growers. It is, therefore, necessary to request the mills which use the long-staple cotton to send their agents for purchasing the cotton direct for their use.

Mr. G. L. KOTTUR called and examined.

1947. (President.) I am a B. Ag., of Poona. I took my degree in 1909. I worked in the Agricultural Department first as a Cotton Fieldman and then as a Cotton Supervisor. I am now getting Rs. 100 per month. The districts of which I am in charge are Dharwar, Belgaum and Bijapur. In these three districts *kumpla* and Dharwar-American are grown. The two varieties are grown together in the cultivators' fields in some taluks such as Ranebennur and Gadag. I am in charge of the cotton farms in Dharwar and Gadag and do no other work but cotton. *Kumpla* has been kept pretty pure. Dharwar-American is showing signs of admixture.

1948. In order to prevent mixing, I have suggested in my written evidence that cultivators should sow only such seeds as sink in water. This is based on my experience. It is being recommended to cultivators now and some of them have taken it up. *Kumpla* contains two kinds of seeds, light and heavy. The light seeds have a low germinating percentage so, in order to get a better stand, I tried to separate out all the heavy seeds and by sowing them we have got a higher germinating percentage and also better yield. That method also removes Dharwar-American seeds, if there is any mixture. They all float as they are lighter than *kumpla*. This method will safeguard *kumpla*. I have not yet devised any method of separating out good Dharwar-American seed. In Hungund Taluka in the Bijapur district, the cultivators purposely mix *kumpla* with Dharwar-American in order to ensure themselves against the failure of Dharwar-American which is precarious on account of red leaf blight.

1949. We are working on the selection of pure varieties and cross fertilization. The types in the ordinary cotton have been studied and the best ones have been separated and are being maintained pure. We have got by selection three strains which give a higher yield and a better ginning percentage and are longer in staple than the ordinary varieties. One is *kumpla*, one Dharwar-American and the third acclimatized Broach. There should be at least one seed farm in each district so that we can keep up the pure strain.

1950. (Mr. Roberts.) The acreage under *kumpla* varies between one million and one and a half million acres. The quality is not uniform and there is much variation. *Kumpla* grown in the Bijapur district is valued as "Westerns." The staple is very irregular and short and it is getting towards that of "Westerns." Botanically they are the same variety. The best *kumpla* is grown round about Dharwar and Hubli and also in Sangli and Bankapur. Bailhngol in the Belgaum district is also famous for long staple. The cotton is a mixture of two types. One is an erect type and another is bushy type. The erect type bears only fruiting branches whilst the bushy type has a lot of vegetative branches. We get the best cotton on the erect plants. In Bijapur, the bushy type predominates. It yields best in wetter seasons and is less drought resistant. The erect type in general has a lower ginning percentage but the selected strain has a higher percentage. The erect type would be more suitable for the drier tracts and the bushy for the wetter.

1951. Dharwar is the only place where selection work is being done on *kumpla*. I once tried the Nandyal selection No. 2, but it was not equal to our selected *kumpla*. It was only equal to ordinary *kumpla* and so we rejected it. I think the cotton selected at Dharwar would be suitable for Bijapur. For the past two years we have been distributing our improved selected seed at Bijapur and it is doing well. There is a great demand for this seed and this shows that it is suitable. We have got about 6,000 acres under selected *kumpla*. It is in Dharwar and Bijapur and there is none in Belgaum. I think that the work at Dharwar would be applicable to Bijapur and Belgaum. We have selected a type that will combine the best qualities of both the bushy and the erect types.

1952. The area under Dharwar-American in 1915-16 was 200,000 acres in Dharwar and 10,000 acres in Bijapur. These figures are based on the village registers in which the statistics are kept separate. I collected them myself. There has been a large increase under Dharwar-American since 1915-16. Taking four acres to the bale on an average, the outturn would come to about 50,000 bales. The area under Cambodia is 4,000 acres in the Dharwar and Bijapur districts together and that under Broach is about 2,000 acres. The ginning percentage of Broach is 32 and that of Dharwar-American 29. *Kumpla* has a ginning percentage of 25. These are the figures for the ordinary cultivator's crop. The selected *kumpla* gives as much as 28 per cent. whilst selected Dharwar-American gives 33.

Bombay.]

Mr. G. L. KOTTUR.

[Continued.]

1953. Selected *kumpla* and the selected Dharwar-American have been given comparative trials on the farm at Dharwar and Gadag. The cultivators have also grown them but I do not know the figures. The selected strains are yielding better than the local cotton. I have been testing them for the past four years on a field scale on the farm.

1954. As regards crossing, a large number of crosses were made with many of the Indian cottons in Mr. Fletcher's time but many of them were rejected. When I came, there were few crosses; most of them were crosses between *kumpla* and *goghari* and one of these was promising. It was better both in point of staple and ginning outturn. I made fresh crosses between *kumpla* and *goghari* in order to study the subject and I found that *goghari* was best suited for crossing with *kumpla*. The cross had a higher ginning outturn and a better staple. A cross was made between *kumpla* and Broach but that proved disappointing, as we lost the higher ginning percentage of the Broach cotton. It did not appear even in the second generation. We are not giving out any crosses between *goghari* and *kumpla*. We are giving out *kumpla* selection No. 1 and also the *kumpla* cross which is *kumpla* crossed with *kumpla*. The *kumpla* cross is just like Broach with a higher ginning percentage and a better staple. I think it is Broach. The *kumpla* selection No. 1 which is being given out is known as Dharwar No. 1. I do not think that it can still be improved. Of the *kumpla* cross we have distributed only 3,000 lbs. of seed which will grow about 300 acres. It is expected to replace Broach in the tracts in which Broach is at present being grown. This cross is earlier than Broach, and so it is less risky than Broach. This year we had not sufficient seed; if we can multiply the seed, there will be more and more prospect for it in the Broach tract. My estimate is that it will cover about 20,000 acres. The *kumpla* selection should eventually cover the whole of the *kumpla* area, i.e., about 1,000,000 acres. The area at present under it is about 6,000 acres. We have been giving out seed in Dharwar and Bijapur for the past two years. This is the second year. We are not doing much crossing work at present.

1955. There are two types in Dharwar-American, viz., New Orleans and Upland. They were grown separately and it was found that the Upland type was better than the New Orleans in ginning outturn, in staple and in point of resistance to red leaf blight, which is a very serious matter here. The Upland type is very hairy while the New Orleans types is glabrous. We are going for a rough leaved Upland type with a high ginning percentage. Cook and Peary which are both rough leaved Upland types were recently imported. We have found that improved Peary has gone down in staple but that Cook has kept its staple but it is a very poor yielder. The present policy here is to push selected *kumpla* and selected Dharwar-American. These are the two big things we have in hand here.

1956. (Mr. Wadia.) Deliberate mixing is done in most of the ginning factories, I have seen it myself. Nothing but legislation could prevent it. Dharwar-American and *kumpla* are mixed. Cambodia is also mixed with Dharwar-American or *kumpla*, to give the mixture a good colour. The mixing is done before ginning. Yellow strained *kapas* and *kapas* in which soil has been mixed are all mixed with other *kapas* of the same variety. The licensing of ginning factories is necessary. It is believed that in Dharwar cotton waste and cotton fly are imported to be mixed with saw ginned cotton. People are not allowed in the ginning and pressing factories to see things of that kind. I would suggest that the import of cotton fly should be prohibited and also the import of *kapas* by rail. My idea is that the whole of the seed distribution throughout the district should be controlled so that no ginners can sell their seed to the cultivators. To make sure that the seed given out is pure, we should require to establish our own gineries on the farm and in the villages in which we distribute the seed. Purity of the crop in the field is also an important thing. For that you must control the seed distribution entirely. I put in a report of spinning tests at Gokak mills. I have just given out 10,000 lbs. of seed to the cultivators which will be enough for sowing 800 acres.

ANNEXURE.

Report by the Manager, Gokak Mills, on *kumpla* selection supplied by the Agricultural Department.

The cotton was considerably superior to any of the *kumpla* cottons as supplied either direct by the ryots or which we have obtained from the near markets. It is bright, clean, long in staple and uniform and of middling strength. From it we spun three counts, viz.:—20s, 30s, 40s. The yarn ran smoothly and demanded very little attention from the work people and we would no doubt have received better results had we had sufficient cotton to make it worth our while to alter our machinery, so that it should be spun into yarn under the best conditions. The loss percentage in the blow room amounted to eight per cent.

The yarn gave the following tests:—

Counts.	Actual average count.	Actual average strength.
40s.	38.4.	34½.
30s.	30.3.	46½.
20s.	19.5.	82½.

Against this we give you the result of 20s spun from *kumpla* and other cotton from the places named:—

Name.	Blow room loss.	Average count.	Strength.
	per cent.		lbs.
Kudchi	9½	20.4	59½
Hubli	10	19.6	65
Athni	11	20.6	59½
Shedbal	10½	20.6	59½
Jamkhandi	12	19.5	62
Mudhole	14	19.6	69
Begalkot	14	20.1	60
Bijapur	13½	19.6	68
Sangali	13½	20.2	65

The cotton you supplied is better than the Cambodia we have seen this year and fully Rs. 20 per *khandi* better than *kumplas* from the surrounding districts. We send you a sample Knot of 20s spun from Dharwar selected and ordinary *kumplas*.

Bombay.]

Mr. SHANKARAPPA KURLI.

Mr. SHANKARAPPA KURLI, Landowner and Ginning Factory Owner, Garag, Dharwar District.

EXAMINED AT DHARWAR, FEBRUARY 18TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

1957. (10) Experience.—I have been stationed in the Karnatak and in the cotton growing districts of Dharwar and Belgaum for about twenty years. I am a land-owner in both the districts, dealing in cotton industry, as ginning, etc. I have been actually in touch with the cultivators and merchants dealing in cotton.

1958. (11) Varieties.—There are three varieties of *deshi* long staple cotton, namely, (a) *kumpla*, (b) Broach, (c) *kumpla* cross.

(a) *Kumpla* is grown on a large scale.

(b) Broach has been newly introduced and is grown only in few parts of Dharwar and Bankapur talukas and also in Savanur State.

(c) *Kumpla* cross has also been lately produced and is grown in limited areas as it is yet under experiment.

1959. (12) Size of holdings.—The average size of holdings is forty to fifty acres but generally holdings differ in different tracts. Recently the proportion of cotton is half to half and even more on account of high prices.

1960. (13) Yields and profits and comparative returns.—The average yields and profits per acre are as follows:—

	lbs.	lbs.	Rs.
(a) <i>Kumpla</i>	350 to 400	30	
(b) Broach	400 to 500	40	
(c) <i>Kumpla</i> cross	370 to 420	33	

Recently cotton growing has been more paying than any other dry crops. I cannot compare long staple cotton with short staple as I know nothing about it. Exotic cottons, namely, Dharwar-American and Cambodia, are more paying than *deshi* long staple cotton.

1961. (14) Rotations and manures.—Juar, cotton or wheat or gram and cotton are rotation crops. In most parts of the districts no manures are given, but previous to cotton, for the rotation crops, farm-yard manure is generally put.

1962. (15) Conditions affecting increase in area.—In the western parts of the Dharwar and Belgaum Districts, climatic conditions are not favourable for cotton crops. In some parts of both districts, where tobacco, chillies and groundnuts are grown largely as dry crops, these are grown in preference to cotton though other conditions are suitable to cotton. A very few intelligent cultivators follow systematic rotation and grow various crops in limited areas. Recently, however, the number of such cultivators is decreasing owing to the enormous prices of cotton.

(2) The only necessity of labour-supply will occur at the time of picking. If any new measures are adopted at the time of picking it will be more helpful to the ryots, for picking of cotton alone costs not less than one-sixth of the gross outturn.

1963. (16) Suitability of existing varieties.—Broach cotton and *kumpla* cross are already introduced by the Agricultural Department but on a small scale. There is yet more scope for these varieties.

1964. (17) Prevention of mixing of different varieties.—To prevent the mixing of seeds in fields, seed depôts should be introduced on a large scale and also seed distribution. To prevent the mixing in the factory, there is a greater necessity for buyers of pure cotton to pay the proper price for long staple cotton. In my opinion, unless some millowners or a good buying agency comes forward to offer proper prices for pure cotton, the mixing cannot be stopped. If the above measures are adopted, it will be stopped of its own accord.

1965. (18) Uses of seed and seed selection.—Cotton seed is used for feeding the cattle and is exported for oil. No selection is made for sowing. Very few ryots hand-gin for sowing-seed.

(c) Exotic cotton.

1966. (21) Varieties.—Dharwar-American and Cambodia are grown in some parts of the Dharwar and Belgaum Districts.

1967. (23) Comparative returns.—The yield of these varieties is as follows:—

	lbs.	Rs.
Dharwar-American	300	35
Cambodia	300	40

(2) These varieties are more profitable than other dry crops and also more than *deshi* long staple cotton.

1968. (24) Rotations and manures.—The same rotation crops are grown as in *deshi* long staple cotton but in a very few tracts, some cultivators grow Dharwar-American cotton without any rotation for long period of ten to fifteen years, giving farm-yard manure occasionally.

1969. (26) Suitability of existing varieties.—Cambodia has scope for growing on a large scale if it proves successful to the soil.

1970. (28) Importation of seed.—Personally I do not think that there is necessity of importing exotic cotton seeds every year. There are no results to show that our exotic cotton, viz., Dharwar-American, has deteriorated within the past forty years or so.

Bombay.]

Mr. SHANKARAPPA KURLI.

[Continued.]

1971. *General*.—I am glad to note that the Agricultural Department has been trying to find out better suited cotton to our districts and has been successful in showing that Broach can be introduced in some parts and Cambodia in others, but I regret to note that these varieties have not found their places to such an extent as they might be owing to want of expert people working at it. Personally I believe, until the cultivators come forward and look to their own benefits, the Government should try to increase the present staff and introduce these cottons in right tracts, by conducting experiments in various centres and by opening seed depôts and seed farms where successful. One or two experiments will not suffice. Rain and climatic conditions so differ that I recommend numerous trials in different places in finding out the right tract suitable to these cottons. When the Department succeeds in finding out these suitable tracts, the question of distributing seeds may be taken up by Agricultural Associations and co-operative societies assisted by Government.

II.—COMMERCIAL ASPECT.

1972. (30) *Local trade customs*.—In the Karnatak, at Hubli and Gadag, there are important cotton markets of long standing. Now a number of ginning and pressing factories are put up as the cultivation of cotton increases. Next to Hubli and Gadag there are small cotton market places, viz., Bail-Hongal, Saundatti, Dharwar, Athani, Nargund and Savanur. Besides these there are many small places. There are many *dalals* (commission agents), at these places, through whom cotton transactions are made. The *dalal* tries to collect as much cotton and *kapas* as possible from customers whether they may be cultivators or petty merchants. These *dalals* advance money to petty merchants and to ryots for bringing cotton to their shops. By selling *kapas* and cotton, the *dalal* gets some commission both from buyer and seller. The buyer pays Re. 1-4-0 per *nag* of 1,344 lbs. The seller also pays 12 annas for the same quantity. Besides this the *dalal* gets commissions known as *chairy*, *hamali*, etc.

(2) The petty merchants purchase *kapas* through ryots, gin it and sell the cotton through these *dalals*. By doing this, they get more profit than by selling *kapas*. If the cultivator and petty merchant wish to sell their stuff, they first have to buy *bardans* (gunnies) to pack it. The weight of a gunny bag when filled weighs from twelve to fifteen maunds (one maund equal to 28 lbs.), and when filled with cotton it weighs six to eight lbs. It is customary among *dalals* that, when selling the *kapas* or cotton to the buyer, they deduct fourteen lbs. and eleven lbs. respectively out of the gross weight of each *bardan*. The weight of a *bardan* varies according to the wet or dry climate of the day. The deduction of the weight of the *bardans* is settled by the chief buyers and the chief *dalals* on personal discussion. The grain in weight of the *bardan*, sample, etc., goes to the buyer and to the *dalal*. The *kapas* and the cotton are sold in the market according to the ruling rate of market of that day on which it is sold if the customer has given permission to do so. If the quantity is big the customer is present there while striking the bargain. If the *dalal* is not an honest man, he plays some mischief, i.e., difference in weight and difference in prices, and when it comes out, no customer will approach him. The petty dealer pays some advance to ryots in villages, charging them a high rate of interests or by contract. This system is somewhat stopped where co-operative societies are started. Cultivators also deceive *dalals* and petty merchants by damping the *kapas* or cotton. Some cultivators and petty merchants bring a large amount of advance money from *dalals*, promising him to sell all their stuff to him. But they sell it through another *dalal*, sending somebody else to sell it. So the *dalal*, who had advanced the amount, will have to wait until he pays his dues or will have to go to civil suit. Some few *dalals* have ruined themselves by advancing the money.

(3) I think there is no other remedy for getting good and pure cotton than to arrange a good reliable buying agency for the proper price for the better quality of *kapas* or cotton. As cotton cultivation does not require a large investment of capital in the Karnatak, as it is purely a dry crop, no cultivator is generally in need of capital for cultivation. As Government has now taken up the auction sale of *kapas*—Broach and *kumpla* cross—full prices are realized from merchants.

Mr. SHANKARAPPA KURLI called and examined.

1973. (President.) I am a landowner and also own a ginning factory. I grow *kumpla*, *kumpla* cross and Broach on my land but not American. I keep my *kumpla* pure. I get my seed from the Agricultural Department. I think *kumpla* cross has maintained its standard pretty well. There is not much variation. There is no Dharwar American on this side. It is all *kumpla*. I am a resident of Garag, a village near Dharwar.

1974. (Mr. Wadia.) There is nothing but *kumpla* in my neighbourhood and so I gin only one quality of cotton. I gin on the commission system for Messrs. Ralli Bros. and such big firms. I buy very little cotton myself. I have got eight double roller gins, I charge Rs. 6 for gining 48 maunds of *kapas* of 28 lbs. each i.e., 1,344 lbs. Out of 48 maunds of *kapas*, I get thirteen maunds of lint, so that the ginning percentage is 27. The colour of our cotton is very good. There are two factories at Garag, but there is no combination. At Hubli, the charge for ginning is Rs. 9, including pool charges, per *nag* of 48 maunds of *kapas*. There is no Dharwar American in my neighbourhood so that no mixing is done. At Hubli and Gadag, they mix Dharwar American with *kumpla* and with Cambodia and also hand ginned cotton with machine ginned cotton. All kind of *kapas* is thrown into it. I have heard that "fly" is brought from Bombay for mixing. Such practices are not good for cultivation and next year the crop is spoiled. If purchasers give higher prices for the better quality, and pay very low prices for the inferior quality, then mixing will stop automatically. Millowners do not now pay more for the better quality. They pay the same price for it as they do for mixed cotton. There are some firms which sell pure cotton seed as Messrs. Ralli Brothers and Heerji Khetsey. Some merchants also sell pure cotton in the Hubli and Gadag markets.

1975. (Mr. Roberts.) On the side all the gins are double roller gins. In my opinion, we cannot get a better price for a superior quality of cotton. The reason is that the local merchants who buy at Hubli and Gadag get cotton waste from the mills and mix it with cotton, press it and send the mixture to Bombay. To get rid of mixing, it is not only necessary that Government should open seed depôts but also that better arrangements should be made for buying. Government or the Millowners' Association should arrange a good buying agency which should be supervised by Government.

1976. (President.) I simply gin on commission and give the cotton back to the person who brings it. I buy very little *kapas* and when I do, I sell lint at Hubli. The seed obtained from the cotton I gin for Messrs. Ralli Brothers is generally sold to dealers. I do not sell the seed for them.

Bombay.]

The Hon'ble Mr. G. F. KEATINGE, C.I.E., I.C.S.

The Hon'ble Mr. G. F. KEATINGE, C.I.E., I.C.S., Director of Agriculture, Bombay.

EXAMINED AT DHARWAR ON FEBRUARY 18TH AND 19TH, AT HUBLI ON FEBRUARY 20TH AND 21ST AND GADAG ON FEBRUARY 22ND, 1918.

Written statement.

1977. *Preamble*.—I. As regards the work on the improvement of cottons, which has been done in this Presidency, I attach, as Annexure I, Bulletin No. 70* of 1915 giving a short account of this work in the Presidency Proper, Bulletin No. 42* of 1911 giving an account of such work in Sind, and a printed note which I drew up in 1911 with the object of putting before the Cotton Trade the results which had been accomplished. If more detailed information regarding this work is required, the annual reports of all the cotton farms can be supplied. For later information regarding the fate of the strains and varieties of cottons which we selected as suitable for the different tracts, I attach, as Annexure II, extracts from the last four annual reports of this Department, which will indicate the lines of policy pursued up to the present time. I attach, as Annexure III, a note drawn up by me recently, after holding a conference of the members of this Department who have been working on cottons, which gives the opinions arrived at regarding the cultivation, manuring, rotations, and diseases of cotton in this Presidency, and indicates the advantages which we claim for the selected strains and varieties of cotton which we are now maintaining on our farms and giving out to cultivators. As regards the relation between the cultivation of cotton on the one hand and the cotton trade on the other hand, I have sent in a note† which I prepared in April and June last on the subject. This deals mainly with conditions in Gujarat.

1978. *Valuations of improved strains by the cotton trade*.—The annexures contain my views on almost all points connected with the growing and marketing of cotton, but I should like to offer a few remarks on the valuations of our hybrid and selected strains made by the Trade, and the result of the efforts which we have made to put out improved cottons on a large scale with cultivators and to market them in a pure condition with the help of Bombay Syndicates expressly formed for that purpose. When it is possible to grow successfully a new long staple cotton in a tract which has hitherto grown a totally different and very short stapled cotton, there is comparatively little difficulty in getting fairly uniform trade valuations which show the excess value of the new cotton as compared with the old one. This has been the case in Sind in comparing the values of Sind-Egyptian or Sind-American with ordinary Sindhi cotton, and in the Punjab (I understand) in comparing Punjab-American cotton with ordinary Punjabi cotton. Over most of the Presidency, however, we have hitherto found it impossible to grow profitably exotic cottons of a staple much longer than that of the local cottons, and all that we can do to improve the staple is to hybridize or select Indian cottons with a view to produce a somewhat better and more uniform staple than that of the local cotton. When we send samples of such improved cotton for valuation, it at once becomes clear that there is no uniform standard of valuation in the Trade, and the valuations received have been so discrepant that in some cases where a batch of such samples have been submitted for trade valuation the sample that one firm will put at the head of the list is placed by another firm at the bottom of the list. This makes it very difficult for us to know what the Trade want, since the Trade do not seem to know themselves. These divergencies of valuation occur not only between different firms but between the relative valuations of the same firm in succeeding years, and there are many cases in which our staff has been unable to account for these changes in any way. So much for the valuation of samples. As regards the valuation of seed cotton in bulk on a commercial scale, the Trade is apparently unable to detect any variation between two grades of cotton unless it is very marked, and is for practical purposes quite insensible to such improvement of quality as we are likely to be able to produce. I understand that the millowners are of opinion that the only real test is the spinning test, but this cannot help the buyer of seed cotton, and further, so much adulteration, mixing and fraud takes place with regard to cotton that the buyers are very sceptical regarding any alleged superiority about which they have no certain test at the time. The result is that we can hardly get any enhanced value for seed cotton, samples of the lint of which are year by year valued as far superior to local cottons. I am bound to say that the Trade is consistent in this insensibility to staple, since not only does it pay no more for superior staple, but it will also pay as much for cotton, the staple of which we know to be inferior to the local cotton. This is the case with the N. R. cotton which we distribute in Khandesh because it is early, prolific and has a good ginning percentage. Its staple is admittedly inferior to that of the ordinary Khandesh mixture, but the Trade make no reduction of price on that account; but, on the contrary, give a higher price for the clean cotton because of its brighter colour. The position then is this that the cultivator knows that he will get no better price for quality, so he aims simply at quantity as denoted by the largest amount of seed cotton per acre, the full advantage of which he can secure, and as denoted by high ginning percentage, part of the advantage of which he can secure at any rate in some localities.

1979. *Operations of the cotton syndicate in Surat*.—As regards our efforts to get over these difficulties with the help of cotton syndicates specially created in Bombay to assist us, I would refer first to the Syndicate created in 1911 to buy our improved Surat cottons which had been valued in England as up to Middling Americans. It was arranged that we should put out our seed with cultivators and that the Syndicate should buy the produce at a five per cent. premium over local cotton. In 1912, 1,200 bales were produced from our seed and bought by the Syndicate at five per cent. premium and the Syndicate expressed themselves as well pleased with the quality of the cotton. In 1913, 6,000 bales grown from our seed were produced. I am not aware how the Syndicate disposed of all this cotton, but I understand that on April 18th the Syndicate sold 1,200 bales of it by auction for an average of Rs. 349 when fine Broach was selling at Rs. 310. In addition to this, the Syndicate admitted that the ginning percentage of our cotton was one per cent. above that of local cotton, i.e., giving an advantage of three per cent. Thus the advantage of our cottons over local cottons as regards this deal appears to have been over thirteen per cent. and they ought to have made a profit under normal circumstances. Unfortunately, however, there was a sharp fall in cotton prices about April 12th, and the Syndicate lost money. The syndicate then closed operations before a good part of the crop had been marketed. This caused trouble and loss to the cultivators, and so the experiment came to an end with mutual dissatisfaction both to the Syndicate and to the cultivators, and the Syndicate declared that the cotton was no better than local cotton. Since then we have put out much less seed with the cultivators and only a few hundred bales of improved cotton are produced every year near

* Not printed.
† Paras 1983-199 below.

Bombay.]

The Hon'ble Mr. G. F. KEATINGE, C.I.E., I.C.S.

[Continued.]

Surat, for which a cotton merchant pays a premium of Rs. 12 per *khandi*. This amounts to a premium of only two or three per cent. for quality. The cotton is yearly declared to be of excellent quality. In 1915, it sold in England above Middling American, and last year I understand that it sold in England at a rate above Rs. 200 per *khandi* higher than local cotton; but Rs. 12 per *khandi* is not a large enough premium to attract cultivators, and we are now only marking time.

1980. *Operations of the Cotton Syndicate in Sind.*—In Sind, a Syndicate was formed to buy American cotton, but the supply never exceeded 550 bales, and the natural difficulties were great and much accentuated by the vagaries of the canal. This experiment has also come to an end, though there is no doubt that good American cotton can be grown in Sind. These Syndicates made a genuine attempt to help us, but it is clear that there is little prospect of success from arrangements of the nature which we adopted.

1981. *Conditions affecting increase in area under cotton.*—Cotton certainly pays better than other dry crops, and will tolerate bad cultivation and short rainfall better than many. Under the influence of high prices, it occupies a very large proportion of the best lands in the Southern Mahratta Country, Khandesh, Broach, Surat and Ahmedabad. I do not think that its cultivation can extend much further in these regions since the people must provide fodder for the cattle, and this is provided by the stalk of the *juar* and *bajra*, which also provide grain. In the tracts which grow most cotton, the value of fodder is usually high, and the price of grain tends to go up also when cotton is grown to excess. This brings about a natural equilibrium. In Kaira, Panch Mahals, Nasik and Sholapur cotton is extending and will probably extend further, if prices keep high. Poona grows very little cotton, though it certainly pays better than most crops.

1982. *The cotton forecast.* Cotton crop estimates are prepared in this office. They are based on—

- (1) The area under cotton reported by the village officers.
- (2) The *anna* estimate of cotton made by the Mamlatdars.
- (3) The formulæ figures used in this office from which the *anna* estimates are interpreted into so many lbs. per acre

(2) As regards (1), this office can only take the figures supplied to it, and call attention to mistakes that can be detected. I fear that serious mistakes in the figures of areas sown are often made, and they are sometimes detected. Last year, for instance, a cotton area in this Presidency consisting of three districts returned an area of approximately 1,000,000 acres under cotton. This was in February. When the final land records for the year were received in the following August, it was found that the area under cotton during the previous season was in reality 1,600,000 acres. This of course seriously affected the estimate of cotton.

(3) As regards (2), there is a general tendency to under-estimate, and few districts will never admit that they ever obtain a crop up to the normal standard. Many attempts have been made to remedy this failing, and I think that in some cases an improvement has been made.

(4) As regards (3), I think that the formulæ figures are fairly correct. The figures for Khandesh cotton has recently been raised. So far as this office is concerned, the Director of Agriculture can do little except to work out and report the figures supplied to him from the districts. He is very seldom in a position to make any change himself and all that I have ever felt myself prepared to do by way of modification is to say that I think that the figures reported for such and such tracts are considerably or somewhat under-estimated. Nearly half the cotton reported in the Bombay forecasts is from Native States, and in their case I have no idea as to the accuracy of the figures supplied or the methods used to collect them; I can suggest no method of improving forecasts that will not cost money; but if an officer were appointed who had time to attend to the statistical work, he might obtain some improvement. The Director of Agriculture has too many other things to do to devote adequate time to this work.

Note on the mixing of long and short-stapled cotton in the Bombay Presidency.

1983. *Preamble.*—(1) The prevalence of mixing long and short-stapled cottons in the Bombay Presidency has for a long time past been recognised, and the losses which result therefrom to the millowners have been a matter of constant complaint on their part. The ultimate losses which must and do result from this practice to the cultivator have also been a subject of occasional comment on the part of observers, though the cultivators themselves are naturally not in a position to appreciate this danger or to take any action to avert it.

1984. *History of previous legislation and discussions.*—The Bombay Cotton Frauds Act of 1863 was the outcome of the agitation on the subject, and as a result of the action taken, in accordance with the provisions of that Act, the Bombay Chamber of Commerce reported in 1864 that there was "a very marked improvement in the general freedom from seed and wilful adulteration which had become so growing an evil previous to the passing of the Act." This improvement was maintained and increased for some years. Subsequently, however, the system of inspection was found distasteful by the cotton trade; and after an agitation of several years by the Bombay Chamber of Commerce, supported by the Chambers of Commerce at Liverpool and Manchester, the Government of India directed the repeal of this Act. Consequently in 1882 an Act was passed repealing all previous legislation on the subject of cotton frauds. The result was, as subsequently admitted by the Liverpool Chamber of Commerce, "an immediate revival of adulteration, which has become year by year more extensive, more systematic and more skilfully conducted."

(2) In 1885, the matter was again considered by the Bombay Government, and proposals were put forward by the Hon'ble Mr. H. E. M. James with a view to—

- (1) distribute pure cotton seed;
- (2) mark each bale so as to show where the cotton was grown and pressed;
- (3) make it penal to gin two or more varieties of cotton together or to mix varieties;
- (4) employ a competent staff to report malpractices.

After taking the opinion of the various cotton interests in Bombay, it was decided not to take action of the nature suggested, on the grounds—

- (1) that it was impossible to improve the staple of Indian cotton;
- (2) that the Associations in Bombay connected with the Cotton Trade objected to the interference proposed;
- (3) that the expenditure on staff would be considerable.

The only comment that I wish to make at this stage is to express an opinion that the first mentioned objection is stated in terms which are too sweeping. It is true that except in Sind and the Dharwar District

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long-stapled exotic cottons have not been found successful; but it has been found that by selection within locally-grown varieties the staple can be considerably improved; and even if improvement in staple is not considered practicable in any locality, steps may be necessary to prevent a deterioration of staple, which has actually taken place in some tracts where a short-stapled cotton has been substituted for a long-stapled one.

(3) The matter was again enquired into in 1905, at the instance of the Secretary of State for India with a view to see whether something could not be done to check the adulteration of Broach cotton with short-staple cottons. In this enquiry, the agricultural officers consulted laid stress on the fact that different tracts and different classes of soil in the same tract were suited to particular varieties of cotton, that a short-stapled cotton often paid the cultivator better than a long-stapled one, owing to the fact that it is more prolific or has a higher ginning percentage, that the cultivator is usually alive to his own interests in this respect and that it would be a mistake to coerce him to grow long-stapled cotton which might not suit the physical conditions so well as a shorter staple one. It was also contended that the mixing of long and short-stapled cottons was one for the cotton trade to deal with rather than Government. In this enquiry, the Millowners' Association, while deploring the growing adulteration of cotton, were not prepared to make any definite proposals for remedial action. It was then decided that the question of mixing cotton should be left to the Cotton Trade to deal with.

1985. *Enquiry into the mixing of long and short-staple cotton in the Broach-Surat tract.*—In 1908, the Directors of the Bombay Cotton Trades Association represented to Government that short-stapled cotton was being brought by rail into the Broach tract and passed on to Bombay as Broach cotton. They also expressed a fear that cotton seed thus introduced might affect detrimentally the variety of cotton grown in the Broach District. Mr. H. R. Greaves also made representations to the same effect. A detailed enquiry into the question was then made by Mr. Main regarding the cotton imported into the Broach-Surat tract, both seed cotton and clean cotton, and the results of his enquiry are shown below.

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[Continued.]

Statement of Imports of "Kapas" and "Cotton" into the Surttee-Broach tract.

Serial No.	Station where received.	KAPAS.				COTTON.				REMARKS.
		RECEIVED FROM OUTSIDE SURTEE-BROACH TRACT.				RECEIVED FROM OUTSIDE SURTEE-BROACH TRACT.				
		Received from within Surtee-Brosch tract.	Source.	Quantity.	Total of outside side kapas.	Received within Surtee-Brosch tract.	Source.	Quantity.	Total of outside cotton.	
		Mds. Srs.		Mds. Srs.	Mds. Srs.	Mds. Srs.		Mds. Srs.	Mds. Srs.	
1	Nausari*	...	...	...	...	12,507 7	(1) Rozi country	...	...	
2	Surat	...	...	...	...	135,857 0	(2) Karnatak .	1,710 37 1,680 24	3,391 21	
3	Sayan*	...	Deccan .	9,313 10	9,313 10	6,339 20	(1) Rozi country	4,465 10	5,194 30	
4	Kim*	...	(1) Rozi country	1,816 9	1,894 9	506,725 0	(2) Deccan	729 10	2,144 32	
5	Ankleshwar*	8,917 3	(2) Rajputana tract .	78 0	...	56,156 14	(1) Rozi country	605 0	...	
6	Broach	7,379 20	(1) Rozi country	751 24	3,167 24	...	(3) Karnatak .	194 0	...	
7	Broach port	4,375 0	(2) Deccan	2,043 0	...	...	(1) Rozi country	17,100 37	22,757 36	
8	Chamargam*	179 16	(3) Rajputana .	373 0	...	...	(2) Deccan	2,981 15	...	
9	Palej .	2,161 29	(1) Rozi tract .	...	...	11,682 33	(3) Karnatak .	2,678 24	...	
10	Misgaum*	6,338 20	(2) Deccan	7,685 15	13,728 15	...	Deccan .	6,839 38	6,839 38	
11	Itola*	...	(3) Rajputana .	4,696 0	...	2,213 37	...	...	...	
12	Baroda	93 17	(1) Rozi country	11,777 10	11,887 10	...	...	...	...	
13	Bardoli*	...	(2) Deccan	110 0	...	5,178 1	(1) Rozi country	...	...	
14	Modhi*	81 0	(1) Rozi country	1,421 22	2,042 31	...	(2) Rajputana	5,804 20	6,367 27	
			(2) Deccan	621 9	1,216 20	6,558 29	(3) Deccan	435 20	...	
			(2) Sind .	215 30	...	...	(4) Karnatak .	742 20	113 4	
			Deccan .	...	...	...	Deccan .	113 4	...	
				479 0	...	...	...	...	...	
			(1) Rozi country	24,452 30	43,728 39	241,561 6	(1) Rozi country	30,097 3	...	
			(2) Deccan	17,262 19	...	...	(2) Deccan	11,953 34	...	
			(3) Rajputana	1,798 0	...	...	(3) Rajputana	435 20	...	
			(4) Sind .	215 30	...	...	(4) Karnatak .	5,325 34	47,812 11	
	GRAND TOTAL	29,525 25								

Note I.—The last four lines of the above statement indicate the relative importance of the four external sources in meeting the demand for short-stapled cottons in Gujarat. It is probable however that some short-stapled cottons were imported previous to March from some of the early districts. The cotton season was practically over by the 15th May. The railway companies could supply this information and, in fact, I am indebted to the District Traffic Superintendent of the Bombay, Baroda and Central India Railway for most of the information contained in this statement.

* A station marked with an asterisk there are no spinning mills in the vicinity.

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(2) He estimated that the short-stapled cotton imported into this tract was equal to five per cent. of the long-staple cotton grown in this tract, and came to the conclusion that though the introduction of cotton seed from outside was not a dangerous factor, and that inferior seed so imported would not be likely to establish itself in this tract, still the cotton, in the form both of *kapas* and lint, which was introduced was largely brought in for the purpose of adulterating the local cotton and passing it off as unmixed Broach cotton, and that this was a legitimate source of grievance to the millowners, and constituted a real danger to the tract, since the good name of Broach cotton would suffer and the value of the whole would fall as a result of these malpractices.

(3) The above conclusions appear to be thoroughly justified, and though, at first sight, five per cent. does not appear to be a high degree of adulteration, it must be remembered that some of the large mills arrange to purchase their cotton direct from the cultivators and to get it pure, so that the degree of adulteration in the residue is higher than five per cent. and must be so particularly at places like Palej and Miagam where a large quantity is introduced and where there are no mills. At such places, the short-stapled cotton must be introduced simply for the purpose of unloading on Bombay as pure Broach cotton a mixture which contains a considerable element of *rozi* and Deccan cotton. The matter is the more serious when it is remembered that the length of staple of the locally grown cottons is Surat $\frac{3}{4}$ ths and Broach $\frac{3}{4}$ ths while the lengths of imported cottons are *rozi* $\frac{3}{4}$ ths and Deccan $\frac{3}{4}$ ths. Another point is that Mr. Main's enquiry apparently referred only to cotton brought by rail, but a more recent enquiry has revealed the fact that *mathio* cotton (similar to Deccan cotton), grown in Kathiawar and North Gujarat is brought by sea from Bhavnagar to Broach for mixing with Broach cotton, so the percentage of short-stapled cotton introduced must be larger than was estimated by Mr. Main.

1986. *Mixing in the Ahmadabad District.*—In the Ahmadabad District the state of affairs is somewhat different. Here and in Kathiawar three distinct varieties of cotton are grown, viz., *wagad*, *ladio* and *mathio*. So far as the Ahmadabad district is concerned, the distribution of these three varieties is shown in the sub-joined table, viz :—

Name of the Taluka.	Wagad.	ladio.	Mathio.
	Acres.	Acres.	Acres.
Dholka	40,120	10,310	...
Dhanduka	56,909	33,940	26,500
Gogha	...	...	400
Sanand	22,416	1,536	...
S. Daskroi	3,700	6,074	...
N. Daskroi	222	6,524	...
Viramgam	124,193	...	...
Prantij	159	714	...
Modasa	...	...	...
TOTAL	247,719	59,098	26,900

It will be noticed that *wagad* and *ladio* are grown extensively, side by side. I understand that the growing and import of *mathio* is prohibited in some of the Kathiawar States, viz., Wadhwan, Wankanar, Morvi, Lakhtar and Chuda but I believe that in other parts of Kathiawar it is extensively grown.

Wagad cotton is a distinct variety. It is suited to heavy black soils.

Yield, Dry, 400—550 lbs. Irrigated 1,000—1,200 lbs. Ginning percentage 31 to 34. Staple $\frac{3}{4}$ ths length, strong, colour dim.

Ladio is identical with Broach *deshi* and is best suited to sandy loam. Yield, Dry, 300 to 500 lbs. per acre. Yield, Irrigated, 1,200 to 1,500 lbs. Ginning percentage 36 to 38. Staple $\frac{3}{4}$ ths inch, strong, colour good at first but gets dim during monsoon.

Mathio is identical with Khandesh cotton and in Upper Gujarat is suited to red or light soils. Matures early and so avoids risk of damage by frost. Yield, Dry, 300 to 500 lbs. per acre. Ginning percentage 35 to 40, Staple $\frac{3}{4}$ ths to $\frac{3}{4}$ ths, rough white.

(2) Apart from these distinct varieties, grown separately, there is unfortunately a good deal of mixture in the field in some localities, viz :—

- Rozi* is found considerably mixed with *ladio* in the Daskroi and Dholka Talukas, due to the fact that *rozi* seed cotton is brought by cart from the Kaira District to the Ahmadabad and Dholka gins for mixing with the superior cotton.
- Mathio* is found growing mixed with *ladio* in the Dhanduka Taluka, due to the mixing of seed cotton in the Dhanduka and Ranpur gins.

1987. *Deliberate mixing of local varieties after picking.*

- Bavla (taluka Daskroi), *wagad* and *ladio* are intentionally mixed at the gins, because *wagad* is valued at ten per cent. more than *ladio*. The whole is then passed off as *wagad*. Sufficient of the two varieties is ginned separately to provide pure seed.
- Dholka.—*Rozi* seed cotton brought by cart from the Kaira District is mixed at the gins with *wagad* and *ladio*. The admixture often amounts to over twenty per cent.
- Ahmadabad the same as at Dholka. Inferior *ladio* cotton from Kadi and Patan is also brought for mixing. Cotton from Rutlam and Marwar is also introduced for the same purpose, and it is stated cotton from Khandesh.
- Sanand.—*Wagad* and *ladio* are mixed, and cotton from Rutlam sometimes added.

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[Continued]

- (e) *Viramgram*.—Formerly Khandesh and Marwar cotton used to be brought to mix with *wagad*; but the gin owners have now combined to stop this, with a view to secure a good name for Viramgram cotton. *Wagad* is grown pure and ginned pure.
- (f) *Bhavnagar*.—*Mathio* mixed with longer stapled cottons.
- (g) *Anand and Baroda*.—Intentional mixing of long-stapled cotton with *rozi* is very prevalent.
- (h) *Ranpur*.—*Lalio*, *wagad* and *mathio* are much mixed in the field and are also mixed after picking.

1988. *Conclusions*.—The conclusions to which all enquiries point are as follows:—

- (1) In Lower Gujarat, only one variety of cotton is grown and there is very little mixing in the field of distinct varieties, and little mixing in the field is likely to result from the introduction of cotton seed from outside, since the long-stapled varieties there mature much later than short-stapled varieties which might be introduced, the conditions are suitable to long-stapled varieties, and the cultivators are careful and weed out any plants of the short-stapled varieties which may be sown, when they thin out the crop. The case of *goghari* cotton in the north of the Broach district is peculiar and is dealt with separately in Annexure IV.
- (2) In the Ahmadabad District and some of the adjacent cotton tracts of Kathiawar, three distinct varieties of cotton are grown side by side, viz., *wagad*, *lalio* and *mathio*. These distinct varieties are grown on three distinct classes of soil and are suited to the soils on which they are grown, and could not be grown on other kinds of soil than those on which they are at present grown without considerable loss to the cultivators. Where cultivators are careful, they can and do arrange to keep the seed of these distinct varieties separate for sowing; but where they are careless, the seed used for the sowing is considerably mixed, and consequently a mixture of varieties occurs in the field.
- (3) The mixture of staples found in the bales of cotton coming or purporting to come from Lower Gujarat is due almost exclusively to the importation into Gujarat of short-stapled *kapas* and cotton from Rajputana and Central India, Khandesh, Berar and other tracts, which is deliberately mixed with long-stapled cotton of Lower Gujarat at the gins and presses and is passed off on the Bombay market as long-stapled cotton from Lower Gujarat.
- (4) The mixture of staples in the cotton that comes or purports to come from Upper Gujarat and Kathiawar is due to three causes—
 - (a) To a small extent to mixture in the fields.
 - (b) To a considerable extent to the fact that the long and short-stapled cottons which are grown side by side in this tract are deliberately mixed together at the gins.
 - (c) To a considerable extent to the fact that short-staple cotton from outside is imported into this tract and mixed at the presses with the long-stapled cotton grown within this tract.

1989. *Imports of short staple cotton into Gujarat and Kathiawar*.—Some idea of the extent of the import of short-stapled cotton into Gujarat and Kathiawar may be gathered from the subjoined table which show for eight years the import by rail into Gujarat and Kathiawar of cotton from the chief tracts growing short stapled cotton.

Imports by rail into Gujarat and Kathiawar in bales (one bale 400 lbs.)

From	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.
Punjab	...	...	...	...	...	...	...	3,000
United Provinces	...	1,000	...	...	3,000	...	2,000	...
Central Provinces	11,000	13,000	9,000	24,000	8,000	...	3,000	2,000
Rajputana and Central India	25,000	37,000	57,000	53,000	86,000	50,000	33,000	44,000
Nizam's Territory	4,000	2,000	4,000	2,000	7,000	5,000	5,000	7,000
Bombay	41,000	18,000	11,000	54,000	60,000	17,000	23,000	40,000
Khandesh	3,000	16,000	6,000	8,000	3,000	6,000	14,000	23,000
TOTAL	84,000	87,000	87,000	141,000	167,000	78,000	80,000	119,000

1990. *The two aspects of mixing*.—On previous occasions when the subject has been considered, there has been a tendency to confuse the questions (1) of mixed seed being sown in the field and (2) of subsequent mixing at the gins or presses of seed cotton or lint; and this has somewhat obscured the issues. It is desirable to keep the agricultural aspect of the question separate from the trade aspect.

1991. *The agricultural aspect*.—So far as Lower Gujarat is concerned, there is very little mixing of varieties in the field and little fear of it. Pure strains of the best character are being produced on a large scale, and this work can be extended as the demand for such seed increases. In Upper Gujarat, the seed is in some cases far more mixed, and it is probable that this Department can with advantage do something to provide seed of pure varieties and to select within these varieties strains with the best characters. The fact, however, that three varieties of cotton are grown side by side and systematically mixed at the gins will make it difficult to keep the seed pure. So much for the agricultural aspect.

1992. *The trade aspect*.—It is the trade mixing at the gins and presses that really dominates the situation. In Upper Gujarat, the admixture of short-stapled cotton is derived partly from within the tract and partly from outside the tract. The problem therefore is complicated, and it is difficult to see what steps Government can take to prevent the mixing of two cottons grown in close proximity to each other, though perhaps something might be done by organising cotton-sale societies for the sale of pure cotton, provided that the cultivators are amenable and the cotton trade will assist. In Lower Gujarat, however, the issue is simple since the admixture of short-stapled cotton which now finds its way into the bales of reputed Broach and Surat cotton is all imported into the tract from outside; and this import can be regulated.

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(2) So far as I understand the matter, the objections raised in the past by the cotton trade to restrictive regulations have been based on the ground that the remedy aimed at by appointing inspectors at all gins and presses was worse than the disease, and that mixing must not be entirely prevented since some mixing is quite legitimate. I understand that the millowners' point of view is that while it is fraudulent for a dealer to mix short-stapled cotton with (say) Surat cotton and pass the whole off as Surat cotton, still for certain purposes in mills, mixing of varieties with slightly different staples is often advantageous since, in such mixtures, the requisite strength of staple and colour can often be obtained at a less cost than by using any single variety pure. Such mixing would not be practised in cases where uniformity of staple is essential; but is often economical where uniformity is not essential, and the exact nature of the mixtures used constitutes a trade secret with the different mills. The mills, however, want to get their cotton pure and to do their own mixing, and do not want to have cotton of unknown mixture palmed off on them as Surtee cotton. This seems to be a very natural aspiration, and if the distinction drawn above between legitimate and illegitimate mixing be accepted, it seems to me that it would be possible to secure the desired result in Lower Gujarat without any inspection irksome to the trade or any appreciable expense to Government. This could be done simply by fixing a scheduled long-stapled tract in Lower Gujarat and by prohibiting the import by rail or sea of cotton or *kapas* into that tract under license. Such licenses would be issued only to mills within the tract on a guarantee given by them to the effect that they required such cotton from outside the tract solely for use in their own mills. To effect this, legislation would be necessary and the effect would be that mills within the tract which wanted to import by rail or sea short-stapled cotton from outside could do so under license, but dealers who wanted such cotton to adulterate the locally grown long-stapled cotton would not be able to obtain it. In this way, such legislation would not interfere with legitimate mixing or with legitimate trade, but would put a stop to the fraudulent practices which now cause such losses to the mills and which give Indian cotton such a bad name and so to reduce its value. So far as export abroad is concerned, it would not afford a guarantee that cotton exported from Bombay as (say) Surat cotton was unadulterated, since any amount of adulteration might be done in Bombay. But it would enable any millowner or export firm which bought cotton in the Surat-Broach tract to know what he was purchasing. I understand that the present system of mixing is closely connected with the speculation in Broach cotton which takes place in the Bombay market. Speculative sales of Broach cotton are made in advance of the crop in Bombay, and it may be subsequently found that the crop is smaller or the price higher than was expected, and the sellers there, in order to meet their engagements or to cut their losses, bring outside cotton into the Surat-Broach tract and either mix it with local cotton or even re-book unopened bales of short-staple cotton to Bombay bearing the mark of some station in the Surat-Broach tract. Some objections on the part of speculators might be raised to legislation which would stop this practice; but if the legislation is otherwise sound and beneficial to legitimate trade, such objections might be ignored, for it would be no loss to the community if the present excessive speculation in cotton were checked.

(2) It will be noticed that the proposal is to regulate the movements of cotton by rail and sea into scheduled tracts. I have not proposed to regulate movements by cart because this would be more difficult. It would, therefore, be necessary to define the limits of a scheduled tract so as to obviate, as far as possible, any chance of short-stapled cotton being brought by rail to a station just outside the limit and then brought in by cart in large quantities. It should not be difficult to fix the limits so as to prevent this; but if it were found that the objects of the legislation were being defeated in this way, the question of regulating imports by cart might be considered.

(3) So far I have suggested the Surat-Broach tract as the only suitable locality for specification as a scheduled area; it might however be found advisable to schedule another tract in Upper Gujarat, and also a tract in the Southern Mahratta Country. The circumstances in Upper Gujarat have already been described. So far as the Southern Mahratta Country (Dharwar, Bijapur, Belgaum) is concerned, the two kinds of cotton grown there are *kumpla* $\frac{3}{4}$ (the staple) and Dharwar-American ($\frac{1}{4}$ the staple). It is essentially a long staple tract. No detailed enquiries have been made on the subject in the Southern Mahratta Country, but the figures of rail-borne trade show that in any year cotton up to the following quantities may be imported into this tract viz.:—

From—	Bales.
Nizam's dominions	10,000
Madras Presidency	10,000
Mysore	5,000
Bombay	4,000

I cannot say that all this cotton is short-stapled cotton brought in for purposes of adulteration, but I believe that a good deal of it is such; and gentlemen closely connected with the cotton trade in this region have assured me that a considerable amount of short-stapled cotton is brought there by dealers simply for the purpose of adulterating the long-stapled cotton, and that cotton waste is brought down from Bombay for the same purpose, mixed with the cotton and so returned to Bombay as cotton. If the cotton trade are disposed to accept the suggestions made above, any further enquiries that may be necessary can be made.

ANNEXURE I.

Note on Improved and Exotic Cottons in the Bombay Presidency.

The Bombay Agricultural Department has for some years past been working at the improvement of cotton. The primary object of the experiments made is to obtain a variety of cotton which will give the cultivators of any particular tract a larger net profit than they obtain from the cotton which they already grow. This may be done by improving either the quantity or the quality. In some tracts success has been indicated rather in the direction of improving the yield than in improving the quality. This has been so notably in Khandesh, and to some extent in the Southern Mahratta Country, where the introduction of Broach cotton has been successful and has added to the cultivators' profit by increasing the yield (both the gross yield of seed cotton and the ginning percentage of lint). It was believed, however, that in the more favoured part of the Presidency, there was a good field for profitable improvement in quality; and with this object experiments have been made with exotic cottons, and by cross fertilization and continued selection of the best

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indigenous cottons. The work in this connection has now got beyond the experimental stage, and it only remains to be seen whether the belief that there would be a good demand for long-stapled cotton will be justified. The following results have been obtained.

Egyptian cotton.—Of the various kinds of Egyptian cotton tried, *Metaffi* is the only one that has given really good results. During recent years, samples of *Abassi* and *Metaffi* grown in Sind have been forwarded to three leading Alexandria brokers, who have been unanimous each year in stating that while the Sind-grown *Abassi* will not grade as *Abassi*, the Sind-grown *Metaffi* is of a strong useful quality and will grade as "fully good fair" Egyptian brown. In order that it may grade as "fully good fair" Egyptian brown, it must of course be properly cleaned and ginned in a gin intended for Egyptian cotton, and not in one intended for Indian cotton. During the past two seasons, it has been impossible to grow Egyptian cotton in Sind, since the Jamrao Canal, the only perennial canal in Sind, has been closed for alterations during the months of March and April when it is necessary to sow Egyptian cotton. In two years' time, however, when the Jamrao Canal has been remodelled, the question of recommending the cultivators to grow Egyptian cotton will again arise. It will not be possible to advise the cultivators to grow Egyptian cotton unless a fair market price for the produce can be guaranteed. Egyptian cotton requires a longer growing season than Sindhi cotton, needs better cultivation, and gives a somewhat lower yield, probably about two maunds less than Sindhi cotton (1 maund=82lbs. seed cotton). It is, therefore, necessary that the price obtained should cover this. When Egyptian cotton was first grown in Sind, good prices were obtained, though they probably bore little relation to the true value of the lots sold. The buyers were of two classes.

(1) Mill owners from Ahmedabad and Bombay.

(2) Exporters from Karachi and Bombay.

The mill owners, several of whom use imported Egyptian cotton, soon stopped coming. They stated that when they bought Egyptian cotton in Alexandria or Liverpool they got a certain grade which was uniform and could be depended on to produce certain counts; whereas for Sind-grown Egyptian, they had to send their agents to Sind at an unhealthy time of the year, and the latter not knowing the Sindhi language were at a great disadvantage. To buy any quantity they had to bid for a number of small lots, some dirty, some stained and some good. These they had much difficulty in getting ginned, as the local gins, which are suited only for short-staple cotton, had plenty of work of their own. In fact a cotton broker is an essential link between the cultivator and the manufacturer. Indian brokers have no knowledge of Egyptian cotton, and a sample of "fully good fair" *Metaffi* submitted to a leading Bombay exporter was stated to be a "foreign variety of a bad colour." The exporter always fought shy of *Metaffi*; and the Indian manufacturers apparently do not want it on account of its colour.

American cotton in Sind.—Various kinds of American Upland cotton have been successfully grown on a fairly large scale in many different parts of Sind. The ordinary cultivation given to Sindhi cotton will suffice for them, and the growing season is shorter than that of Sindhi cotton. American cotton can therefore be grown on ordinary inundation canals wherever Sindhi cotton can be grown, and in addition it can be grown in Upper Sind where at present practically no cotton is grown, and in parts of lower Sind where the autumn mists are prejudicial to the later maturing Sindhi cotton. It is hardy, but easily affected by *kalar* (alkali soil). During the past year it produced in many cases as much seed cotton as neighbouring plots of Sindhi cotton; but it would be safe to take it as yielding on the average about one maund (82lbs.) less seed cotton per acre than Sindhi cotton. As regards quality the following report on samples of American cotton grown in Sind was made by the Chairman of the British Cotton Growing Association to whom they were submitted:—

"I now have very much pleasure in enclosing report on the different samples of cotton, which are most satisfactory. Cotton of any of these types, if produced in commercial quantities could be readily sold at satisfactory prices in Lancashire and in any quantity. You will notice that the lowest 1st price, namely Boyd's Prolific, is worth twenty points more than 'middling' American and over ½d. more than 'Fine Broach.' Quotations for 'middling' American and Fine Broach are given at the bottom of the valuation. As is pointed out by Messrs. Wolstenholme and Holland, these are just the quality of cotton required by Lancashire."

* * * * *

Liverpool, 14th February 1910.

"We enclose valuation of samples of cotton grown from American seed in Sind, Mirpurkhas, India, on Government Farm."

"We are pleased to say that the quality is excellent, and very suitable for the English market. As the cotton is ginned, you will know the percentage of outturn if they have gone through your own gin. This is just the cotton required by Lancashire."

(Sd.) WOLSTENHOLME & HOLLAND.

Black Rattler.—"Strict good middling in grade good colour, staple 1½ inch, little irregular fairly strong value 9-25d. Yield of lint 33-37 per cent."

Peterkin.—"Fully good middling, staple 1½ to 1½ inch, fairly strong, value 8-50d. Yield of lint 33-30 per cent."

Griffin Variety.—"Fully good middling staple 1½ inch, inclined to be tender, value 11-00 @ 11-50d. Lint 30-0 per cent."

Boyd's Prolific.—"Strict good middling, staple 1½ inch, fairly strong, value 8-40d. Yield of lint 31-23 per cent."

Triumph.—"Fully good middling, staple full 1½ inch, rather soft, value 8-60 @ 8-70d. Yield of lint 35-71 per cent."

Toole Variety.—"Fully good middling, staple 1½ inch, fairly strong, value 8-60d. Yield of lint 33-33 per cent."

Allen's Improved Long Staple.—"Fully good middling, good colour, staple fine, rather irregular, inclined to be soft, value 10½d. to 11d. Lint 30-56 per cent."

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[Continued.]

Texas Big Boll.—"Fully good middling, good colour, staple 1½ inch, strong, value 8-60 to 8-70d. Yield of lint 31-25 per cent."

(Sd.) WOLSTENHOLME & HOLLAND.

"Middling American—Value 8-20/100d."

"Fine Broach.—7/9/16."

Local buyers in Sind do not care to deal in American cotton; and in some cases the growers mixed their American cotton with Sindhi, and sold it as such. In other cases where it was with difficulty sold as American the price given for it was only Re. 1 to Rs. 2 per maund (82lbs. seed cotton) more than the price paid for the very short-stapled Sindhi cotton.

Improved Cottons in Gujarat.—For some years past the work of developing an improved variety of indigenous cotton at Surat has been in progress, and we can now claim to have evolved several fixed varieties of hybrid cottons with a staple considerably longer than that of the local cotton.

The work of substituting these cottons for the local cotton has now reached a critical stage. In the season 1909-10, 500 acres were sown by cultivators with the Government seed. The crops resulting from this seed yielded very well, and the lint was of a superior quality. The Agricultural Department arranged with a mill-owner to take over the whole produce of the 500 acres at a rate of five per cent. in excess of the prevailing rate, and to re-sell the seed to the Agricultural Department for redistribution for sowing.

During the current year, about 5,000 acres have been sown with our seed; and we are endeavouring to make arrangements for its sale at a higher price than the local cotton; but this is rendered difficult owing to combination of the local buyers, who have combined to keep down the price of seed cotton, and who will purchase seed cotton only at a general rate settled amongst themselves. Two difficulties now occur.

(a) We cannot go on indefinitely extending our operations of this nature, which are already putting a strain on the Department which has much other work to do.

(b) We believe that we are not obtaining for the cultivators the full value for their crop, which is necessary if they are to be induced to take up the new seed keenly.

As regards the question of value, the following table will show the valuations made of two of our improved cottons last year:—

Register No. of cotton	Valuation in Rs. per khandi of 784 lbs. by the Bombay Cotton Trade's Association.	Percentage increase in money value.	Report on the spinning properties by the Bombay Mill-owners' Association.	Percentage increase in spinning value.
Hybrid 1027 A.L. and F.	340	3 per cent.	Creamy white, good for spinning 30s. to 32s.	72 Per cent.
Ordinary Local Surat cotton (for comparison).	330	...	Very dull in colour, good for spinning 16s. to 20s.	...

Similarly samples from a sub-farm located near Navsari were also sent for valuation with the following results:—

Register No. of cotton.	Valuation in Rs. per khandi of 784 lbs. by the Bombay Cotton Trade's Association.	Percentage increase in money value.	Report on the spinning properties by the Bombay Mill-owners' Association.	Percentage increase in spinning value.
Hybrid 1018 P. G.	355	4½ per cent.	White and soft, good for spinning up to 36s.	20 per cent.
Ordinary local Navsari cotton (for comparison).	240	...	Good for spinning 30s.	...

In the case of the Surat-grown cottons we see that although the spinning values of the cottons stood as:—

172 : 100

still the money valuations stood as—

103 : 100

while in the case of Navsari grown cottons the spinning values stood as—

120 : 100

and the money valuations as—

104½ : 100

From the remarks in the Millowners' report it will be seen that the money values were not reduced because of some other defect, such as bad colour or weakness.

Five bales of cotton were last year sent to Mr. Arno Schmidt, Secretary of the International Federation of Master Cotton Spinners and Manufacturers' Association. They were valued for him by Messrs. Hoyle & Jackson, Ltd., of Oldham, and bought by them.

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[Continued.]

Copy of letter dated 29th November 1910 from Messrs. Hoyle & Jackson, Ltd., of Oldham to Mr. Arno Schmidt

"Attached we give you full particulars of the five bales you sold us on October 25th together with the valuation. Of course an off lot like this is not as valuable as the same cotton in quantity and we think it will be fair on both sides, if you make the invoice out as follows:—

Marks G. G. & Co.	Gross.	Tare.	Nett.	Nos. on Valua- tion letter Oct. 26th.	Valuation pence.	Quality.
431	421	18	403	5	7½	Surat good staple.
432	396	17	379	1	7½	Dharwar
433	422	13	409	2	7½	Broach.
434	415	11	404	3	7½	Broach.
435	415	13	402	4	7½	Broach.

Middling American quotation on 26th October	7-88
October futures on October 26th	7-70
Fine Broach on October 26th	7½d.

Another English firm to whom they were submitted made the following remarks about them:—

BALE MARK—

- 435 would spin upto 20,24s. If mixed with American cotton, could be spun upto 30s.
- 434 Beautiful staple. Could easily be spun upto 20s. twist, 26s. weft.
- 432 Very clean; about as good as "Good Middling American," perhaps equal to staple Texas.
- 433 Fully good to fine Broach.
- 431 Badly ginned. Probably ginned before the cotton was matured.

It may be mentioned the Bale No. 431 was *kumpla* cotton grown at Dharwar. Bale No. 432 was Cambodia cotton grown at Gadag (Dharwar District) and the remaining three bales were of cotton grown by cultivators near Surat from seed supplied from the Surat Government Farm and were fair samples of the whole.

The remark about bale 432 will be noted; and it will also be seen that bale No. 433 was valued at 7½ when middling American was quoted at 7-88.

Bale No. 433 was valued at ½d. more than Fine Broach, i.e., 3½ per cent. more; and "Fine Broach" (i.e., Navsari cotton) is usually valued at five per cent. more than cotton grown round Surat. Cotton grown near Surat should therefore be worth at least eight per cent. more than ordinary cotton grown near Surat. It is with great difficulty, however, that we can obtain for it in the local market five per cent. or even three per cent. more.

In addition to the Gujarat cottons, the work of this Department in the Southern Mahratta Country shows that long stapled cotton can be grown in the east of the Dharwar District. Bale No. 432 mentioned above comes from that tract and cotton grown from newly imported American seed has done well there.

Mr. Arno Schmidt adds to his report the following remark:—"I may say that those to whom I have shown your samples are delighted with what can be produced in India."

The object of the foregoing statement is to show what the Agricultural Department has demonstrated can be grown in the Bombay Presidency in the way of long-staple cottons; not on a small experimental scale, but on a large scale by cultivators in their own fields. The cultivators take up our seed keenly; but unless this Department takes steps to secure the resulting seed, it is seldom retained and is mixed with other seed and lost for purposes of cultivation.

We have several large farms which produce seed, and we have hitherto taken steps in many cases to recover the seed of the produce grown from our seed; but we cannot extend these operations indefinitely; and have now about reached our limit in making arrangements for marketing the produce. Good seed can now be made available in large quantities, but if the cultivators are to be induced to keep it pure and to grow it over large tracts to the exclusion of inferior varieties, it is necessary that they shall obtain the real value of their produce, and shall obtain it without more difficulty than they now have in obtaining the real value of their inferior produce. To secure this what is required is a buying agency able to state and ready to pay the fair value of the produce and to arrange its proper ginning, and the retention of the best seed for sowing. This Department will, of course, be glad to assist so far as it can, will always have some seed for distribution, and will arrange to maintain on its farms the standard reached; and confidently hopes to improve on that standard.

Unless, however, the trade finds it worth their while to establish such buying agencies for good cotton, it will be useless for us to continue on our present lines, and we had better drop our efforts at improving quality and devote ourselves to the question of quantity only. The cultivators of many tracts have in the past deliberately substituted a short-stapled cotton for a long-stapled one because it gave more lint, and they found that the buyers cared only for quantity and not for quality; and this process is still going on. It must not be supposed from the above remarks that the cotton trade has been unfriendly to our efforts. On several occasions, Bombay merchants and others have done their best to help us; and on many occasions merchants and millowners have offered to give a good price, or even a fancy price, for the produce of our seed, provided that we would arrange to buy, gin and press it, and send it to them. It is, however, impossible for the Agricultural Department to undertake these operations on a large scale; and it would not advance matters if we were to do so once in a way on a small scale. The matter requires to be put on a permanent business footing.

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[Continued.]

In conclusion it may be stated that on our farms the average yield of seed cotton with ordinary good cultivation is as follows:—

1. *Metaffi* cotton in Sind ... 400 lbs. per acre, ginning percentage 31 to 32.
2. American cotton in Sind .. 500 lbs. per acre, ginning percentage 32 to 33.
3. American cotton in the Southern Mahratta Country 400 lbs. per acre, ginning percentage 30 to 31.
4. Cambodia cotton in the Southern Mahratta Country 400 lbs. per acre, ginning percentage 36 to 42.
5. Improved cottons in Gujarat 500 lbs. per acre, ginning percentage 32 to 33

Good cultivators obtain about the same yield per acre, and large areas are available for cotton in Sind, Gujarat and the Southern Mahratta Country.

POONA,
1st March 1911.

G. KEATINGE,
Director of Agriculture.

ANNEXURE II.

Extracts from the Annual Reports of the Bombay Agricultural Department.

(i)

Extract paragraphs 7 to 13 of the Annual Report of the Department of Agriculture, Bombay, for 1913-14.

7. *Cotton*.—It was proved that in Sind, with perennial irrigation, good crops of Egyptian *Metaffi* cotton could be grown, and for a time a considerable area was sown with this cotton. The chief difficulties for its successful introduction were that the very poor system of cultivation which is common in Sind would not suffice for Egyptian cotton, and there were difficulties in marketing it. Its cultivation was brought to an end by the uncertainty of the perennial water-supply. These difficulties will have to be overcome before Egyptian cotton becomes a commercial crop in Sind, and they will be difficult to overcome; but when perennial irrigation extends in Sind, I have little doubt that in days to come, Egyptian cotton will be profitably grown there, and that our experimental work will then produce its result. Meantime it has been found more promising to push American cotton in Sind. Various good stapled American cottons will grow in Sind with seasonal irrigation and with the same kind of cultivation that is given to the Sindhi cotton. This season a crop of 1,000 bales is expected in Lower Sind and a special agency exists for marketing it. Whether this cotton is to be grown in Sind extensively or not depends on the price that can be got for it, and in the present state of the cotton market this year's prices will give us little information but there is no doubt that good stapled American cotton will grow well in Sind, and some of the larger *zamindars* are keen on it and are cultivating it well.

8. The only other locality in which a foreign cotton recently imported is doing well is the south of the Dharwar District, where Cambodia does very well in most years. This is a tract which grows Dharwar-American cotton, and it is as a rival to Dharwar-American cotton that we are pushing Cambodia. The great advantage of Cambodia over Dharwar-American cotton is that it has a ginning percentage of 38 as opposed to the ginning percentage of Dharwar-American cotton which is 28. This means that an amount of seed cotton which will give 100lbs. of lint in the case of Dharwar-American cotton will give 130 lbs. in the case of Cambodia. In four years out of the five that we have tried them side by side, Cambodia yielded better than Dharwar-American in point of seed cotton, and by 1912-13 it had obtained considerable popularity with cultivators and several thousand acres were sown with it. In that year, however, its yield was very poor as a result of continuous rain immediately after sowing, a condition which suited the Dharwar-American cotton crop, and as a result the area under it fell considerably in the past year. The indications are that in the great majority of years it is more profitable in this tract than Dharwar-American cotton, and many good cultivators are keen on it. It is, therefore, probable that it will find a permanent place in the crops of the locality, and that the demand for seed will increase considerably. As this occurs, we shall take steps to meet the increased demand.

9. The introduction of Broach cotton into the western part of the Dharwar cotton tract which gets both the early and the late rains has been a considerable success. The advantage of this cotton lies in the fact that, whereas its yield of seed cotton per acre is at least equal to the local *kumpla* cotton and the quality of the lint at least as good, the ginning percentage is 33 as against 27 in the case of *kumpla*. This means an increase of lint to the extent of 24 per cent. In order that the full market value of this superior ginning percentage may be obtained, we have found it necessary to grade carefully all the Broach cotton grown in the Dharwar District, on the basis of ginning percentage, and to hold an annual auction. The area now under Broach cotton in the Dharwar District has now extended to about 2,500 acres and at the last auction cotton worth over Rs. 1½ lakhs was sold, bringing to the cultivators a profit of about Rs. 40,000 over and above what they would have obtained by growing *kumpla* cotton. The advantage to be obtained by growing this cotton is substantial and in some villages they now grow it almost to the exclusion of the *kumpla* cotton. The difficulties in the way of securing its more rapid extension are as follows:—

- (1) It requires a longer growing season and has to be sown earlier. This gives rather more trouble.
 - (2) It has to take the risk of both the early and the late monsoon, and is liable to damage by the vagaries of the July and August rainfall at a time when the *kumpla* cotton is not yet sown. This difficulty was marked in the present season when the continuous rainfall in July and August did considerable damage.
 - (3) Fresh seed has to be brought from Gujarat every few years, since the high ginning percentage deteriorates after a few years in the Dharwar District.
 - (4) To secure the proper prices we have to grade the cotton and hold an annual auction.
- Difficulty No. (1) is not serious, but cannot be ignored in a tract where the cotton-growers cannot be described as generally hard-working.
- No. (2) is more serious, though the risk is small as compared with the advantage to be gained in the great majority of years.
- No. (3) is not serious and can easily be overcome by organisation.

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[Continued.]

No. (4) is somewhat crucial, since, though we have been able to undertake this work on a small scale, it is not possible for us to extend it indefinitely. The cotton must be grown within reasonable carting distance of the scene of our auction sale and this, of course, limits the area that can be sown. We cannot undertake to grade and sell the cotton of the whole country side, and no one seems disposed to take up this work. It would be a pity to drop this line of development, since it ought to bring in several lakhs of rupees in additional profits to the cultivators of this tract; but the difficulties mentioned above are taken together considerable, and unless we can find some way to overcome the marketing difficulty, I fear that we shall have to drop the work.

10. In the improvement of the *kumpla* cotton, our work has given substantial result. We now have a *kumpla* cross cotton which year by year gives a ginning percentage two per cent. better than ordinary *kumpla*, denoting an advantage of eight per cent. in the quantity of lint, and we have a selected *kumpla* strain which, with continued selection, gives a ginning percentage of three to four per cent. better than ordinary *kumpla*, denoting an advantage of twelve to sixteen per cent. in the quantity of lint. That such an advantage may be realised it is necessary that the market should be sensitive; and how little this is the case is exemplified by the following facts. It is found that in certain definite localities in the Dharwar District, owing to natural advantages, the ginning percentage of the ordinary *kumpla* cotton is, year by year, about two per cent. better than is the case over the great bulk of the area where this kind of cotton is grown. The buyers of seed cotton are aware that some advantage of this kind exists, and will sometimes offer a rupee or two more per *naga* (1,344lbs.) for cotton from those villages; but the real advantage would be represented by an additional value of Rs. 12 per *naga*. With a market so little sensitive, it will be realized that the advantage of a new cotton must be very large and obvious before it is possible to secure for the cultivator the fair price which will make him anxious to adopt it.

11. In Lower Gujarat, where the ginning percentage of the cotton is already high, our efforts were directed to improvement in the quality of the lint, and met with considerable success. Of the many improved strains which showed promise, we finally selected three, of which two were hybrids and one was a selected cotton, and by 1909 we were putting out these cottons on a fairly big scale. The lint of these cottons was most favourably reported on both in Bombay and in England by the trade which expressed much satisfaction at the improvement effected. Our cotton had a staple of one inch and was reported to be good for spinning 30s. to 32s. when ordinary Surat cotton was good for 16s. to 20s., and our seed got a good name locally so that the cultivators were often able to get a better price for the produce, and once when we arranged with a millowner to take over the produce of 500 acres at a rate five per cent. in excess of the prevailing rate, he expressed himself well pleased with his bargain. It was then felt that the time had come when we must be able to guarantee to the cultivators a better price for the cotton grown from our seed if we were to get our seed widely taken up. We therefore approached the trade, and, in 1911, a Syndicate was formed in Bombay which undertook to purchase cotton grown from our seed at five per cent. over current market rates. This scheme came into operation in 1912 when 1,167 bales of cotton grown from our seed were purchased by the Syndicate at a rate five per cent. in excess of the current rate, and, though the operations were not free from difficulty, the Syndicate and the cultivators both expressed themselves as well satisfied. In the following season, some 17,000 acres round Surat were sown with our seed and about 6,000 bales of cotton were produced. Early in this buying season, however, difficulties arose, and the Syndicate declared that they were being made to pay excessive prices. The cultivators were certainly very much alive to the possibilities of working the arrangement in their own interest, and three main difficulties were found to exist:—

- There was no authoritative means of deciding what was the ordinary current local price of seed cotton for the day, and cultivators were apt to declare that they had been offered such and such prices for their cotton by local buyers, and to claim five per cent. extra. The Syndicate questioned the reality of such offers, and it is certainly possible that local dealers did offer a better price on account of the superior quality of the cotton and that the Syndicate was thus asked to pay the increment twice over.
- The Syndicate were under agreement to buy, but the cultivators were not under agreement to sell. The result was that on any day when prices were low, the cultivators brought in no cotton, while on any day when ordinary prices were high the cultivators brought in their cotton in quantities and claimed five per cent. over the ordinary rate for the day.
- The market in that season steadily fell, and all who held up stocks suffered. As a result of these causes, the arrangement for marketing this cotton broke down, and the Syndicate closed its operations towards the close of the season. It was afterwards alleged that some of the clean cotton, which arrived in Bombay, and purported to be grown from our seed, was no better than ordinary cotton. We did our best to see that no substitution took place and employed a large staff for the purpose, but it was impossible for us to say that no substitution took place between the time when the seed cotton left the field and the bales of clean cotton arrived in Bombay. The Syndicate made a genuine attempt to help us in popularizing this new seed, and our thanks are due to them, but the scheme contained inherent difficulties which, in the circumstances of the season, resulted in a breakdown, and made it clear that it is the local buyer of seed cotton rather than the cotton merchant in Bombay who dominates the situation. Since the breakdown of these arrangements, the cultivators have been left to make their own arrangement for disposing of the produce of our seed. They are glad to get our seed and recognize the superiority of the cottons which it grows and can often get a somewhat better price for it; but unless they can be certain of getting a better price the majority will not take much trouble to obtain it, nor will they pay for it a price materially higher than they pay for ordinary seed at the gins.

12. From the above facts it will be realized that, in the present condition of the cultivators and of the cotton market, an improved cotton must have the following characteristics in order that it may obtain rapid success:—

- The improvement must be in quantity rather than in quality.
- The improvement in quantity must be considerable and obvious.
- The cultivation must involve no additional labour or risk to the cultivator.

13. An improved cotton which has these characteristics has been found for Khandesh and the neighbouring districts in *roseum* (N. R.) cotton. It yields more heavily than the ordinary Khandesh mixture;

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[Continued.]

it has an advantage in ginning percentage of three per cent., denoting a further nine per cent. increase of lint, it has a good colour which attracts buyers, and is a hardy and early maturing variety. The growing of this cotton is worth at least Rs. 6 per acre in additional profits to the cultivators in an area which grows some million and a half acres of cotton, and the cultivators have rapidly realized the advantage. We have far larger demands for this seed than we can supply, though we charge more than double the price of ordinary cotton seed, and to meet this demand we have opened a large departmental seed farm and have nineteen seed-growers who grow our pure seed on an area of 732 acres. One lakh lbs. of this seed was sold during the past year, and we shall steadily increase the number of our seed-growers. In addition to our departmental effort, some individuals and organizations are taking steps to produce this seed in a pure state for themselves. The success of this seed appears to be certain.

(ii)

Extract paragraphs 5 to 9 of the Annual Report of the Department of Agriculture, Bombay, for 1914-15.

5. In the last report, I endeavoured to estimate the progress that we were making in introducing new varieties of cotton in different tracts. Since the buying agency established at Surat by the Bombay Syndicate had broken down, as was explained, it was necessary to introduce some fresh organization to enable the cultivators using seed of our improved strains to get the benefit which an insensitive market for seed cotton refused to them. We commenced on a small scale by getting the cultivators of a group of seven villages to combine to grow our seed, gin their own cotton and market it jointly. A committee was formed with a representative from each village and the Divisional Inspector of Agriculture as Chairman. The matter was carried through successfully, and the committee sold the lint to Messrs. Narandas Rajaram & Co. at a premium of Rs. 12 per *khandi* over the price of local cotton. This represents the advantage in quality only. The advantage of ginning percentage was also obtained by the cultivators, since they ginned their own cotton. The net sum obtained by the cultivators amounted to Rs. 21,500 or an advance of $7\frac{1}{2}$ per cent. on current local rates, three-fifths of which represented improved quality and two-fifths improved ginning percentage. The matter was carried through by Mr. Bhimbhai Morariji Desai, to whom the credit for the organization is due. That the purchasers were well satisfied is clear from the following letter:—

NARANDAS RAJARAM & Co.,
BOMBAY.

No. 111, Esplanade Road,
Fort, Bombay,
23rd September 1915.

My dear Bhimbhai,

You would be interested to know the report that I have got from Liverpool regarding the farm *kapas* cotton consigned by me to that market for sale. I transcribe hereunder the quotation in full:

"Consignment 08.—We have sold six bales BOT at 5-41 and reserved remaining bale for type purpose. The price obtained was 15 points over the 'future' quotation, at the time, of 5-26 for August. Middeing American was quoted that day at 5-39, so that we secured a small advance over your limit. The buyer was the mill that had tested a sample so we presume the trial was satisfactory. We anticipate a nice business next season if you can get this quality in bulk."

I have already told you that the local mills to whom I forward the cotton are completely satisfied also and thus you may conclude that the outcome of this year's farm *kapas* crop has met with the approval of those for whose custom you may be catering.

Yours sincerely,

PURSHOTAMDAS THAKURDAS.

I think that this shows that our improved Surat cotton is a distinct advance on the local cotton and that we have produced a strain which the mills appreciate both in India and in England. Our operations this year were of course on a very small scale as against what we formerly attempted, but we must try to steadily extend them year by year, inducing groups of villages to organize to market their cotton grown from our seed jointly. It will not be an easy matter for the Department to organize on a large scale, but I can see no alternative.

6. In Sind, American cotton continues to do well and is quite satisfactory both as regards yield and as regards quality. The difficulty, here-also, was to get the cotton valued and bought at a fair price. To meet this difficulty a Bombay Syndicate was formed to buy the seed cotton. The operations for three years may be summarized as follows:—

Year.	Upper Sind (estimates).	Lower Sind (actuals baled).
		bales.
1913 . . .	25 bales	500
1914 . . .	100 „	550
1915 . . .	Nil (abandoned for want of a buying agency)	270

In Sind, cultivation is so scattered and the country so undeveloped that it is not easy to make rapid progress. In Upper Sind also, this difficulty occurred that the people were not accustomed to grow cotton at all, and it was a question of introducing cotton and not merely of changing the variety of cotton. Consequently the quantity received fell short of expectations. In Lower Sind, however, a fair start in production was made, but it received a check owing to the defective buying arrangements which did not suit the views of the cotton growers. In the first place, the Syndicate were never ready to buy at the beginning of the season. American cotton begins to come in in September, but the Syndicate was never ready to buy till well into November, so that people who had brought in their cotton from a distance had to wait about indefinitely. Secondly, the system of deferred payments and payments by drafts on Hyderabad were very unpopular. There were other minor points of complaint on the part of the cultivators and the result was that in 1914, half the cotton was sold not to the Syndicate but to Messrs. Ralli Brothers. In 1914, cotton price

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[Continued.]

were much disorganized by the war, but relatively the Sind-grown American cotton did very well, for with Sindhi cotton selling at Rs. 4 per maund, American sold at Rs. 6 per maund at the beginning of the season and Rs. 7 at the end. In 1915, as a result of the fall in the price of cotton due to the war, a low inundation and the defects of the buying agency, the estimated outturn of American cotton is only 270 bales. The Bombay Syndicate have declared that the amount is too small to make it worth their while to buy and have finally closed down their buying agency. I understand that a Japanese firm is this year buying the American cotton. In Upper Sind, the production of American cotton amounted to 100 bales in 1914, but as no buying agency materialized it has been abandoned for the present. There is no reason to doubt, however, that extensive growing of American cotton in Upper Sind might have been nursed into existence with the help of a suitable buying agency. Another difficulty arose from the fact that roller gins were put up by the Syndicate instead of saw gins which are requisite for American cotton, and the value of the lint produced was considerably lessened. The present position is this that, in Lower Sind, we now have a large seed farm, which grows excellent American cotton giving an all round average of 700 lbs. per acre, the lint of which is valued at Liverpool at 6d. per lb., the spot price for American middling at Liverpool on the same day being 5-8d., that many cultivators are keen on growing American cotton, but that we must arrange for an effective buying agency before we can grow American cotton on a large scale. I am not yet prepared to say how we shall overcome this difficulty.

7. Our experience of creating buying agencies in Sind and Gujarat, if it has done nothing else, has given us experience as to what are the essentials of a buying agency suitable for nursing up an extended cultivation of superior cotton. They are roughly these:—

- (a) There must be a responsible man on the spot with authority to act without constant reference to his principals at a distance.
- (b) He must be able to value the cotton and pay for it on the spot.
- (c) He must be ready to buy the cotton as soon as it comes on the market in the same way that local buyers do, and without any question of deferred payments or drafts on a distant treasury.
- (d) The agency must be prepared to handle the cotton in the most effective way and to the full value, so that the maximum encouragement may be given to the cultivators; and, if necessary, the agency must be prepared to drop money during the first few years until the area under the improved cotton expands to the extent necessary to place the business on a remunerative basis.

8. The introduction of N. R. cotton in Khandesh continues to progress. In view of the heavy fall in the price of Khandesh cotton which occurred last year, considerably less cotton was sown this year, and as a result of this we had more seed of N. R. cotton on our hands than we could dispose of and the expansion did not proceed at the expected pace. This is, however, only a temporary check, and I expect that next year the expansion will continue normally. Our seed farm at Jalgaon is now organized, and we have forty registered seed growers. Apart from this many cotton growers are now keeping their own seed. Fortunately, this cotton requires no special buying agency, and it will doubtless continue to find favour, not only in Khandesh and Nasik, but in Ahmednagar and Sholapur also.

9. In the Southern Mahratta Country, Broach cotton has done badly during the last two seasons, which have been very wet in July and August, and shows a tendency to reduction in area. It is still restricted to the tract within easy reach of Dharwar, where we hold the auction, and there are many difficulties in the way of holding the auction at other places as well as at Dharwar. Perhaps the greatest obstacle to the spread of Broach cotton, even in suitable localities, is that it must be sown early when the people are busy sowing their *juar*. In some tracts Broach cotton seems to be established, and it will probably remain popular there, but I think that as regards the greater area we shall do well to concentrate our attention on putting out a strain of *kumpta* with a good ginning percentage. We have several strains obtained from pure line breeding which show a marked advantage in this respect, and as soon as we are in a position to make a final selection of the best strain and to multiply its seed to an adequate extent, I propose to concentrate efforts in the direction of putting it out on a large scale.

(iii)

Extract paragraphs 4 to 7 of the Annual Report of the Department of Agriculture, Bombay, for 1915-1916.

4. In the matter of producing and introducing improved cotton seed to meet the requirements of the different cotton-growing tracts, the operations during the year have been recorded in detail in the reports of the various Deputy Directors. In the Surat District, a second group of villages was added to the area in which we put out our improved cotton seed last year, and the area under operations was doubled. One thousand five hundred and four acres were sown with our cottons, and the average outturn of the seed cotton marketed from this area amounted to 295 lbs. per acre, which was not a bad outturn considering the unsatisfactory season of Gujarat. The total value of the produce sold was Rs. 66,462 or Rs. 44 per acre, and the advantage in price that was obtained for the produce of our seed amounted to Rs. 4,300 or Rs. 2-86 per acre, which means a premium of 6½ per cent. for our cotton over the local cotton, of which 3½ per cent. represents the advantage of ginning percentage and 3 per cent. the advantage of quality. The advantage in price is smaller than might have been expected, but the Department is much indebted to Messrs. Narandas Rajaram & Co. for the assistance which they are giving in purchasing this cotton annually. The arrangements for the marketing of this cotton are not easy to make so as to satisfy everyone, and I do not think that it will be possible for us to control effectively a larger area than this for some time to come; for our experience when we attempted to put out this seed on a much larger scale was not fortunate. So far as these operations go, the gain to the cultivators is appreciable and they are glad to get our seed and obtain the extra profit; but a gain amounting to rather less than Rs. 3 per acre in the case of an article like cotton, the price of which fluctuates so rapidly is not enough to impress the mind of the cultivators greatly, and they are not at present disposed to take much trouble in the matter. We must aim at increasing the margin of profit much more by a continued process of seed selection, and that this is possible the figures given by the Deputy Director of Agriculture, Northern Division, regarding the valuation this year of Selection A, show to be the case. The advantage of this Selection over local cotton amounts to a premium of nearly five per cent. for quality and fifteen per cent. for quantity (due to higher ginning percentage). When we can establish on a large scale this strain, which is worth twenty per cent. more than local cotton, the margin of advantage will be sufficient to attract the cultivators. Quantity, as represented by high ginning percentage, appears to be the most profitable thing to aim at; but the question of quality must not be neglected.

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5. *American Cotton in Sind.*—That American cotton of the "Triumph" variety can be grown in Sind without deterioration is shown by the fact that, in April 1916, a bale of our Sind-American Cotton sent to Manchester was described as "very good colour, good middling in grade, staple 1½ inch, to 1½ inch, strong and valued at 8-20d." when Middling American stood at 7-9½d. This valuation of cotton grown from seed which had been acclimatized for three years in Sind is the best that we have yet received. The Empress Mills of Nagpur and the Elgin Mills at Cawnpore, which used part of the crop confirm this favourable estimate and consider the Sind-American worth ¼d. per lb. more than Middling American. On our seed farm, forty bales of American cotton were produced and the best price that we could get for them worked out at under 6d. a lb. when Middling American was selling at Liverpool for 8-20d. per lb., which looks as though we did not obtain a fair price for the produce. The American crop in Sind amounted to 560 bales. The Sind Cotton Growing Syndicate having suspended its operations for the year, this produce was purchased by Messrs. Ralli & Co. and by a Japanese firm at the rate of Rs. 9-1-0 per maund, when the price of Sindhi cotton was Rs. 8-4-0, which represents a premium of only ten per cent. It is an unfortunate fact that much of this American cotton marketed by the cultivators was seriously mixed with Sindhi cotton, which must have considerably reduced its value. How and where this adulteration took place, I am unable to state. American cotton grown in Sind has a ginning percentage of 31-72, while Sindhi cotton has a ginning percentage of 33-54. That is to say that from a given quantity of seed cotton about six per cent. less lint will be produced in the case of American cotton than from Sindhi cotton. As regards the actual outturn of seed cotton per acre, the matter is not yet quite clear. Mr. Henderson estimated that the yield of seed cotton per acre was as large in the case of American as in the case of Sindhi, but Mr. Main holds that it would be safer to take the outturn of American as 25 per cent. less than Sindhi, since it is more susceptible to damage by *kalar* (salt land) and is more apt to suffer at the end of the season from boll worm and red leaf curl. The extreme patchiness of the Sind soil makes accurate comparisons on a large scale difficult, but it is noteworthy that on the seed farm we obtained an all round average of 616 lbs. per acre of American cotton on 93 acres. Still taking Mr. Main's estimate that the produce of American cotton is 25 per cent. less than Sindhi, there should still be a good future for American in Sind. If the Sind cultivator is to obtain for his American seed cotton a premium of 25 per cent. over his Sindhi cotton, the value of the lint must be 41½ per cent. greater. At present Bombay prices, Sindhi cotton is valued at Rs. 240 per *khandi* and it is agreed by competent millowners that pure Sindhi-American is worth Rs. 400 per *khandi*. This constitutes a margin of 66½ per cent. for lint, and should enable millowners to pay the cultivator a premium of forty per cent. for his American seed cotton, provided that he brings it in pure. Such a premium would pay the Sindhi cultivator handsomely, and the two questions upon which the success of American cotton in Sind now depends are—

- (1) Will the margin between the value of long and short staple cotton remain at anything like its present level?
- (2) Can the Sindhi cultivator be induced to bring in his American cotton unmixed with Sindhi cotton?

If these two questions can be answered in the affirmative, all that we need is to secure a buying agency that will pay full value for the long-stapled crop. I am glad to say that the Sind Cotton Growing Syndicate has agreed to resume its buying operations at Mirpurkhas under a revised agreement, and it is hoped, that the operations of 1916-17 will settle some of the outstanding questions. In view of the fact that the seed at the ginneries was badly mixed last year, it was decided to distribute only pure seed from the seed farm. This has been sown pure, and if the cotton brought in by the cultivators is mixed, the mixing will be deliberate. Owing to the small quantity of seed issued the crop for 1916-17 will be small, but if no mixing takes place the area under American cotton can be rapidly extended in future years, provided that the present margin of advantage in value is maintained.

6. In Khandesh, the work of producing and distributing N. R. cotton seed has advanced rapidly. Nearly 200,000 lbs. of pure seed were distributed during the past season as compared with about half this quantity the year before. There are no new features to mention in this line of work which has previously been described in detail. The seed is appreciated, and the increased profits resulting from its use in Khandesh during the year must have amounted to well over Rs. 1 lakh. This seed is now spreading to Ahmednagar and Sholapur.

7. In the Southern Mahratta Country, operations for the establishment of Broach and Cambodia cottons were continued. The season was not very favourable to either so far as outturn went, but good prices were obtained at the Departmental auctions. With *kumpta* cotton selling at Rs. 148 per *naga*, Broach fetched, in the auction, prices ranging from Rs. 165 to Rs. 190 per *naga*; and with Dharwar-American selling at Rs. 150 per *naga*, Cambodia sold at prices ranging from Rs. 195 to Rs. 221 per *naga*. The Broach cotton was brought by Messrs. Tata & Co., and the Cambodia by Messrs. Forbes, Forbes, Campbell & Co., for the Gokak Mills. The value of the cotton sold at these two auctions amounted to Rs. 56,000. Some of the cotton of these varieties is disposed of privately; but our auctions serve to fix the standard. The cultivators of the Dharwar District have now had a number of years to make up their minds regarding the profits to be derived by substituting these cottons for the local *kumpta* variety. Broach cotton does not tend to increase, while the popularity of Cambodia is spreading. It may be now taken that Broach cotton is fairly established in the Dharwar and Bankapur Talukas, and Cambodia cotton in the Gadag and Ron Talukas. For other tracts we shall probably have to trust to our improved strains of *kumpta* cotton. We have already begun to put these out on a fairly large scale and the results will be carefully watched and reported.

(iv)

Extract paragraphs 6 to 9 of the Annual Report of the Department of Agriculture, Bombay, for 1916-1917.

6. *Surat Farm cottons.*—In the vicinity of the Surat farm, 895 acres were sown with our selected strain as usual. The outturn worked out at 360 lbs. per acre, and the cultivators got Rs. 11 per *bhar* more for the cotton from our seed than for ordinary Surat cotton. This represents an increased value of rather over Rs. 4 per acre, or a premium of seven per cent. The valuations of the last five years indicate that the true premium should have been thirteen per cent. Ten bales of a selection for quality, marketed in Liverpool by the purchaser, realized a very good price which I understand showed an advanced of about Rs. 200 per *khandi* on ordinary Broach, but the conditions of the market during the past year were such that it would probably be unsafe to regard this as a normal indication of value.

7. *Sind-American Cotton.*—A reference to paragraph 6 of last year's report will show how the matter stood before this year. In order to make sure that the seed distributed was pure, no seed was distributed

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except that grown on our seed farm. The amount of cotton produced was consequently very small. The Bombay Syndicate which resumed its operations bought American cotton equivalent to 176 bales, and I understand that Messrs. Ralli & Co. bought cotton equivalent to forty bales. The crop was badly affected by wet weather in August and round Mirpurkhas was very poor. The price paid for the American cotton gave a premium of 23 per cent. over the price paid for *deshi* cotton, and a few larger *zamindars* obtained a price that gave a premium of 33 per cent. This is a distinct improvement on the premium obtained during the previous year. The quality of the cotton was, however, declared by the Syndicate to be poor and the staple uneven, and the price paid was about the current price for ordinary Broach cotton. It is difficult to account for the falling off in quality during one season, after the quality had been maintained for four years. It may have been due to the unfavourable season or possibly to substituting roller ginning for saw ginning. We must clear up the matter in future years. During the current year, it has not been possible to sow American cotton in Sind, since the Jamrao Canal was not working at sowing time. In view of the quality of the cotton received and the small production, I understand that the Syndicate do not wish to continue buying operations. For the moment therefore the growing of American cotton in Sind ceases to have a commercial aspect. I have little doubt, however, that there is a future for it, though sustained botanical work may be necessary. Given a canal that will work throughout the year, the physical conditions in Sind seem to be suitable, though the economic conditions are difficult.

8. *N. R. cotton in the Deccan.*—The work in connection with this cotton extended, and 290,000 lbs. of seed were distributed. Its popularity continues, and the cultivators have no difficulty in realizing the true value, since its advantage lies in quantity. To facilitate the extension of this seed-distribution work, seven Seed Societies have been formed.

9. *Cottons in the Southern Mahratta Country.*—Broach and Cambodia cottons are still sown on a fair scale, and the area under the latter tends to increase. Both continue to fetch very good prices as compared with *kumpta* cotton, but for the reason previously stated they are not likely to have an extended success. Prolonged botanical work on them will probably alter the situation. Meantime we are devoting ourselves to a selected *kumpta* strain and for the Dharwar-American tract to a strain of Upland American cotton. The advantage of these cottons over the local ones is about twenty per cent., mainly in the direction of quantity as denoted by ginning percentage, though the quality also is superior to that of the local cottons. The seed is now being reproduced on a large scale and we shall have a good deal to distribute next year.

ANNEXURE III.

Cultivation, manuring, rotation and diseases of cotton.

Cultivation.—For the eradication of deep rooted weeds deep ploughing is necessary everywhere, but given clean land, ploughing will not pay in the heavier soils of Southern Gujarat and Khandesh as an annual operation. Ploughing is practised on the lighter soils in Khandesh and generally in the Southern Mahratta Country.

Interculture is very well done in Lower Gujarat, has improved in Khandesh, and varies greatly in thoroughness in the Southern Mahratta Country. Speaking generally, the cotton lands are in a foul condition in Upper Gujarat, Ahmednagar and a large part of the Southern Mahratta Country. In Gujarat, *lavala* is the weed that gives most trouble, in the Deccan, *hariaki* and *kunda*.

A good stand of cotton is usually obtained in Gujarat and Khandesh, but in the Southern Mahratta Country a very poor stand is obtained, and improved drills need to be introduced, accompanied by thicker sowing and thinning out to the proper stand. Dibbling is recommended for lighter soils in Gujarat.

Manure.—The application of farmyard manure gives better crops everywhere, particularly in tracts of heavy rainfall, and more is required for cotton crops. This can be obtained by taking better care of what already exists and by adopting a system of mixed farming where conditions permit.

Artificial fertilizers have nowhere been found to pay for cotton. Crude night-soil has been found to produce wonderful effects on cotton in tracts of good rainfall and has increased the outturn fourfold in Gujarat and Khandesh.

There is no doubt that more manure is badly needed in general for cotton cultivation, and with a view to gradually add to the plant food in the soil and grade it up to a higher level, experiments are being tried in Gujarat of broad-casting *san* in cotton and turning it in, or of growing cotton in strips with *san* in alternate years.

Rotations.—Til and groundnut have been found to be excellent rotations for cotton. Groundnut is spreading rapidly in Khandesh.

Shape of plant.—It is a problem what shape of plant gives the best outturn. It used to be supposed that what was required was a bushy plant, but it has been noticed that bushy plants often contain many purely vegetative branches. In Southern Mahratta Country, a type of tall erect plant has been selected as giving the best outturn, and the characteristic shape has been found to be hereditary. Apart from hereditary characteristics, it is important to decide on the best shape for the plant, since the question of spacing in the rows is affected thereby.

Ahmednagar District.—Cotton is spreading in the Ahmednagar District, but the shortness of early rain is against it in many years. It would be worth while trying cotton on the new canals with one or two irrigations, and also to try Cambodia and Dharwar-American cottons there, grown as an early crop.

Will causes very serious losses to cotton in almost all tracts. It is said to be spreading. Growing cotton after cotton tends to increase the trouble. No remedy is known. American cottons are immune to it, but Cambodia is said to suffer from it to some extent.

In Gujarat, it occurs in patches.

In Ranpur, it is said to affect *mathio* throughout the field.

In East Khandesh, in wet years, it attacks plants throughout the field and twenty-five to thirty per cent. of the plants die.

In Dharwar and Bijapur, it occurs in patches and is said to be increasing.

Barren plants occur in Broach cotton, both in Gujarat and Southern Mahratta Country, and cause loss, especially in dry years. The disease appears not to be hereditary, and its cause is not known. It occurs hardly at all on other varieties of cotton.

Seed.—It is very important to get good plump seed, which gives much stronger plants and better outturn. This may be effected on a small scale by Mr. Mehta's machine or by the salt water method, as recommended by Mr. Kottur. The difference in the outturn of the crop obtained on the Dharwar and Poona farms by this

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means amounts to twenty to thirty per cent. An efficient machine is wanted which will separate light from heavy cotton seed on a large scale.

Some device (e.g., blast) is also required to remove the fuzz, and so permit the use of an automatic seed drill which sows at even distances.

Selected strains.—The advantage of any strain may lie in its yield of seed cotton, the ginning percentage of the seed cotton or the quality of the lint or in two or all of these characteristics. The following figures show the advantage of our best selected strains in Surat taken on a five-year average, viz.:—

	Yield of seed cotton per acre.	Ginning percentage.	Valuation per khandi.
	lbs.	Per cent	Rs.
(1) IA	559	36.5	341
(2) 1027A.L.F.	519	35.4	346
(3) II	632	35.1	330
(4) Local	503	35.2	332

Numbers (1) and (2) have been distributed in the villages round Surat and a price has been obtained for the seed cotton which is seven per cent. in advance of local prices for the day which roughly consists of 2.75 per cent. for quality and 4.25 per cent. for ginning percentage. The advantage of yield is, of course, obtained separately by the cultivators on the quantity marketed. According to our figures the cotton ought to be worth at least ten per cent. more than local cotton for quality and ginning percentage. The fibre of Selection II is still uneven.

N. R. Cotton in Khandesh.

The following figures on the Dhulia Farm for three years show the advantage of N. R. cotton over the ordinary Khandesh mixture which contains about fifty per cent. of N. R. cotton, viz.:—

	N. R.	Ginning percentage.	Khandesh Mixture	Ginning percentage.
	lbs. per acre.		lbs. per acre.	
1908-09	450	37.5	000	34.4
1909-10	870		860	
1912-13	102	37.5	71	
Average	474 lbs.	...	410 lbs.	

On the above figures the average produce of lint per acre comes to—

N. R.	178
Khandesh	141

showing a net advantage of 37 lbs. of lint per acre in favour of N. R.

Valuations show an advantage for N. R. as follows:—

15.5 per cent. for yield.
9 per cent. for ginning.
10 per cent. for quality (uniformity and colour).

This is distributed on a large scale and the people get an enhanced price for it without difficulty and are keen to get it.

This seed is not of a selected strain, but of a variety selected from the Khandesh mixture.

Southern Mahratta Country. Five-year average.

Main tract.	lbs. per acre. of seed cotton.	Ginning percentage.	Value per khandi.
Selection No. 1	583	28	Rs. 341
Kumpta cross	552	30	344
Kumpta × Goghari (a)	598	32	325
(b)	498	35	315
Ordinary local Kumpta	527	25	310

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Tract which now grows American cotton.

	Lbs. per acre of seed cotton.	Ginning per- centage.	Value per khandi.
Upland	419	32	Rs. 281
Cambodia	342	37	300
Ordinary Dharwar-American	362	28	276

ANNEXURE IV.

Goghari Cotton in the Broach District.

In the Surat-Broach tract, the staple of the cotton grown tends to be longest in the south and shortest in the north, and this is mainly due to physical conditions, which in the south appear to favour a long staple. Throughout the Surat District and in the south of the Broach District, the cotton grown is of a fairly uniform type and is known as Surat or Broach *deshi*. In the Broach District however a different type of cotton is found, known as *goghari*, growing mixed with the *deshi* cotton. In the south of the district, this mixture is very small, but increases as you go north, being about thirty per cent. at Ankleshwar fifty per cent. at Broach and up to ninety per cent. at Jambusar. It is not a distinct variety, but a different type (or rather number of types) the important characteristic of which is its high ginning percentage. It is probably derivative of *wagad*, and possibly crossed with Broach *deshi*. It gins about five per cent. higher than the *deshi* cotton, which means that a given quantity of *goghari* seed cotton produces fifteen per cent. more lint than the same quantity of *deshi* seed cotton. The length of its staple is $\frac{3}{4}$ th inch as against $\frac{5}{8}$ th for Broach *deshi*, but it is strong and very white. Its lint has sometimes been valued about the same as Broach *deshi* and sometimes considerably lower. On account of its high ginning percentage, the buyers of seed cotton will always pay higher for it than for *deshi*, and consequently this is the seed that cultivators want, and they refuse to take Surat *deshi* seed which will produce a cotton with a longer staple but a lower ginning percentage. At the Government station at Broach, we are separating out the various types of *goghari* and trying to select pure strains having the most valuable characters. Up to the present, four distinct types of *goghari* have been found, but these types are not homogenous within themselves and do not breed true, but again split up, indicating that *goghari* is a cross-bred cotton of unmixed character. Much botanical work remains to be done with this cotton.

The Hon'ble Mr. G. F. KEATINGE, C.I.E., I.C.S., called and examined.

1993. (President.) We have three methods of preparing forecasts. First of all, the village officers give the figures of the area under cotton. The Mamlatdars fix the anna valuation, which is interpreted by means of formula figures in my office. A twelve anna crop is a normal crop. If, in a certain tract, 300 lbs. of cotton were the normal outturn, an eight anna crop would be 200 lbs. per acre and a sixteen anna crop 400 lbs. That is the way we prepare the forecasts for the Presidency proper. My office is not concerned with Sind. The Commissioner's office in Sind supplies me with figures which I pass on. I cannot say how the forecasts are prepared there. Half the cotton in the Presidency proper is grown in Native States. I have absolutely no idea how they prepare their figures of area and outturn. I just give their figures as they are sent in, showing them separately. There are means of checking the figures for British districts to some extent at the end of the year. For British districts, at the end of the revenue year in August, I get figures of areas under all crops. Sometimes there is a discrepancy between the final figures and the forecast figures. Last year three districts returned an area of a million acres under cotton. The area turned out from the final figures to be one million and a half. No satisfactory explanation was forthcoming. Probably although there was a very large increase under cotton in many villages, the village officers reported very much the same as the previous year. There was one state in Kathiawar which returned no cotton at all. I enquired why this was the case and found that cotton had been grown there to the extent of several thousand acres. As regards the statistics from British territory, there are four distinct crops, the Southern Mahratta crop, the Khandesh crop, the South Gujarat crop, the North Gujarat and Kathiawar crop. The first thing that is wanted is that the men who are responsible for the statistics should have time to attend to them. I candidly confess that I have no time and it has sometimes happened that the cotton forecast had to go in without my seeing it. The reason may be that I am perhaps somewhere in Sind and that it has already been delayed by non-receipt of information. If you want to get accurate forecasts, it would be best for the man who is doing the work to be in the place for a month or so in advance and to go round to the dealers and the gineries and ask them their opinion about the figures. It is an extraordinarily difficult thing to get correct figures in some years, especially in years of excessive rainfall. Take the case of Khandesh this year: I know of fields some of which had 700 lbs. to the acre whilst some of the adjacent ones had no crop at all. This was simply due to the fact that the crop in one case was picked just before the rains whereas the other crop was considerably later and the bolls all fell off before they opened. In a year like this, there are enormous variations in very small areas. I certainly do not feel competent to vary the estimates made by the local people and no man could do so unless he has been on the spot. What is wanted is a competent man who knows his business and could rush round for a month in advance. We forecast for cotton, various kinds of oil seeds, sugarcane, wheat rice and groundnut. If the crop in a district is small, we just give a rough estimate. As far as cotton is concerned, people do not use the figures and do not care about them. In Khandesh, the figures of outturn can be tested with the railway returns. There is not a very great deal of movement of cotton into Khandesh from Berar. I have worked out the figures for the local mill consumption and for local consumption for stuffing pillows and mattresses. I also obtained figures showing how much was exported from each station to Bombay and I found that, for a series of years, we had been considerably underestimating. As a result, at

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the last revision of our formula figures, I put up the Khandesh formula figures considerably higher. There is so much movement in other parts e.g., in Gujarat and the Southern Mahratta Country, from Native States to British Territory and *vice versa* that it is not possible to adopt a similar procedure everywhere. As far as I can make out, nobody uses the figures; but on one occasion I got a complaint from the Bombay Cotton Trade Association that our Khandesh figures appeared to be grossly under estimated. I found it was so; that was about eight or nine years ago. I then pointed out to the Collector of Khandesh that no attempt was made to estimate on the basis of an average crop. When the crop was good, it was reported as ten annas, when it was bad it was reported as four annas. The forecasts are published at the Government Press. I do not post them up anywhere. There is no scrambling for them; nobody ever reads them as far as I know. It would be much easier to prepare accurate forecasts if the movement of cotton from one district to another were regulated. If the ginning and pressing returns were made compulsory and if each bale were marked with the mark of the press at which it was pressed, then we should know what cotton came from each tract with certainty in a given year, and that would enable us to forecast with more accuracy for future years of known agricultural character. At present we have no standard of comparison because we do not know what was produced in any given year in a definite tract.

1994. (Mr. Wadia.) I have seen the instructions of the Agricultural Department of the United States in regard to the preparation of forecasts. I made enquiries about them when I was in America. I thought they were very good. The United States has an enormous Bureau of Statistics very highly staffed. They get a lot of information from local men who are in the trade. I quite agree that this is the way to do things provided you have a bureau with a head and a staff who are capable of utilising such information to the best advantage. I could not do things that way with my staff which is very small. What we want is staff, i.e., men who can be sent to each important tract a month before the return is submitted with a certain amount of money to pay to people who give them good information and then we shall get such information. The great difficulty is staff. Except for a few clerks in my office, there is no statistical department. The men in my office compile information on the basis of the information supplied by the revenue authorities.

1995. The ginning and pressing returns were fairly accurate in the first year. We have had them going for two years now. In the first year, they worked out only slightly below the departmental forecasts for the amount of cotton produced in the Presidency. In the second year, they were absurd, that is to say, the figures supplied by the gins and presses were obviously ludicrously below what the real amount was. In the first place, gins and presses do not run throughout the whole year. What was always happening was that was sent out detailed questions as to what we wanted together with stamps and cards for reply. In about a fortnight we got them back from the dead letter office. Sometimes they were not even returned from the dead letter office; probably somebody used them as waste paper. We waited till we thought the season was about to begin and then we sent them out again. Some of the factories responded. We wrote again to those from whom we heard nothing: sometimes, owing to a pool, they were closed. We never knew whether we were really in touch with them or not. If the returns were received through the Mamlatdars, the Department would, at any rate, know which gins and presses were working and which not and the Mamlatdars would be able to say if there was any mill which did not send in any return. Collectors would however undoubtedly strongly object to the work being imposed on the Mamlatdars. As the return came in in the second year they were obviously useless. I think it would be useful to make the returns compulsory. I do not see why they should not be. There is no need to have both ginning and press returns. Ginning returns would be the better as they would deal with all the cotton ginned. All cotton is ginned but all is not pressed. For instance, round Ahmedabad most of the cotton goes to the mills without being pressed, simply being rammed into *docras*. You could get from the rail borne trade-returns how much goes to Bombay.

1996. The only attempts made to publish the Bombay or Liverpool prices in up country markets have been in connexion with the cotton sale societies in the South Mahratta Country and in Khandesh. They say that they have found publication of Bombay prices very useful. In the Southern Mahratta country, they have been getting daily wires from the Bombay Cotton Exchange during the season. What they did was to put up a list showing that if cotton was selling at so much per *khandi* in Bombay, it should be selling at such a price in particular places. The list gave a rough correspondence between the price of lint in Bombay and the price of seed cotton in local markets such as Hubli or Jalgaon. I do not see the advantage of publishing Liverpool prices in upcountry markets. After all, the Bombay prices are those which have direct effect on local prices. The Liverpool prices only affect Hubli prices *via* Bombay. If the Bombay prices do not move in consequence of Liverpool prices, I do not see how Hubli prices will do so. There is a good deal to be said in favour of publishing Bombay prices subject to the condition that people must not expect local prices to vary absolutely with them.

1997. (Mr. Roberts.) We do not consult non-official agencies with regard to the publication of forecasts. I get reports before each forecast from each Deputy Director and Divisional Superintendent in which they state their opinion of the crop in general so far as they have seen it. They give me any information they can to enable me to check the returns sent in by the revenue officials. I have had an estimate in maunds and pounds. I took it for what it was worth.

1998. (President.) As to the question of the adequacy of my staff for the investigation of cotton problems in this province and the relative importance of cotton in the general agriculture of the Presidency, cotton is by far the most important commercial crop in the Presidency and we have given it a very large proportion of our time. Our four biggest farms at Mirpurkhas, Jalgaon, Surat and Dharwar are almost exclusively cotton farms, not to mention the smaller farms at Gadag and Dhulia. As for tackling cotton problems in this Presidency, the great point is that we are faced with extraordinarily diverse conditions; for instance Sind and Khandesh grow the same variety but the conditions are quite different. Then we have Upper Gujarat as a distinct tract by itself, Lower Gujarat a distinct tract by itself, and the Southern Mahratta country (the Karnatak), which has a sub-tract growing Dharwar American. In these tracts, the problems of varieties, cultivation, organization and marketing, are all different. Our staff to tackle all these questions is much too small.

1999. As to the necessity for further botanical work by an Economic Botanist the present Economic Botanist has not paid much attention to cotton. That is due to the fact that Professor Gammie was Economic Botanist here before he became the Imperial Cotton Specialist and his work was still available. Our work is based mainly on his previous investigations and on his subsequent help. He is still in very close touch with the staff of the Agricultural Department working on cotton. We have therefore no necessity for an Economic Botanist of our own for cotton. Unfortunately for cotton in this Presidency, his headquarters are in the only tract where no cotton is grown. I do not think that this matters very much from the point of

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view of training students at the Poona College. I do not think that the students at the College would ever have time to go very deeply into the problems of cotton; they have so many miscellaneous subjects to learn. We do grow some short staple cotton on the farm for teaching purposes. If the college were in a cotton tract, the students might learn more. If the Economic Botanist has to do a lot of teaching in the college and to be bound up with the college work, he has no time for cotton. We have got sanction for a second Botanist. Mr. Chibber is at present holding the appointment. He is devoting his attention to rice and wheat. On Mr. Gammie's retirement from the post of Imperial Cotton Specialist, if his successor is not located in the Bombay Presidency we shall be in great difficulties, and I consider that the Department would require an officer who could devote practically all the time to cotton. If a Deputy Director chooses to take up cotton breeding as an integral part of his work, he can do so. When Mr. Fletcher was here, which was before my time, he worked in Surat which he made practically his headquarters. I understand that he obtained a lot of fresh crosses and did a lot of work in that line on cotton. He was keen on plant breeding. Mr. Henderson did not go in for plant breeding at all; his work was on the new varieties. We certainly want an officer who can devote practically all his time to cotton. Whether he should be primarily a botanist or secondarily a botanist, I am not prepared to say off hand; I should think primarily a plant breeder but he should be capable of taking up both the cultivation and the business side of cotton.

2000. As to the question of staff in Sind, the agricultural conditions of Sind are, of course, very different from those of the Presidency proper. The agricultural future of Sind may be altered by the construction of the Sukkur Barrage and it might be necessary then to give it a separate agricultural Department. At present I am practically the only link between the Agricultural Department of Sind and the Presidency proper except that our Agricultural Engineer goes there occasionally. For practical purposes, Sind is almost beyond the radius of the Agricultural College except that Sindhis are trained at the Agricultural College. The amount of time that I can spend there and the assistance I can give is very limited. Every now and then Mr. Gammie is able to help by getting tests done and work of that sort. Sind is very isolated. I believe the Punjab is much more closely allied with Sind agriculturally than with the Presidency proper. Of course, the question of a separate agricultural department for Sind would be contingent on a great material development; it would be contingent on the construction of the Barrage. It is a reasonable proposal provided there is a great material development. The trouble in Sind is the climatic conditions. It is extremely unhealthy. You cannot condemn a man to live there all the time. If you make his headquarters Karachi, he cannot stay there during the rains as that is the cultivating season. He cannot go to the hills without a long trip.

2001. As long as the Imperial Cotton Specialist is stationed at Poona, we have nothing to complain of, but there is plenty of room in the Bombay Presidency for a special man on cotton alone. There is room for two or three men. I think a crop specialist for each province is desirable but it would be difficult to work the scheme out. I think Khandesh might go in with Berar; I believe the agricultural conditions are very similar. Instead of an Imperial specialist you might have a number of specialists, perhaps working in two provinces where the tracts are similar.

2002. As to the policy which has been pursued by the Agricultural Department in regard to cotton, in the beginning we started on all the farms trying any exotic variety which seemed likely to give any useful result. A very large number of Indian varieties also and crosses were collected from different parts of the country and were watched for a long time. All the exotics have fallen out except the small amount of American cotton we have in Sind, Dharwar American and Cambodia. The crosses and selections that were made, have in the last few years been narrowed down to very few. In Sind, we have done practically no work except on Egyptian and American cotton, and if the American were to drop out, there would be nothing left to show, so far as present conditions are concerned. Mr. Main is now working on N.R. cotton and is selecting out *neglectum roseum* from the Sind crop. He is also trying N. R. selected in Khandesh. As regards Khandesh, we have not yet been able to put out anything that was not there already. There is one hybrid which is being kept on. They have got it on the Dhulia Farm; it is a cross between Comilla and *bani* which has from time to time shown promise. All we have seen our way to do has been to select and put out the N. R. cotton which was an ingredient in the local mixture. In some parts it was a very large ingredient, the proportion being as high as sixty per cent. It has been put out partly on account of its inherent hardness and partly on account of its high ginning percentage but the proportion in the crop was already very large. We have practically done nothing in Upper Gujarat except to make a preliminary investigation. Nothing systematic has been done in Upper Gujarat, as there has been no staff for supervision. In Lower Gujarat, we have in the course of time narrowed down the cottons which we were prepared to be put out to two; 1027-A. L.F. and selection No. 1-A. Since the break down of the arrangements with the Bombay Millowners Syndicate, I have told the staff to put the whole of the farm under 1-A, only keeping a sufficient quantity of 1027-A.L.F. to keep the strain going. The reason for this was that we found that we could not see our way to guarantee the cultivators any appreciable extra price for quality, so we went for the strain which gave us greater quantity but was still valued as appreciably superior to the local cotton. That has been the policy for the last few years. Since we have failed to get a market for quality in Lower Gujarat and the Southern Mahratta country, our two long staple tracts, our policy has been to go for quantity rather than for quality as denoted by yield of seed cotton and by high ginning percentage, subject to the condition that the quality must not be inferior to that of the local cotton. For that reason we have gone for 1-A at Surat and on the same principle for Dharwar selection No. 1 on the Dharwar Farm. Selection 1-A at Surat gives the highest yield, except selection 2 which we have thrown out because its valuation was not so good. The valuation of 1027-A.L.F. was the best, but the yield and ginning percentage were lower than those of 1-A. We have therefore gone in for 1-A in preference to 1027-A.L.F. In Dharwar, the yield of seed cotton of selection No. 1 is 583 lbs. per acre. That of the cross between *kumpla* and *goghari* is 598 lbs. and its ginning percentage is much better. We have however gone for No. 1 in this case although *kumpla* and *goghari* is valued higher than the local *kumpla*.

2003. I cannot understand the grounds on which trade valuations are made. If the trade were told that a cross contained *goghari*, they would at once say that it was no good. They would refuse to look at it whatever its merits might be.

2004. (Mr. Wadia.) Mr. Purshotamdas Thakurdas said he did not recognize any difference between 1027-A.L.F. and 1-A. In 1911, 1027 A.L.F. was valued at Rs. 340 per *khandi* and ordinary Surat cotton at Rs. 330. We had 500 acres under 1027. Although 1027-A.L.F. was bright in colour and good for spinning 30s. to 32s., while ordinary Surat was dull in colour and was good for spinning only 16s. to 20s., the difference in the trade valuation was only Rs. 10 per *khandi*. I do not think the valuation should be proportionate to the counts spun but Rs. 10 per *khandi* is not sufficient to induce cultivators to cultivate cotton which would spin 32s.

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Our policy up to the time of the Syndicate was long staple cotton. Since the break-down of the arrangements, our policy has been quantity subject to condition that the cotton must not be inferior to the ordinary local variety.

2005. As to whether the cottons in this Presidency which have a trade name or reputation, such as Broach, *navsari*, *kumpla*, etc., are pure to type or are mixed, I should say that *navsari* is fairly pure to type except that there is a little *goghari* intermixed with it. *Kumpla* on the whole is still pure to type though there are distinct types in it. It would perhaps be more correct to say that it is pure to variety. *Wagad* is also pure to variety. Assuming that the Department had a man who was keen on plant breeding, I should like him to go on crossing in the hope of getting something better. I do not suppose that we have reached finality in this respect. In a general way, I should say that until we had something undoubtedly better than the existing local cottons to put out, I would keep the best existing strains of those cottons pure in the tracts suited for them.

2006. The onward march of *goghari* is a very difficult problem. It has increased very much in the last few years but exactly to what extent I do not know. Mr. Bhimbhai says that there has always been a lot of *goghari* in his circle. I believe it has increased because the gin owners like the high ginning percentage. I think the opinion of our men is that it will not invade the Surat district very badly because in the Surat district it does not do as well relatively as in Broach. They believe that it has invaded the north of the Surat district to some extent. I should think that the sharp differentiation in price that has occurred would tend to stop it but I do think also that any law which would control the trade movement of cotton would have tendency to keep the strains pure because it would tend to make the market more sensitive to quality. I am in favour of the idea of restricting the movement of *kapas*, half pressed bales and fully pressed bales, all three. This would tend to make the market more sensitive to value. I have said fully pressed bales because fully pressed bales are sent from Khandesh to Navsari and it is arranged that the Navsari mark should be put on them and the bales then despatched to Bombay. My proposal is to schedule the long staple tracts. I would have no importation of *kapas* at all into the scheduled tracts except by license.

2007. (President.) Wilt is very important in Bombay. I do not think that insect attacks are very serious. In the case of exotic cottons in Sind, boll worm has sometimes been serious especially on Egyptian cotton eight years ago. It has been less serious on American cotton. White ants do a certain amount of damage in Upper Gujarat on the Nadiad Farm. In some years, they do a considerable amount of damage. In some parts, wilt is very serious. Wilt is well worth special investigation but the position is not so serious as to require a special officer provided the investigation into the disease can be satisfactorily carried out from Pusa. We have not got anybody to tackle it.

2008. (Mr. Roberts.) The principle on which we are working in the Southern Mahratta country is the same as that I have already mentioned, i.e., that the cotton should be the best all round cotton: we are aiming at present at quantity rather than on quality because we know that for quantity, i.e., the amount of seed cotton produced, people can get their prices. We are aiming at a type which will produce a large amount of seed cotton, and which has a better ginning percentage than the ordinary type of *kumpla* cotton. This is subject to the restriction that the staple should not be worse than the local staple. We have isolated a type Dharwar No. 1, which is considerably better from every point of view. This is the cotton which we want to put out. On the basis of an increase in the yield of seed cotton No. 1 A. (*kumpla* and *goghari* cross)—seems to be by far away the best. It has been valued above ordinary *kumpla* but selection No. 1 is the one that we decided to go for. Selection 1 is valued at Rs. 341 a *khandi* whereas the strain *kumpla* and *goghari* is valued at Rs. 325 per *khandi*. Another point is that *kumpla* and *goghari* has more Broach characteristics. Selection No. 1 is just like the *kumpla* plant and the cultivators are accustomed to it. I regard the figures of relative yield as fairly reliable. They are the averages for five years. They are based on the cultivation given by the best cultivators. There are fields full of *hariali* grass and in those conditions the cultivation results are not worth recording. But the results got on our farms are absolutely comparable to the results got by good cultivators. There is nothing special in the way of cultivation, nothing special in the way of manure nor in the way that these plots have been treated. This work may apply to a very large area of cotton, over a million acres. I certainly think that it is important to be certain on the question of the yield, under the conditions on which the cultivators work outside. We have been putting out a certain amount of selection No. 1 and so far as the eye can see, it certainly does very well. The people have taken to it and are very pleased with it both in the Bijapur and Dharwar districts.

2009. The organization for pushing these strains of cotton is a matter about which I have not definitely made up my mind. There are three ways in which you can proceed. The first is to secure a better price for better cotton and to get the cultivators to take it up voluntarily. That is what we tried in Gujarat. The second method which we shall probably adopt in the Southern Mahratta country where the cultivators are good deal more amenable to suggestion than in Gujarat, is to try and rush out in one year a very large amount of cotton seed. We might, for instance, cover practically the whole of the Hubli and Dharwar talukas with Dharwar No. 1, in which case it would mean that by far the greater part of the cotton which came in would be of this superior type. The seed from that would predominate at the Hubli and Dharwar ginneries and be sown in the following year, and the area would be practically covered with the pure variety. The area affected by this policy would be about one hundred thousand acres. We have now got thirty acres on the Dharwar Farm and we can get another thirty acres outside. Each acre will give us seed for twenty acres, so that we can get seed for 1,200 acres. We would get two or three villages near Garag to grow this seed in a solid block. There are two small gins there which could gin the cotton of the tract. We would deal with it ourselves probably with the help of a buyer. We would agree to indemnify him by promising to buy the seed back at a bigger price or else we would arrange to sell the cotton and to get the seed back. The next year we should have seed for 24,000 acres. If you multiply that by twenty, that would give you about half a million acres in the third year, though the area would not, of course, go on increasing in geometrical progression. As far as I can see, after that, unless people find out that it pays them to keep the seed pure, all we can do is to put out as much seed as we can and trust that it will have a marked effect on the purity of the cotton in the tract. Unless the cultivator finds that he can get a better price for uniform cotton, we cannot induce him to be careful in getting pure seed and in sowing it. I am suggesting that a fairly large area can be sown with pure seed in the course of a year or two by giving seed cheaper or even free. We can then rush it out in a large quantity in one year which would make a considerable influence on the crop. There will be no finality about it. We shall have to go on putting it out in large quantities for a number of years to make the effect permanent. It will be seed of a pure strain and when the cotton is ginned, the seed will find its way back to the cultivators. If we do this for this tract, say Hubli and

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Dharwar, we will buy back a lot of the seed ourselves and we will try to get it off the next year. The thirty acres outside the farm which I mentioned just now are under members of Agricultural Associations and we can make arrangements to get the seed back. I have not yet definitely considered the arrangements that would have to be made for dealing with the crop next year. If I could get a big man who will take the whole crop cotton at somewhat better price and give us back the seed, that would suit us. If not, we shall have to make some arrangement to get the seed back, and it may cost the Department something to get it separately ginned. That will have to be done under our supervision. Some of the cultivators will sell their crop standing in advance and some may sell their *kapas* in advance so that we cannot be sure of getting all the seed. But we shall get a good deal of it back. The third method of pushing superior strains is to advertise the seed and wait for people to come and ask for it. That is what we have been doing in Surat. If this is done on a big enough scale, though the seed may get mixed in the ginneries, it is bound to have some effect on the local *kapas* in course of time. A good many careful cultivators do come and take our seed in small quantities. One year there were 600 bales and another year 1,200 bales of our selected strains. All this cotton goes through the ginneries there and it is probable that it has some effect on the nature of the general seed supply. Since the difficulties in Surat, I have been simply marking time there. If it had not been for the trouble there, we should have gone in for putting out some selections there two years ago but we have gone slowly and instead of putting out the *kumpla* cross, I now propose to put out Dharwar No. 1. People do not like the *kumpla* cross. It is terribly late. It has a certain number of barren plants in it and is slightly more subject to wilt. Another reason in favour of selection No. 1 is that it is indistinguishable from the *kumpla* which the cultivator had been growing all his life. It is only a selected strain of *kumpla*. In regard to the auctions, the trouble is that for Broach we classify only for ginning percentage and not on the basis of quality. In point of fact, inasmuch as the seed which we import from Navsari has a certain amount of *goghari* in it, it is quite likely that the cotton with the higher ginning percentage has the greatest amount of *goghari* seeds. We could classify our *kumpla* on the basis of ginning percentage; but it would be very difficult to classify it on the basis of quality as well. I should not like to forego the higher price on account of quality which works out at Rs. 31 per *khandi*. I would not like to forego that altogether. The ginning percentage of selection is 28 and of ordinary *kumpla* 25. There are some localities, where in some years the ginning percentage is much higher; in others where it is lower. All that we could give would be a certificate to the effect that we had ginned a sample of it and that the ginning percentage was so and so. It is impossible for us when cotton is grown on a big scale to give a guarantee that this or that is grown from our seed. We cannot have a man sitting and watching each cultivator. We can say that he got his seed from us; and that this is his stuff; we cannot say more than that. I do not know how far we can get a fair value according to trade valuations. Our valuation were done for us by the Mill-owners Association, the Cotton Trade Association, Messrs. Tata and Sons and other Firms.

2010. As to pushing these varieties by means of co-operative credit sale societies, if you can get co-operative sale societies to work, there will be some finality about the marketing difficulty. Here we have a million and a half acres and unless the people will do something for themselves, I do not see how we can manage it all. Co-operative credit societies are strong in the Southern Mahratta country and that is why we are attempting to work through them but I am not hopeful of getting them to work very energetically at once. They made a small start last year though not quite on the lines that I had proposed, but still they got a start made and several societies were working on the lines that each considered most desirable. My experience of co-operative societies is that they are capable of managing credit pretty well. They find it very difficult to take up anything with enthusiasm which involves the handling of some commodity other than money. They keep their accounts and do their banking business quite all right but the moment they come to handling cotton, seeing that the weighments are fair and that the cultivator gets the best prices, it is very difficult to get them to take enough trouble. I am not hopeful of creating a new heaven and a new earth but I propose to push on with them though not to the exclusion of several other methods. At present the type of cotton sale societies is rather a *dalal* society. We have one of these at Hubli, one at Gadag and one at Dharwar. They are managed by cultivators and *dalals* together but mostly by *dalals*. My original proposal was to start a unit in a village and get the village to put out seed and to keep close supervision on the seed grown in the village. At present these co-operative societies sell cotton for anybody who brings it in whether he is a member of the society or not. It really means one *dalal* instead of another but the men who organise the societies maintain that the cultivators have more confidence in them than in the ordinary *dalal*. It is only a beginning. I do not attach much importance to them at present. They are only a beginning but I am hopeful.

2011. The Department intends to substitute the Upland variety for the mixed Dharwar American as it is by far the best strain in it. We are selecting pure types of the Upland variety. We are prepared, as soon as we have seed, to put out selected strains of Upland of proved excellence in preference to ordinary mixed Dharwar American. We have had no luck with the recent American cottons we have imported. The extra yield of Upland is mainly due to the fact that it resists red leaf blight and so is more prolific. I am not prepared to say what I expect to do in the way of area under it. There is a much smaller area under Dharwar American than under *kumpla*, only about 200,000 acres. At present, there are about twenty acres under this cotton on the Gadag Farm. The Department could get big cultivators in Hulkoti and Kurtkoti to grow it pure on a considerable area and in the course of a few years enough seed could be produced to cover the whole of the Dharwar American area. There are prospects of success with Cambodia in a few villages. In one or two villages, the people are quite keen about it. It has a very good ginning percentage. The people will keep it. I think we ought to keep it going for a number of years and to do some botanical selection work on it. We have not worked botanically on it yet. In so far as any selection has been done, it has been a selection for high ginning percentage and not for staple. The result has been that, whilst in the Madras Presidency, it has a staple of an inch or more, here I don't think it is more than half an inch. It is certainly very variable. It is a most attractive looking cotton. We cannot expect a big area under it but it is worth studying, assuming that we have the men to study it. The *kumpla* work is quite the biggest; then I consider comes the work on Upland. I think we ought for a number of years to go on studying Broach cotton in Dharwar and Cambodia cotton in Gadag botanically and selecting.

2012. Our district staff is a very small one. Our farms are doing other things besides cotton. The chief thing that we really can claim credit for is the improvement in cultivation of hundreds of thousands of acres by putting out iron ploughs. Half the land is not in a fit state to sow cotton in at all. We have devoted a great deal of time and attention to putting out ploughs which is one of the most important things that the district staff has to do. We have many other things to look to such as sugarcane, and groundnuts. The amount of time that the staff has spent on the introduction of Broach cotton into the Southern Mahratta

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country is small. It was considerably more a few years ago. We have not bothered about it for the last year or two. Two men do two or three months' work every year, one on Cambodia and one on Broach cotton.

2013. In Khandesh we are putting out N. R. seed. We have an area of 20,000 acres under it. That is not very big as compared with the whole of Khandesh. All up the Tapi Valley, the bulk of the cotton is N. R. already. The figure of 35 per cent. estimated for extra profit is made up of 15.5 per cent. for yield, 9 per cent. for ginning and 10 per cent. for quality. I do not say that they get all that but that is what has been estimated. They get the 15.5 per cent. for yield all right. They get something extra for increased ginning percentage. They also in some places certainly get a bit extra for colour. We can get the extras for our farm cotton. The ordinary cultivator is satisfied as his cotton gives him more *kapas*; it is hardy and prolific and an early maturing variety. The 15.5 per cent. is the advantage in yield over the ordinary Khandesh mixture: I do not see any difficulty in pushing this variety in Khandesh except in a year of late rainfall as that of last year when late rain in October ruined the crop, whereas other cottons did not suffer so badly. Those people whose crop was damaged would probably not be keen in growing it this year. There was an enormous demand for the seed. We certainly seem to have got into a cycle of late rainfall in the Deccan. In my first twenty years in India, we were always short of late rain but in the last four years we have had a good deal of it. If you got a series of years of late rain fall, people would not care so much about N. R. I do not think one year would have much effect. I should say that sufficient investigation has been made to show that one type of cotton should be put out rather than a mixture. There is no doubt that, at present prices, N. R. pays the best. Agriculturally speaking, there is no doubt that N. R. is the most prolific and that it has the biggest yield and ginning percentage. I do not think that there is anything much in the present Khandesh mixture: it is an absolute hotch potch. There is a certain amount of American in it but it is obviously fortuitous: well meaning people have failed to introduce the long staple *bani* which yields miserably. As far as purity goes, I cannot see any justification for extending the mixture. *Cutchicum* runs N. R. pretty close and, in a wet year, it may do better. We tried *cutchicum* on the Poona farm. It beat N. R. in yield but I do not think it better in staple. That suits a wet year rather better than N. R. Looking only at quantity, I think there is no doubt that N. R. is the thing for Khandesh. That is the opinion that all the men there have formed and I think it is right. They have come to the same opinion in the Central Provinces. We ought to be able to spread it very rapidly. There is an enormous demand for it. We could supply a great deal more seed than we have, but I have not got sufficient staff. We have not got any supervision; the Deputy Director of the Northern division has an unwieldy charge. I am not prepared to do any more cotton work either in Khandesh or in Gujarat for want of supervision until I can get the charge split up. It is a double charge at present consisting of three or four districts in the Deccan, i.e., the two Khandesh districts and the whole of Gujarat; there are a great many farms and experimental plots and it is no good asking the Deputy Director to do anything more. Since the war started an absolute prohibition has been placed on employing any new staff. When I can get more staff I can with the greatest ease spread *roseum* cotton. People will pay three times the ordinary price for the seed. It would be possible to cover a large area quickly without paying much attention to quality. We have started seed unions and hope that they will multiply seed for themselves. They are really co-operative societies. The work is much easier to supervise in Khandesh than in the Southern Mahratta country. It is simply a question of broad lobed *versus* narrow lobed; and white flowered *versus* yellow flowered. It is quite easy to teach uneducated men to rogue out unsuitable plants. It is only a matter of staff to rush out a big area in a short time and then trust to the gins to spread the seed. I should think that, with organization, the fifty per cent. of the N. R. in the Khandesh mixture could be converted a very few years to eighty per cent. It would be a long business to get it up to one hundred per cent, as other cottons would be coming in from outside. I believe a great deal of Sind cotton is sold as Khandesh cotton. I have never been able to understand why Sind cotton does not fetch as good a price as Khandesh. There has been no signs of falling off in the price of Khandesh cotton so far. I cannot say whether, if the area under N. R. cotton increases, the price will fall off. It is a matter on which I should be glad to have expert advice. I understood that the extra value for this short stapled cotton was due to the fact that it possessed some qualities that were liked. I was told that these qualities were bulkiness and its good colour for the purposes for which it was used. I had the components of the Khandesh mixture valued at Bombay.

2014. As regards Gujarat, we are putting out this 1-A at Surat. It gives Rs. 7 per acre more value to the cultivator. That is what we have actually obtained for the cultivator during the last few years, including the ginning percentage. The acreage has not increased owing to the fact that the cultivator does not care about Rs. 7 because it is accompanied by certain conditions. Including the high ginning percentage, the net profit should be Rs. 25 to Rs. 33 which is about twenty per cent. Even that amount of extra profit will not necessarily make the Gujarat cultivator very keen to get our seed. It makes him completely alter his system of marketing. The ordinary system of marketing is that the small dealers come to the villages and buy from the people. They are never bothered to bring that cotton to the market at all. On the other hand if the cultivator markets his cotton through us, we get it ginned and he does not get his money back till the cotton is sold. Under this system, he cannot take it further south to Bardoli and Navsari so as to get better prices nor can he hold out indefinitely nor arrange for forward sales. He is bound to sell it through our agency. In the beginning of this year when prices were very high, several cultivators came to Mr. Bhimbhai and wanted to make forward sales. Mr. Bhimbhai promised to see Mr. Purshotamdas Thakurdas and try to arrange forward sales with an advance of Rs. 12 per *khandi*. In point of fact, Mr. Purshotamdas Thakurdas accepted Mr. Bhimbhai's proposals. The cultivators knew Mr. Bhimbhai very well and if it had not been for him they would have sold their cotton separately. Our system alters their whole arrangements and the Gujarat cultivator is very independent and fancies himself at a deal. He does not think that we can show him much in the way of making a bargain. There is not much prospect of spreading this variety. We are up against very great difficulties. It is, I believe, only with the help of a buying agency that we can succeed. Mr. Purshotamdas Thakurdas only gives about two per cent. over ordinary Surat cotton. The premium is fixed at Rs. 12 per *khandi* whatever the price of Surat cotton may be. When Surat cotton was only at Rs. 300 a *khandi*, a premium of this amount was pretty good. With Surat cotton at Rs. 750, it works out at only a trifle over 1½ per cent. above the daily rate for Surat cotton.

2015. I have never found any one in India who could tell me the real value of cotton. Selection 1027 A.L.F. with nine other selections were sent to the Bombay Cotton Trade Association and to a big firm in Bombay to be tested. One of the two put it at the top of the list of cottons sent whilst the other put it absolutely at the bottom. One makes it out much better than the ordinary Surat cotton and the other

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much worse. Every year we send these cottons for valuation and we get extraordinarily different reports. There seems to be no continuity. We cannot understand the basis on which cotton is valued by the various trade associations and by the large cotton firms in Bombay. The Cotton Trade Association put 1027 A.L.F. as the top of the list and Messrs. Tata put it at the bottom. That was in the year 1912-13. There was no mill test. I have lost interest in this question of quality. It does not seem to make any difference to anybody. Our valuations are generally made by the Cotton Trade Association and by Messrs. Tata and Sons.

2016. As to our policy in Gujarat, we are marking time. If I can get any one who is prepared to make a better offer than Mr. Purshotamdas Thakurdas for Surat 1-A, I am prepared to push that cotton. We are prepared to give seed to anybody who wants to grow it. Unless we can get a buying agency in Gujarat, working under arrangements which I can consider practicable, I am not prepared to organise any extensive campaign for putting out superior seed. The cultivators in Gujarat are not easy cultivators to deal with. We could put out a lot of this seed by giving it at less than the cost price. That would tend to influence the general staple for the better; but there would be no finality about it.

2017. We are merely studying *goghari*. *Goghari* is simply a local name for a large number of unfixed hybrids. I cannot yet say what will be the value of the work which we are doing on *goghari* but we have got some very promising strains. I do not want any more district staff for Lower Gujarat till I have something to push which is going to yield a profit.

2018. In Upper Gujarat, there is a very difficult problem as there are at present three varieties of cotton, *wagad*, *lallo* and *mathio* growing side by side. The three are very largely mixed in the ginneries with each other and also with cotton from Lower Gujarat, Khandesh and Rajputana. But there seems to be some demand for pure seed there. So far as mixing in the field is concerned, we could easily select seed which would give the cultivator a purer crop but the cultivator sends down to Palej for *goghari* seed because the purchasers of seed cotton will pay more for *goghari* owing to its higher ginning percentage. It is the purchaser of seed cotton who dominates the situation, and so long as better prices are paid for *goghari*, no cotton of any other class with better staple and smaller ginning percentage has any chance of success, and nothing that the Department can do will stop the cultivator from sowing the seed that pays him best. I think we ought to start studying *wagad* botanically and selecting out strains of it. *Lallo* is a crop about which I do not know very much. What is now called *lallo* is stuff from Broach which contains Broach *deshi* and *goghari* and is a mixture of all sorts of hybrids and crosses. Mr. Gammie tells me that there was an old *lallo* which had a considerably better staple but which is almost extinct. If we could find a few plants of it and work on them, we ought to do so. But there again this is work which I do not see where such work is going to lead. The dealers won't take it in preference to *kanvi* if it has a relatively low ginning percentage. There is great need for botanical study in these tracts. I would like to have men doing both the botanical and the agricultural side of the work. I want Deputy Directors but they must have ample time. At present the Deputy Director has too much to do to pay adequate attention to scientific work of this kind. If the Department had one cotton specialist, who should presumably be a botanist, that would be a good start, but there is sufficient work for three men at least. I have asked for considerable additions to the staff but the restriction some years back on recruitment for the Indian Agricultural Service and subsequently the war have prevented my obtaining what I want.

2019. Sind is a place in which we have not studied the cottons botanically. I do not know what was the trouble with the Sind American cotton last year. For three years it had gone on without any deterioration. Then suddenly last year's crop was said to be poor staple, mixed and altogether inferior. I do not know whether this was purely a seasonal effect but we really have not studied the crop botanically. It wants more botanical study than we have been able to give. The same holds good as regards Egyptian. The foreign varieties that we have brought in require to be grown, acclimatised and watched botanically and if necessary to be selected. I should like advice as to whether it would be better to go on with the present varieties or to import fresh seed.

2020. (Mr. Ashton.) I have not formed any definite opinion as to irrigation in Sind except that the canals there work very badly, especially the Jamrao. The great trouble in Sind is malaria. I think it is going to check progress enormously. As regards cultivation, we have not sufficiently studied the prevalence of *kalar*. Years ago I asked for a soil specialist and if I got him, I would put him in Sind to study the soil conditions. I think it would be a good thing to have an agricultural soil survey made of the desert and unirrigated tracts. You cannot tell what the soils are until you put water over them. Probably there would be years of work studying the soils and recording information. There is a tract in Upper Gujarat where one or two waterings from wells are given to *wagad* and *lallo* cotton and very largely enhanced outturns are obtained. Waterings are given in January and February. A scheme has been put forward to tap the Sabramati river but I do not think these Gujarat projects will ever come to anything. Projects to take water from the Mahi river have also been prepared. As far as I know, nothing is likely to come of them in the near future.

2021. Our irrigation policy is now mainly to develop canals in the Deccan and not in Gujarat. Generally speaking, the cotton in Gujarat is grown on heavy black soils and, on the whole, they are not suitable for irrigation. There is practically no cotton under irrigation on the Nira Left Bank Canal. I think there is no reason why there should not be some on the Right Bank Canal and also in the Ahmednagar District on new canals. The trouble about irrigation is this that whether garden crops, sugarcane or cotton are irrigated, the land must be levelled. They will not level the land for irrigating crops like cotton and jowar. I think good cotton could probably be grown in Ahmednagar if the people levelled their land and too much water were not given. Irrigation from reservoirs in the *ghats* could give water at a cheap rate as otherwise monsoon water goes to waste. There are a large number of projects for canal irrigation in the Deccan. The Nira Right Bank Canal is under construction. The Gokak Canal has been sanctioned; it will be one of the biggest in the Deccan. It has been held up for want of funds. A further large programme has been drawn up. The most profitable crop on these canals will be sugarcane. The area will not be much as it takes a lot of water. Sugarcane will make them pay. There will be other crops grown in rotation with it but the sugarcane is the real thing for the cultivator. It is a paradise for sugarcane. It will be very interesting to see whether high class cotton can be grown in rotation with sugarcane. I do not anticipate any increase in cotton from these canals.

2022. As regards Sind, the main difficulty about American cotton is that the water supply is not assured. There are constant closures. When the water supply was assured, American cotton grew very well there, but we have not yet proved definitely that it would cut out the local cotton. The closures in Sind apparently take place in March, April and May. There is no particular reason for closing at that time from

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the agricultural point of view. The reason is that they must close at some time and they wait until the wheat is ripe. I understand that they go on watering the ordinary early cotton there until quite late. In January and February they want water for wheat. All that is wanted for American cotton is an assured water supply.

2023. (Mr. Hodgkinson.) In regard to selected strains, we are going to push 1-A though it is no doubt the fact that 1027-A.L.F. is the better cotton. The Trade do not give me very much guidance in these matters. I do not believe that they know what they want themselves. We do not intend to give up 1027-A.L.F. We shall keep it going on the farm, and keep enough to see that the seed does not die out. I proposed to have four or five acres grown under it every year enough for one bale. I do not propose to go on putting it out for the reason that 1-A is the heavier yielder giving forty lbs. per acre more and we must give the cultivators the one that yields the most. With more manure we could double the crop in tracts of good rainfall, but people must keep more cattle or use night-soil. I think that, in course of time, they will do so though they won't do it quickly. It is not that the people do not know about it but a large proportion of the manure produced is used for fuel.

2024. The leaf of cotton is very brittle in the Southern Mahratta country. There is room for very great improvement in picking. It is now done in such a way that it amounts to deliberate adulteration on the part of the cultivator. The way in which picking is done is that the cotton picked is piled in small heaps on the ground and the heaps are bundled up together in the evening. I have asked cultivators about it and they have told me that it is the fault of the pickers. Everybody knows that the cotton is picked in the Southern Mahratta tract worse than anywhere else in the Presidency. The whole idea is to get as much weight as possible, including leaf and dirt.

2025. (Mr. Wadia.) It is true that, in the Bombay Presidency, there are about six and three quarter million acres under cotton. The yield is 74 lbs. per acre of lint cotton. Except in the Central Provinces and the Punjab, this is the lowest on the list. The reasons for this are bad cultivation, lack of manure and in many places bad sowing. Taking, first, bad cultivation and bad sowing, these are due to the carelessness of the cultivators; bad organisation and lack of means. It is more due to bad organisation and lack of means than to ignorance. The cultivators are very small peasant holders. You cannot get as good results from them as you can from more substantial farmers. In this tract, for instance, some of the substantial cultivators are not better educated than the poorer ones, but they get double the outturn. In course of time, the establishment of co-operative credit societies may to some extent remedy the poverty of the people. As to lack of organisation, some cultivators have no bullocks of their own. This is not entirely due to poverty. Ten acres won't support a pair of bullocks nor would the cultivator have enough land to give them work to do. It is a question of general organisation. In the cotton tracts, the cultivators are the reverse of hard working, because they get good prices for their cotton. I have calculated that on an average in the cotton tract of the Southern Mahratta country, the cultivator works only for 120 days in a year of 365 days and that the average working day is only four hours which includes the marketing of the crop. A higher standard of comfort might mean harder work. It is difficult to say exactly what the Agricultural College at Poona has done in spreading education among the cultivators. The class of men that we get at the College are not the actual cultivators. On the whole, the bulk of the men we have turned out have gone into Government service into the Agricultural, Education or Revenue Departments. We had a course of a year for the cultivators but we had to drop it since the college was taken up as a hospital. It will certainly be resumed after the war. Poona is not a cotton centre; we do not go in for cotton there except for a certain amount of short staple cotton on the farm. I do not think that, in the interests of cotton cultivation, an agricultural college is necessary at Dharwar. Its effect would be very small. Steam ploughs which ploughed a thousand acres of land and cleaned the fields up to sixteen inches in depth would do more good than a college. That in itself doubles the crop. For rapid results demonstration is much more effective than education. The best cultivators already do cultivate well. A substantial man with fifty or sixty acres with a couple of pairs of good bullocks keeps his land clean; a smaller man could keep his land clean if he got up an hour earlier every day. I should be delighted to have a college in Dharwar but I do not think that it would substantially remove the present difficulties in the way of cotton. I regard cotton on the whole as an easy crop to grow. There is no waste land for our students to buy if they wanted to do so. They must have land of their own. Sometimes we get the sons of substantial landlords at the College who want to learn to manage their own estates, but not very often. The big estates are usually let out to a number of small cultivators and the owner simply gets his rent, and does not really do any work. He is quite different from the class of men down here who gets a lease of foul land for twenty years, cleans it and starts growing cotton. I think that the short courses that we have are useful. People learn about methods of tillage, seed selection, ingredients in the soil, the plant foods and so on. They get some advantage from them but I do not think, as a rule, that those who attend are cotton cultivators. We have an agricultural school at Devihosur in this district where we cultivate cotton and show the boys the advantages of good seed and good cultivation. The instruction is given in the vernacular. We get boys from substantial landholding families. There are forty boys in the school. We have a school at Poona with fifty boys and one in Konkan. There is one in Sind which has sixteen boys, and we are opening one in Gujarat. I should imagine that they would do good work. The one in Sind is on a different plan. At Devihosur, we take the boys for two years and give them board, lodging and education free. They pay nothing. We do not find that there are a large number of applicants for admission to the school.

2026. As regards the increase of outturn per acre, the first necessity I should say is clean cultivation. A hundred steam ploughs in this district would make all the difference. I do not think that large holdings are necessary for steam ploughs. We plough blocks of 400 acres and undertake the ploughing when a block of people apply for it. If grass bound fields were cleared by means of steam ploughs, it would make a great difference to the outturn. When we plough up land for the cultivators, the charge is debited to their *tagai* accounts; they have to pay it in two instalments in the two following years. We charge Rs. 25 per acre for steam ploughing in the Dharwar district. In Gujarat, where we do not plough so deep, the charge is Rs. 13 per acre. The charge just covers expenses down here but it leaves us some profit in Gujarat. I think we could put it higher; it could go up to Rs. 30. In the Southern Mahratta country, we have a very poor cultivation season. I think probably in the Deccan we could do one thousand acres easily in the season here in the Southern Mahratta country we can do about six hundred. As far as the Agricultural Department is concerned, I regard it as our duty to do experimental work of this sort but if we do work on a big scale it is no longer experiment but business, and takes up too much of our time. Even if I got a special staff, I would rather see a business firm subsidized to do it, if necessary. I think they would do it better. Steam ploughing is done generally by business firms in England but to make it pay they have to use their engines

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for other purposes such as road rolling, threshing, etc. If it was proposed to have a large extension of steam ploughing, I should like to see some business firm subsidized for the purpose. In that case, I think the Government might be prepared to collect the charges as *tagai* (agricultural loans). Without that no firm could work. Now-a-days Government have agreed to the principle of subsidy, I believe. I should be prepared to recommend it myself. The next step after better ploughing is better sowing. The system of sowing is very defective in the Southern Mahratta country. Great gaps are left in the field. What we advocate is thick sowing and then thinning out. The people here don't like it as they say that it is wrong to pull up small plants. The third step is more manure. The best thing is night-soil: failing that, more cattle must be kept. But that would mean mixed farming which under the present conditions of congested villages and scattered holdings is practically impossible. We have demonstration plots in various parts to show the advantage of thick sowing against thin sowing. We have three places in this tract where we do it, i.e., our three farms there are also the agricultural associations and we demonstrate on the cultivators' own lands.

2027. As a general rule, long staple cotton has a higher value than short staple. In order to secure an increase in the length of the staple, you have got to produce the seed first. If you have a strain which is better, you must get the people to take up the seed. The first step is to produce your strain of long staple and the second is to distribute it. We have selected some strains which are distinctly better than the local varieties. We can very easily reproduce them if we wish to. How we can get people to take them up is a different matter. The total control of seed distribution by Government is rather a heroic measure. It would be impossible to control the distribution of all the cotton seed in the country if for no other reason than that the people would require seed for feeding their cattle. Take a concrete example. All the cotton in the Hubli Taluka is picked and brought into Hubli, sold and ginned. In theory, Government could take over all the seed at the gins. Then the people would want seed for feeding their cattle and also seed for sowing. We should have to issue some for sowing and some for feeding cattle. I do not know how that difficulty would be met. A great deal more will be wanted for feeding cattle than for sowing. The germinating power of all seed not intended for sowing might possibly be destroyed. I cannot say whether that would be feasible. If the movement of *kapas* and cotton were controlled, it would be much easier to get seed out on a big scale. The first step towards improvement is that all movement of *kapas* and cotton should be regulated in order that mixing may be prevented.

2028. As regards licensing of gins and presses, I would certainly like presses to stamp the name on bales to show where the cotton was actually pressed. If there were no movement of cotton in fully pressed bales and a stamp was put in to bale, at any rate, you would know where the cotton was grown and that it was grown within carting distance of the press. The only point of licensing ginneries would be that you might check deliberate mixing in the ginnery. It would not be necessary in places where only one variety of cotton was grown, if the movement of *kapas* was prohibited. It will not be possible in places where two cottons were grown side by side. It would not be necessary in Dharwar because there is no Dharwar-American cotton grown there. Here in Hubli, there would not be very much point in it, as Dharwar-American and *kumpla* are often grown mixed together. I would fix a scheduled tract so as to include Belgaum and Dharwar and would make Bijapur another tract but that would require detailed consideration. I do not quite see the object of licensing gins. How are you going to identify what was ginned at a particular ginnery before it goes to the press? I would recommend that every bale should be stamped with the name of the ginning factory, the pressing factory and the name of the station. *Docras* might be stamped with the name of the ginning factory. This would help the trade to control malpractices.

2029. It depends on the relative agricultural merits and the profit bringing capacity of the two different cottons, whether it would be good policy on the part of the Agricultural Department not to give out short staple cotton in a tract in which long staple cotton can be grown. Supposing that the short staple cotton gave double the yield, it might pay the cultivators well to grow it even if the long staple got double the price owing to the higher ginning percentage of the former. That is an extreme supposition but the cultivators do work out the merits of the rival cottons. There is also the question of dangers from frost to late maturing cotton as for instance in the case of *mathio* in Upper Gujarat, where in one year in five serious damage is done by frost to the late maturing cotton, but not to the *mathio* which ripens early. I cannot say whether if mixing of long and short staple cottons were stopped and if both the cottons were marketed separately, the margin between the two varieties would widen year by year. I understand that no large proportion of the Khandesh crop is used for mixing. It is mostly exported to Japan. I do not think that the proportion of the crop brought to Hubli has any effect on the price of Khandesh cotton. Khandesh cotton seems to get a different market, which brings in a price out of proportion to length of staple. I understand that when you get a mixed cotton with long and short staple in it, it is poor for spinning purposes but yet the trade does pay for it.

2030. Cotton is said to be deteriorating in many places, but I should say that *kumpla* has deteriorated the least. We have been giving out seed only during the last four or five years. There is an increasing proportion of white-flowered cotton in the Khandesh mixture. The staple of the white flowered is not so good as that of the other ingredients in the mixture, so that the cotton is therefore deteriorating in staple. I believe that *goghari* is extending to the north. It has extended south but when it did so I do not know. When we began to do our field analysis, we found a lot of *goghari* all over the Broach district and also in the north of Surat. That was about six years ago. There was plenty of it then. I think that the widening in the margin between Broach and Navsari cotton is due not only to the increased proportion of *goghari* in Broach but also to the fact that cotton from short stapled tracts is brought to Broach on a large scale and passed off as Broach. During three months of 1908, fortyseven thousand maunds of lint were brought into the Broach tract by sea and by road from outside tracts which were short staple. The proportion of that to the total crop grown in that tract worked out at five per cent. There was a lot of *rozi* cotton coming in from the Kaira District as well as *mathio* from Bhavnagar. I have been told that, during the last season, the amount introduced from outside was enormous.

2031. The policy I have already mentioned, viz., that the Department should aim at spreading a cotton which produced more than the local cotton, but was not inferior to it in staple, was in regard to long staple tracts and did not apply to tracts such as Khandesh, which is a short staple tract. The small amount of *goghari* seed which has been given at Broach was not given out under my instructions. It was given out by my subordinates as they wanted to test it on a field scale. I agree that they ought not to give out such seed on a large scale until it is definitely approved of, but 100 acres will not make any difference. I am not prepared yet to give out any *goghari*. People are really keen to get it. We could cover the whole area with *goghari* if we liked as the cultivators like it because of its ginning percentage. If *goghari* is killed by the regulation of transport by rail, we have plenty of Surat strains ready to put out. Formerly the difference

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between Navsari and Broach was only Rs. 30, now it is Rs. 150. I do not think that is entirely due to *goghari*. It is partly due to the mixing that goes on at Broach. If you put out Navsari seed in Broach, it will not give the same results as at Navsari but would grow Broach *deshi* cotton. Even if we could get Rs. 30 per *khandi* for it less than for Navsari, it would pay; but in point of fact we could not get the price the values into *kapas*. We put out 1027-A.L.F. in several *talukas* in Broach. That was five years ago and dealers refused to buy at the same price as ordinary Broach on account of the lower ginning percentage. 1027-A.L.F. is pure to type and even in staple, I believe. There have been no complaints about unevenness of staple. The policy of the Department must be to put out the cotton which pays the cultivator best. Until I know what the effect of the restrictions on movement of cotton by rail on the prices of long and short staple cotton will be and also what the outturns and ginning percentages are, I cannot say which will pay better. I know there is a scramble for long staple cotton at present but I do not know how long it is going to continue. The growing admixture of Broach and *goghari* in the Broach tract is not due to us. We have brought nothing into the Broach tract that was not there before, except improved cotton from Surat. The *goghari* cotton on our farm is simply a selection made within Broach itself. No more *goghari* will be given out until a definite policy has been decided on. Our policy must be dictated first and foremost by what pays the cultivator best. America has introduced a shorter staple cotton into the Mississippi tract in order to combat the boll weevil. They have done this for the definite reason that it pays the cultivator best. I quite understand the trade point of view and am most anxious to assist but we cannot ask the cultivator to grow what does not pay him.

2032. As a rule to get the trade valuations, we send a few pounds only. We send samples of our selections and of ordinary Surats or *kumplas* grown on the farm. Both are treated in every way similarly, cultivated, picked and ginned under similar conditions so as to be in every way comparable. In future, I will always send a bale. In some cases we have sent bales and we have had spinning tests made. We do want assistance from the trade.

2033. There is one point in regard to this proposal to restrict the free movement of cotton from one district to another. I proposed originally that legislation should be undertaken to restrict the movement of cotton by rail or sea. The way I think it would be best to do it would be to schedule certain tracts and to make it permissible for Government to apply the legislation to such tracts as it thought fit. I would make it illegal for anybody to import either seed cotton or lint including waste into that tract by any means either by rail, by sea or by road. In as much as prevention of transport by road would give a lot of trouble, I would only apply measures to prevent import by rail or sea in the first instance. My reason for that is this that although you might have no watch kept on transport by road, still the mere fact that there was legislation against it would in itself have a beneficial effect in checking it. If transport by road were not made illegal, cotton might be taken by rail to a place just outside the scheduled tract and then moved on by road just inside the tract. I only want to introduce such restrictive legislation into the few tracts growing long staple where mixing is doing undoubted and considerable harm to the millowners. My idea is that in a place like Khandesh or Sind where the staple is already very poor, it would not be worth while to bother about it. I do not know why cotton should move from one district to another even in a short staple tract unless for mixing purposes. A general prohibition would mean worrying the trade all over India for the sake of a few districts. I think it would be simpler to schedule tracts than to have a general prohibition. The Southern Mahratta country and Lower Gujarat are the only tracts in which I would apply the legislation proposed. In Upper Gujarat, we have already three different kinds of cotton growing side by side. I agree, however, that if there are many tracts in India in which cotton is imported for the purposes of adulteration, it might be preferable to have a general prohibition. The one advantage of having a scheduled tract would be that it would prevent carts coming from one tract to another. The cotton could only be brought up to a certain point.

2034. Another point on which I have not made myself quite clear is in regard to samples, as to whether they do really represent what we grow on the farm. We have taken the very greatest care to make these samples absolutely genuine and in the case of the samples sent for trade valuation, we have made the greatest efforts to secure that there shall be only one variety, that the conditions of growing, of picking and of ginning should in each case be absolutely identical and that the only difference should be the actual seed used; one being selected seed and the other not. Our fieldmen have very clear instructions about this; they are supervised by the Deputy Directors: Mr. Gammie kindly comes and helps us. Personally I am satisfied, as far as I can be without claiming to be an expert in the matter, that the greatest care has been taken and that in fact our samples are absolutely genuine and represent a fair sample in each case of the cotton grown. The Trade has expressed an unqualified opinion that our improved cottons are undoubtedly superior, based not only on small samples but in a very large number of cases on bales which we have sent year after year. I only wish to make it clear that if there were any suspicion whatever that these samples were in any way faked, our work for the past ten years in the Department would be absolutely non-existent.

2035. (Mr. Roberts.) The samples of ordinary cotton we send are from seed such as cultivators use, grown under farm conditions so that there is only one variety.

2036. (Mr. Wadia.) The cultivator cannot get pure N. R. seed easily. Except our seed, there is no pure N. R. seed. We have distributed enough seed for about fifteen to twenty thousand acres, i.e., three lakhs of lbs. at the rate of fifteen lbs. to the acre. I consider that the best use to which the energies of the staff of the Agricultural Department can be devoted is to obtain for the cultivator the biggest profit provided that there is no reason which makes us consider this undesirable. I do not consider the pushing of *roseum* undesirable. My proviso applies only to long staple tracts and not to Khandesh.

2037. I have already suggested that proper buying agencies should be formed. I remember the details regarding the formation of the buying syndicate in 1911. In May 1911, there was a joint meeting of the representatives of the Agricultural Department, the Bombay Cotton Trade Association and the Bombay Millowners' Association. As far as I remember, the Syndicate was to buy up to 2,000 bales the first year. The actual wording, as I have it here, which was drawn up, I believe, by the Secretary was that, if Government would guarantee 2,000 bales grown from Government seed, three or four mills would form a Syndicate and would guarantee to buy the cotton. It is clear that they wished to have 2,000 bales. This Syndicate was for Gujarat. The Sind Syndicate is quite a different one. I cannot find anything in the records about guaranteeing the quality. The understanding simply was that the cotton was to be grown from Government seed. There was no formal agreement. We had a very long discussion and I did my best to put before the Syndicate what we were capable of doing. I said we would put the seed out and that we would do our utmost to get the cultivators to grow it pure and to keep it pure and would supervise it throughout. That is my im-

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pression as to what happened. From the records read out to me, I did apparently say that it would be grown under our supervision and would be of superior quality. My reason for saying that it would be of superior quality was that the Trade had always valued our cotton from that seed as superior. With reference to the letter of 30th July 1913 to the Chief Secretary to the Bombay Government which shows that the agreement which I made was that for the one year only, 1911-12, in the first instance and was that the cotton should be bought at five per cent. above the local price, in 1911-12, 1,200 bales were taken up by the Syndicate. The Syndicate was satisfied and we were satisfied with the premium paid and everything went on most promisingly. In point of fact, I went on furlough for two years before the actual marketing in 1912. Mr. Smart took my place. He acted as Director of Agriculture from the beginning of 1912. In April 1912, Mr. Smart met the Syndicate and it was arranged to continue the operations in 1912-13 on the same lines as 1911-12. I understand from you that the only point in regard to which the Syndicate complained was the disposal of the seed from the special cotton which the Agricultural Department did not entirely take up according to their original promise and that there was difficulty in the disposal of it but that the Syndicate at that time had perfect confidence in the work and the guarantee given by the Department. The Syndicate had agreed to take up to 5,000 bales next year. They actually took up 3,600 bales at five per cent. premium in accordance with the agreement. I have seen some valuations made in July 1913 to the effect that certain bales were inferior to the local cotton. I understand that four bales were sent to the Bombay Cotton Trade Association, one from each centre, viz., Bardoli, Rander, Syan and Kim respectively. The official valuation of the Cotton Trade Association given on the 17th June 1913 was as follows:—

Bardoli at Rs. 320 per *khandi*.

Rander at Rs. 315 „ „

Syan at Rs. 305 „ „

Kin at Rs. 305 „ „

the price for fine Surat on that date being Rs. 315. You say that the Syndicate submitted with that letter a statement showing the spinning tests of the various mills which showed that the spinning qualities were poor. I am quite prepared to take your word for that. As to the statement that the Syndicate accordingly refused to buy the balance of 1,400 bales that year, I may state that they had refused to do so many months before. They refused to buy the balance in April and the valuation was dated the 17th June. The Syndicate closed down on the 25th April; I am not prepared to accept the statement that there were any complaints in April as to the quality. There were disputes as to price paid locally for the seed cotton. I have it on record that, on the 1st May, Mr. Greaves informed Mr. Smart that there was no complaint whatever as to quality. The total output was, 5,600 bales. It may, as you state, have been grown on 15,000 acres in British territory and 9,000 acres in Baroda. Mr. Bhimbhai inspected the cotton grown in Baroda territory. I admit that there was a possibility of substitution in this arrangement. That such a substitution might have taken place on a limited scale, I think is quite possible but the evidence before me does not point to the fact that that was the reason why the Syndicate gave up their buying. The real reason was that there were a number of disputes in regard to the prices over which the premium of five per cent. promised by the Syndicate should be paid. The Syndicate had agreed to pay five per cent. more than the local price of the day at the different markets. For instance, a man would offer Rs. 150 a *bhar* for cotton and five per cent. extra meant only another Rs. 7½ as the premium and the seller would say that he had had an offer of Rs. 155 as the local price and the Syndicate were only giving him Rs. 2½ extra. The Syndicate did not agree that that was the local price. There were disputes like that going on especially at Bardoli. I see from the records that Messrs. Smart and Main several times interviewed Mr. Greaves on the subject. Mr. Bhimbhai intervened on behalf of the cultivators. These disputes were all settled. As far as I can judge, the real trouble was that the market was steadily falling. Mr. Greaves bought up the cotton from the beginning of the season, i.e., from the month of February, and held it up. The market steadily fell and when he came to sell there was a big loss in spite of the fact that at an auction held at Bombay, our cotton fetched a substantial premium over the locally grown cotton on the same date. On the 18th April, 1,200 bales were sold at an auction for an average price of Rs. 349 per *khandi* as against Rs. 310 for "fine Broach." The price of "fine Surat" on that date was presumably Rs. 325 as the price of Surat was then Rs. 15 ahead of Broach. I do not know what those four bales were. One thing you must remember is that there was a very strong local opposition that year to the arrangement with the Syndicate. I have no information as to what happened to the bales valued by the Cotton Trade Association. It is possible that there was a substitution of the bales between the time they left Surat and the time they were valued in Bombay. I have no evidence on the one side or the other: there was a chance of substitution of *kapas* on the way from the cultivators' fields; there was a chance of adulteration in the gins or presses and there was also a chance of the substitution of the bales between the time they left Surat and the time they were valued in Bombay. The ginning and pressing were carried out under the same conditions as in the previous year. The valuation is unintelligible to me. It was certainly not due to any defect in the seed we issued. I have evidence to show that. I cannot conceive how these bales turned out to be worse than the local cotton. Even if local cotton had been substituted for the improved cotton, I cannot understand how the cotton came to be valued lower than the local cotton. As far as I know, the complaints were received in June and the Syndicate stopped buying in April. The first intimation that there were any complaints as to quality was in the letter of July 30th to the Government of Bombay. There is another point that I should like to make clear with regard to this cotton. Even assuming that the quality was not better than that of the local cotton, I should like to point out that the ginning percentage was two per cent. better. That gave the cotton an advantage of six per cent. I do not see how the Syndicate could lose, even admitting that it was only one per cent. as stated by Mr. Greaves, that, at any rate, makes up three out of the five per cent. that was paid extra, as one per cent. ginning percentage is three per cent. of lint. The Syndicate bought the *kapas* and got the advantage of the ginning percentage which they admitted themselves to be one per cent. On their own showing they got three per cent. benefit, i.e., Rs. 9 out of the Rs. 15 that was paid. Nobody regrets this trouble more than myself: it must have been extremely trying for the Syndicate to have this cotton held up. They made it out worse than the local cotton. I am quite unable to understand that. It is absolutely unintelligible to me how in the first year the cotton came in pure and in the second year there was this enormous substitution. I can quite understand that small substitutions might have taken place but substitution taking place on a large scale is absolutely unintelligible to me. After the arrangements with the Syndicate were closed in April, we had to dispose of our cotton and we disposed of it to a local mill in Surat, which gave us the opinion that it was much better than the local cotton. It was our local cotton grown in Surat—not the cotton from

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Baroda—which was found so inferior. This was the very cotton over which I had year after year exercised close control. It has always been valued above the local cotton both before and since. I cannot say that there was any want of supervision. There were only three fieldmen to supervise it. The more supervision you have the better but I do not think that want of supervision could have been the reason in Surat. The staff in Surat was the same then as now.

2038. Government were very anxious to start a buying agency in Sind. In regard to the Sind Syndicate I agree, that, as you state, it was formed in 1912 in consequence of the protest of the Bombay Millowners against a proposal of the British Cotton Growing Association to start a buying agency in Sind. A grant of Rs. 75,000 was included in the budget proposals. The Hon'ble Mr. Fazulbhoj Currimbhoy suggested to Government that if the proposal of the British Cotton Growing Association were vetoed, he would form a Syndicate to carry on the buying agency without asking any grant from the Government. Accordingly on the 23rd March 1912, a conference was arranged at the Bombay Secretariat at which Mr. W. H. Lucas, Chief Secretary to the Government, Mr. Smart and some of the millowners were present and an arrangement was brought about to form a Syndicate on the following terms:—

- (1) That the Director of Agriculture would be prepared to deliver all *kapas* grown from American seed or cause it to be delivered to the ginnery proposed to be established by the Syndicate.
- (2) That the Syndicate should start two factories, one at Shikarpur and the other at Mirpurkhas.
- (3) That the Syndicate was to market this cotton, the price to be offered to cultivators for the *kapas* to be the price recovered by the Syndicate either in Bombay or in Liverpool less certain charges. Government fixed those conditions with the Syndicate through Mr. Smart. The Syndicate accordingly established two factories.

The above facts as detailed by you are substantially correct. The Director of Agriculture was quite aware that there was practically no cotton grown at the Shikarpur at the time but he had hopes of getting cotton there. In the first year, there were only 25 bales. In the second year, there were 100 bales. There was no buying agency there after the second year and so we stopped issuing seed. The machinery was never put in the factory. It may be that the 25 and 100 bales that were grown were taken to Mirpurkhas to be ginned. The fact was that they could not get the people to take the cotton up quickly. The trouble was this. Mr. Henderson was satisfied himself that the land was suitable for growing American cotton. He got good results from a number of small plots. To make the cotton successful, it had to be sown quickly when the inundation water first came but the people were very slow in getting to work. The result was that they sowed the cotton later than it ought to have been sown and the thousand bales promised did not materialise. So far as Shikarpur is concerned, I think the Agricultural Department was over sanguine in expecting that the people would take up the cotton very quickly in spite of the warning of Mr. Chatfield to the contrary. They satisfied themselves as to the physical possibilities but they did not allow for the laziness of the Sindhi cultivator. They tried to hustle him but found to their cost that he could not be hustled. I understand that there was no loss on the machinery; the loss was only as regards the building. This is the first I have heard of there being a loss of Rs. 4,000 on the machinery alone. When it was found that the factory at Shikarpur could not be worked and that the building would be useless, proposals were made to Government to take it over. In regard to the statement that the building at Shikarpur cost Rs. 8,700 and that Government paid the Syndicate Rs. 5,000 only as compensation, I would like to point out that enquiries were made which showed that the building would be of no use to Government whatever. The Rs. 5,000 which was paid was therefore compensation, pure and simple, as Government were prepared to admit that the Syndicate had put up the building on the basis of an estimate which did not materialise. The Engineer estimated that the cost of putting up such a building would be about Rs. 6,000. He stated it had been very badly put up. In view of the fact that the building had cracked, he estimated the present value at Rs. 5,000 and Government offered that amount. The intention of Government was to offer reasonable compensation. I think Government treated the Syndicate extremely liberally. The scheme put before Government by the British Cotton Growing Association contained all the elements of success. In consequence of the emphatic protest from the Bombay Millowners' against Government accepting it, Government had accepted the schemes put before them by the millowners which, in my opinion, from the commencement contained all the essential elements of failure. I do not know who drew up the scheme. In a letter dated March 30th, 1912, Government accepted the Millowners' proposals. The scheme may have been drawn up by Mr. Smart and Mr. Lucas, I was not there, so I don't know. The British Cotton Growing Association recognised that, in the first three years, they would probably lose twenty thousand pounds and in order to run the scheme successfully they suggested that Government should be prepared to bear half the loss. That was an essential part of the scheme whereas it was an essential part of the Syndicate's scheme that Government should bear no loss. That is the difference. In spite of that, Government paid Rs. 5,000 compensation. The stipulations that were made with the Syndicate were not legal stipulations. Government only said that they would get cultivators to grow the cotton. If Government had any idea that they were entering into a legal binding guarantee that they would on no account produce less than a thousand bales of cotton, they would have gone into the terms of the agreement more carefully. The Syndicate was anxious to get cotton and the Government was willing to oblige them. Each side was expected to do its best; it was one of those cases in which each side was to do its best and assist the other and to work mutually. Unless this was done there was no chance of carrying out the scheme to a successful termination. I admit that the full number of bales estimated at Mirpurkhas has never materialised in any of the seven years that the Syndicate has been at work there but I do not think it was our fault. If there had been an effective buying agency in the first year, there would have been a large increase in the production of cotton at Mirpurkhas in subsequent years. I think the offer of Rs. 5,000 as compensation at Shikarpur was a fair offer. I certainly hope that another buying agency may come forward to help us even after this occurrence. I am not prepared to express any opinion as to whether any agencies will start in the future and on what conditions. The original arrangement was that the Syndicate was to pay half prices in the first instance and that the balance was to be paid to the cultivator after the Liverpool valuation had been received. The main objection of the cultivator to this system was that he wanted his money down at once. I do not know if Mr. Henderson pointed out the difficulty and Mr. Smart insisted on keeping to the condition. I personally consider that it was an impossible system and that the cultivator was bound to object. It may be, as you say, the fault of the Director of Agriculture and not of the Syndicate. Mr. Greaves, the next year, at my suggestion, made arrangements to pay the cultivators money down. There were several changes made and that was one of them. The Syndicate used to pay by cheques on Hyderabad and the cultivators did not like that. Another point was that the Syndicate did not get their agent up early enough. In the first

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year they did not get him up till the middle of October. When the war broke out in 1914, I went up and interviewed the representative of Messrs. Greaves Cotton and Co. who said that the bottom had fallen out of the cotton market and that the best thing would be to let the cultivators sell the cotton as best as they could. In that year, the cultivators sold half their produce to Rallis and the other half of it to Messrs. Greaves Cotton and Co. In 1914 there were 550 bales but in 1915 there were only 270 bales. Half of it was bought by Rallis. The wording of the agreement with the Syndicate was unfortunate as Government could not compel the cultivators to bring all their cotton to the Syndicate. The cultivator's cotton belongs to the cultivator. All that Government could do was to do their very best to get the cultivators to bring it in. Government in their efforts to get the cultivators to bring in all their cotton for the Syndicate, sent out all the staff available into the districts to try to collect all the cotton. The agreement was that the Government should see that the cultivators delivered the cotton to the ginning factories. On one occasion, when the cultivators had sent in their cotton by train to Mirpurkhas, it was lying at the station and the staff of the Agricultural Department had to take to charge of it, as the ginning factory refused to take away the cotton from the station although it was only 200 yards away from the factory as they thought it was the business of the Agricultural Department to do so under the terms of the agreement which stipulated that the cultivators would deliver the cotton at the ginning factory. We did our utmost to get the people to bring the cotton in but there were some big *zamindars* who were extremely sophisticated and the mere fact that we were urging them to bring the cotton in was quite sufficient to make them take it elsewhere. If you regard the conditions as strictly legal, then they were not carried out literally. If you regard them in the spirit, then Government did its best to carry them out. Anybody who knew the conditions of rural life in India was aware that the cotton belonged to the cultivator and not to Government. Government anticipated that the wording which was merely the wording of a letter from the Syndicate to Government would be reasonably and sensibly interpreted with reference to common knowledge of the existing rural conditions in India. Whenever Government make a legal agreement with anybody, they submit it to the Legal Remembrancer who goes through it and drafts it in legal form. No such thing was attempted in this case. I certainly hope that in spite of past experiences the Bombay millowners will continue to work with the Bombay Agricultural Department harmoniously. The Syndicate is in existence still. This last season its operations closed down as there was no American cotton because there was no water in the Jamrao. The estimated amount of cotton was produced for one year, 1916-17, starting on a new basis with pure farm seed. The Syndicate was helped to pay its way that year by ginning *deshi* cotton. That kept their ginnery busy the whole season. Mr. Saklatwala has stated that the crop besides being poor in quantity leaves much to be desired in point of quality also. He is under a misapprehension as regards quantity. The quantity came up to what was expected. In 1914, the value was slightly above Middling American or fifty per cent. over *deshi*. In 1915, the premium secured was 15½ per cent. In 1916, it was 25 per cent. In 1916, the first sample was valued at the same price as Navsari; the subsequent quality was said to be much poorer. In view of the fact that the Jamrao canal is behaving so badly, I think it would be as well to close down the operations of the Syndicate. I think the machinery could be disposed of at a profit in Mirpurkhas as there are no other ginneries there. As regards the building, I cannot say whether Government would be able to buy it. It might be of some use. It is close to the station. It might be possible to sell it as a going concern to gin *deshi* cotton. There ought not to be any loss. The two essential conditions necessary for the success of the American cotton in Sind are (1) a buying agency and (2) an alteration in the character of the Sindhi cultivator. If these two conditions are fulfilled, Sind can be made to produce a large amount of American cotton when it has perennial canals. It is very easy to distinguish between Sindhi and American cotton and to buy American cotton quite pure. I cannot understand why the quality of the American cotton was so poor last year. I think it will be possible to induce the cultivators to bring it in pure. I certainly think that there is every chance of American cotton being grown on a large scale in Sind, if the barrage at Sukkur is completed, provided the canals work properly. I cannot estimate the area at all but it should be very large. The Sindhi cultivator and the Sindhi climate are the difficulties.

2039. (Mr. Roberts.) I do not think, taking it from the point of view of the cultivator, that he has obtained a fair premium for this Sind American in the past. Some years it was valued above Middling American. A large mill valued it at Middling American but did not offer that price for it. The cotton farm produce has been systematically valued above Middling American. In 1916, we got a low premium. The quality was said to be bad. I think it would encourage the cultivation enormously if the cultivator got a proper premium. I would like to comment on the syndicates in general terms. I still think that unless we have some arrangement for a buying agency with the trade, we cannot successfully market cotton, the advantage in quality of which over local cotton is comparatively small. I think that the idea of these Syndicates was a good one to start without if they were to be successful, it was absolutely essential that both sides should be working harmoniously together and that there should be a great deal of give and take. The cultivator in each case was the dominating factor and anything like the Syndicate and Government trying to hold each other down to business terms when the cultivator really commanded the whole situation was out of the question. I think it quite a reasonable proposition that the loss should be divided between the Government and the Syndicate. If there is to be harmonious working, it is extremely desirable that there should be one person running things who should have the complete confidence of both sides. That was the proposal put forward by the British Cotton Growing Association. They were to send out a thoroughly competent man capable of purchasing American seed cotton at its true value and who should for the purposes of buying represent both the Association and Government. The Agricultural Department was unduly optimistic about the possibilities of Upper Sind at this period. As regards Lower Sind the chances are much better. I am sorry that the millowners have lost their money and consider themselves so badly treated. It was not a very big loss. It was less than £1,200.

2040. (Mr. Wadia.) I said yesterday that we were not distributing seed of N. R. cotton except in Khandesh. I should have added the Deccan as we are distributing some seed in Sholapur, Ahmednagar and Nasik.

2041. (Mr. Roberts.) I agree with Mr. Itgi in regard to the yield of Cambodia. I have heard cultivators say that it yields as much as local cotton in some villages but our figures on the farm are less. Our figures are Upland 419, Cambodia 342, Ordinary Dharwar American 360. If ginning percentage is taken into consideration, it is a different matter. Cambodia has only taken on in two or three villages. A bad year came in and knocked it out elsewhere. We were getting on very fast with it when the bad year came. The staple of Cambodia is worse than that of Upland here but it has the high ginning percentage of 37. It is in the interests of the ginning factories or buyers to get seed given out with a high ginning percentage. The staple of Cambodia was not shorter than that of Upland at first but it is said to have

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deteriorated. I think it is a sounder policy to concentrate on the Upland type. We have determined to do that and leave Cambodia alone except in a few places where Cambodia does particularly well. The people in the few villages where it has proved successful will carry it on. At present we are doing nothing with it except to market it for them and that work has been handed over to the co-operative sale society. I have no objection to dropping it altogether, but the people of those few villages like it as it gives them fifty per cent more profit per acre. It is bought by one mill which apparently likes it. I had not heard before to-day that Cambodia seed was being mixed with Dharwar American and being sold to the cultivators. We hope in a very short time to have enough of the superior Dharwar American strain to cover this tract. I think it will beat Cambodia.

2042. (Mr. Wadia.) The Deputy Directors are always fully consulted on any technical matter and their opinions are sent on to Government. My personal opinion is that if a council of Deputy Directors were appointed to deal with such a question as that of the operations of the buying agency in Sind, it would not be a success. Somebody must finally decide such matters. If the Director is not capable of obtaining proper opinions from his Deputies and making proper use of them then the best plan is to get a new Director. Speaking generally, one man can pass final orders better than a council. I do not think a council like that of Pusa would be of any use.

Sardar MAHABOOB ALI KHAN, Savanur.

EXAMINED AT DHARWAR, FEBRUARY 19TH 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

2043. (11 and 20) Varieties.—Below are tabulated the varieties grown in different parts of the Karnatak :—

District.	Staple.	Class.	Outturn of lint per <i>nag</i> of 1,344 lbs.
<i>Deshi.</i>			
Miraj, Athni and villages on that side	Shorter .	Better	LB. 350—355
Bailhongal, Saondatti, Dharwar and villages on that side	Long .	Do.	352—364
Average <i>kumpla</i> coming to Hubli market	Do. .	Do.	371—375
Average <i>kumpla</i> coming to Gadag market	Shorter .	Leafy	370—373
Bagalkot, Bijapur and villages on that side	Do. .	Better but dull colour. . . .	360—367
Savanur <i>kumpla</i>	Long .	Leafy	378—385
Davangeri	Shorter .	Reddish in colour	360—362
Broach grown in a few places	Long .	Best	400—420
<i>Exotic.</i>			
Guttal, Ranabennur Davangeri side, called 'Mungari'	Shorter .	Better	395
Banaver coming to Davangeri market	Do. .	Silky	400
'Sawgin Dharwar' grown in Gudgori Kundgol, Saonsi side and coming to Hubli market.	Long .	Best	392—400
'Sawgin Dharwar' grown in Ron, Mulgund side and coming to Gadag market.	Do. .	Inferior	392—400
'Cambodia' grown near Gadag only	Do. .	Best	420—445

(2) It will be seen from the above that "Savanur *kumpla*" is the second best amongst the *deshi* varieties as regards outturn and staple although it is leafy in class. This leafiness can be avoided, if the improved method of picking, advocated by me and fully explained in the accompanying report be adopted by all the cotton growers. I had my own cotton fields picked according to this method and sent a few bales for test and report to the Gokak Falls Mills. The result of the test is, as may be evident from the copy of the report annexed, satisfactory and more than justifies this method in claiming for it the advantages mentioned in my report. Savanur *kumpla* is also well known to the ryots for its superior qualities and for the better price it always fetches than other varieties. The soil and rainfall of almost all places in the Karnatak is suited for this variety. So this can be grown with advantage throughout the whole of the Karnatak. "Broach" is no doubt superior to this, but it grows only in a few places as the soil and rainfall of the major portion of the Karnatak is not suited to it. The growers are, therefore, not in favour of this and it will not be difficult to introduce Savanur *kumpla* if efforts be made as they are now for Broach. The Seed Society at Hubli now keeps seed from cotton grown in Saondatti and that side. This cotton is not so good in outturn as Savanur *kumpla* though it is a bit cleaner class owing to the clean picking. If this Seed Society at Hubli and other

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Seed Societies keep for sale seeds of selected Savanur *kumpla*, it will go a long way in introducing this variety. When only one variety is grown in the whole of the Karnatak, the danger from adulteration or admixture will be diminished.

2044. (17 and 27) **Prevention of mixing of different varieties.**—Adulteration or admixture of staple cotton with inferior commodity is being practised by some merchants, who, for this purpose, sometimes bring cotton from Bengal and even “fly” from mills. This admixture is not detected till after the cotton passes through the spindles and then the mills begin to distrust even the pure commodity and offer for it a price far less than its intrinsic value. The growers of cotton thereby lose heavily. Nothing but legislation, I think, can put a stop to this bad and dangerous practice. The condition of the ryots will not be improved until this practice be put a stop to. I suggest the following measures and trust their adoption will do the needful in this direction :—

- (1) Merchants should be prohibited from bringing cotton from one market to another unless it is ginned and pressed into bales at the market of purchase. Mills may be permitted to do so on satisfactory proof that the cotton is required for their *boni fide* consumption.
- (2) At the time of passing the seed-cotton through the gins, some merchants mix with it inferior lint, inferior seed-cotton, or sometimes “fly.” This leads the seeds to get mixed and causes gradual deterioration of the staple cotton. The ginning factories should be prohibited from ginning adulterated seed-cotton for their customers, infringements making such factories liable to be closed for a certain number of years.
- (3) Some merchants put good lint around lint of an inferior quality and get it pressed into bales and pass these off as of the better quality. Pressing factories should be prohibited from pressing for their customers adulterated cotton, infringements being dealt with as ginning factories above.
- (4) Mills should be prohibited from selling their “fly” to men who are likely to use it for purposes of admixture. This “fly” may be sold to paper mills, if of use there, or made into *razais* (quilts) and then sold. If this too is not possible, it might very well be burnt. This will not cause any loss to the mills, because they have now to pay for it five times what they get for it when it comes mixed up with good cotton.
- (5) Merchants now pass off bales from one place as bales of another place, whereby even the good quality bales will not fetch full value. It should, therefore, be made compulsory that each bale turned out of a factory should bear a distinguishing mark to clearly indicate the name of the factory and the place. When consignments of cotton bales are despatched by railway in wagon loads, the railway authorities do not mark every bale in the consignment with their mark but only put their mark on the seal of the wagon. This gives facilities for passing off the bales as above. The railway authorities should be asked to mark every bale in a consignment with the name of the place of booking.

2045. **Causes of deterioration of seed.**—(i) **Bad picking.**—The present method of picking cotton is responsible, to some extent, for the gradual deterioration of the seed as well as the cotton year by year. Instead of picking from day to day as the pods open they wait till the whole field is ready and then do all the picking at one time. The cotton becomes leafy and dirty and the seeds from good and bad cotton get mixed up in the gins. If the improved method of picking, explained in the enclosed copy of my report of 1915, be adopted by all growers, it is sure to improve the quality of the cotton and also the seed therefrom. The first two pickings under this improved method give the best cotton and the seed from such will necessarily be the best for sowing purposes. Reliable ginning factories may be asked to select the best from the cotton that comes to them, gin it separately, set apart the seed and inform the Agricultural Department of the quantity of such selected seed they have. If the Mamlatdars then issue circulars to all the villages under them stating that ryots will not be allowed to sow cotton in their lands, unless they obtain such seed for the purpose of sowing, the introduction of good seed will be quite easy. Seed depôts at convenient market places will render it easy for the ryots and seed societies to obtain their seed supply.

(ii) **Bad ginning.**—Machine-ginned seeds are not inferior to handginned seeds provided the machine-ginning is properly done. Some merchants, in order to get a larger outturn of lint, induce the managers of ginning factories, to set the knives of the gins a bit wider and when the cotton is passed through such gins the thorns of the seed get broken and such seed does not germinate. This is the reason why machine-ginned seeds are considered by some as inferior. I own three ginning and one pressing factory and have been doing work for several years for Messrs. Ralli Brothers. The Japan Cotton Trading Company, Diwadker & Co., the Gokak Water Power and Manufacturing Co., etc., are all known to care more for the quality of their cotton than for its outturn, and from my experience I can safely say that machine-ginned seeds are as good as handginned for sowing purposes.

(iii) **Absence of suitable rotations.**—Another cause for the deterioration of the seed is that the ryots, tempted by the high prices for cotton do not observe proper rotation of crops in their lands. They sow cotton in the same lands for three or four successive years, whereby not only does the seed deteriorate but also the yield, staple and outturn of the cotton decreases year by year. At present the area under cotton is 75 per cent. of the total, only 25 per cent. being under other crops. To ensure proper rotation of crops, the area under cotton should be restricted to fifty per cent. The ryots in the Karnatak are not educated enough to realise the loss they are incurring by not observing proper rotation of crops and Government intervention is needed.

(iv) **Smallness of holdings.**—The holdings on this side range from four to thirty acres and, if they are cultivated by the owners themselves, they have been kept in good condition. *Inamdars*, *desais* and *deshpandes*, etc., own from 100 to 1,000 acres and they generally let these to tenants on short term leases. At the expiry of each period, they are again let to new tenants at larger rents. This being the case the tenants do not even care to keep the lands in good condition, let alone improving them. Many lands have consequently deteriorated. This may be remedied if the Government fix the minimum area of separate holdings at twenty acres, the minimum period of leases at 25 years and the maximum rent at a fixed times the assessment on the lands.

(v) **Lack of manure.**—No artificial manures are used on this side, the economic state of the ryots not permitting. Only farmyard manure and ashes, and these too not in sufficient quantities, are used. Owing to the rise in prices of fuel and the difficulties in obtaining it, the ryots have left off using cowdung, etc., for purposes of manure and instead use it as fuel in the shape of cakes. If things are allowed to continue

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in a few years the soil will have lost all its strength and even the best selected seeds will not then give satisfactory results. The question of manure calls for prior attention and, I think, asking the railway companies and other factories to use only coal for their factories will be a step in the right direction.

II.—COMMERCIAL ASPECT.

2046. (30) **Local trade customs.**—The dates for the collection of Government revenue, as at present fixed, fall a full month too early before the ryots can harvest their crops, sell them to the best advantage and meet the demands. Consequently they have to borrow money from the *sahukars* at high rates of interest and often times by agreeing to sell their produce, when harvested at prices 25 to 30 per cent. less than those they get during the season. The economic state of the ryots therefore gradually goes from bad to worse and the necessary improvements to their lands have to be postponed for an indefinite period. Co-operative societies will, no doubt, help in this matter. But I think the re-fixing of the dates for the collection of the Government revenue in suitable months, i.e., when the ryots have harvested their crops and can sell them to the best advantage, will be more effective in making the ryots independent of the *sahukars*. Then the money that now goes to the *sahukars* will be saved to the ryots and the necessary improvements to their lands will come within their easy reach.

IV.—MANUFACTURE.

2047. (36) **Type and number of gins and presses.**—I own three ginning factories, one at Guttal, one at Ranebennur and the third at Savanur. The Guttal and Ranebennur factories have each twelve double roller gins and one sawgin of sixty saws. The factory at Savanur has 29 double roller gins, one sawgin of forty saws and two double cylinder cotton openers. I also own a pressing factory at Savanur, where bales of $4\frac{1}{2}$ feet $\times$ $1\frac{1}{2}$ feet $\times$ $1\frac{1}{2}$ feet and weighing 400 lb. gross are turned out.

2048. (42) **Effect of replacement of short-staple cotton by long staple.**—No alteration in the existing double roller gins is necessary, if long staple is introduced as they are suited for short as well as long staple *deshi*. Sawgins are not suited for either short or long staple *deshi*, as they injure the staple and reduce the outturn of lint. To suit exotic cotton, double roller gins should be provided with moving grids of $\frac{3}{8}$ inch. Still the class will not be so clean as if passed through sawgins. Sawgins have fans and the dirt and leaf, etc., is all blown out. Per day of twelve hours, 120 maunds of *deshi* is ginned at each double roller gin whereas only 72 maunds of exotic will be ginned at such gins in the same period; at sawgins, exotic to the quantity of 384 maunds may be ginned in the same period. It will be seen that double roller gins are the best for *deshi* and sawgins for exotic.

2049. (40) **Factory labour.**—Great difficulty is now being experienced in obtaining labourers for the factories. Even two to three times what was paid to them formerly can not induce them to come to factory work here. This is all due to the expansion of railways and agriculture where the majority of labourers find employment.

V.—GENERAL.

2050. (46) **Attitude of buyers to improved cottons.**—No premia have ever been offered by purchasers for growing improved cotton. The ryots are ignorant and they do not know their own interests. Even the few who realise the advantages of growing improved cotton, do not do it as that does not pay them. What they produce is only a small quantity and the purchasers do not pay for it any appreciably higher price as owing to the very small quantity they have to mix it with other commodity to be of any use to them. If this is grown in very large quantities, it will fetch better prices.

2051. **Increase in begging and its effect on labour.**—Of late, begging is being resorted to as an easy means of livelihood, even by those who are able to earn their living by honourable work. This should be put a stop to by legislation similar to that in England and other European countries. It may perhaps be suggested that this would be interfering in religious matters; but a careful scrutiny of the present day beggars will surely reveal the true fact that these are not in the least beggars of the type sanctioned by our religions. The majority of these have adopted begging in later life and our religions recognise hereditary begging only. By stopping this begging, the supply of labourers will increase and the difficulty now experienced in getting labourers for factory will be removed to some extent. Here I may mention that the present day beggars were once labourers, i.e., when labour was worth only annas two to four per day; but when owing to famine they could not live on this earning they began begging and thereafter have continued in it thinking it an easier way of maintaining themselves than by labour although the lightest. So they do not come to work at any wages.

ANNEXURE.

Correspondence regarding improved methods of picking cotton.

I.

Letter with enclosures from Sardar Mahaboo Ali Khan, Savanur, to the Director of Agriculture, Bombay Presidency, dated the 18th September 1917.

I had, about two years back, submitted to you a report containing a few suggestions regarding improvement of the quality of the present deteriorated *kumpla* cotton and also pointed out the advantages of adopting a new improved method of picking *kapas* from day to day as the pods opened instead of waiting till the whole field was ready. I now beg to enclose a copy of that report for ready reference and also a copy of the report by Mr. L. McIlwrick, Manager of the Gokak Falls Mills, on the four bales of *kumpla* grown on my lands, picked according to the improved method advocated by me and sent to the Mills for the test. The result is satisfactory, and, you will agree, more than justifies the improved method of picking, claiming for itself the advantages mentioned in my former report.

2. I therefore request you will kindly arrange to publish in your Agricultural Magazine my report and the result of the test by the Gokak Falls Mills so as to bring the advantages of the improved method of picking prominently to the notice of the cotton-growing ryots.

3. The ryot may perhaps say this improved method is costlier than the one at present in practice. It is true the cost of picking *kapas* which according to the present method is about Rs. 15 per *nag* of 48 maunds, may go up to Rs. 25 per *nag*. But it will be seen from Mr. McIlwrick's report that *kapas* picked according to the improved method will fetch at least Rs. 275 per *nag*, if not more, while the same quantity picked

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according to the old method fetches only Rs. 250, thus leaving a balance of Rs. 15 per *nag* in favour of the improved method, after making due allowance for the Rs. 10 extra cost involved in the improved method.

4. Another noteworthy advantage of this improved method is that it ensures good value for the produce at all times as it gives no room to the unscrupulous persons for adulteration whereas the old method, by giving every facility for this vicious practice, puts into the pockets of those men the money that should justly go to the growers besides causing loss to the mills in this country.

5. Neither our cotton growers nor the labourers employed by them realise that all this mischief can be avoided, if they only adopt the improved method of picking. The chief cause of this, I think, is their want of education and enlightenment. Even the ordinary labourers of other countries, e.g., Japan and America, more fully understand in what lies the benefit of their country than the majority of the educated persons here. In our country agriculture is looked down upon as below the dignity of the educated, the goal of such being an appointment under Government. Government spend a lot of money on colleges and other agricultural institutions for the benefit of our country. I regret to have to say that most of the students (with a few honourable exceptions) after graduating at these institutions try to secure Government appointments. Even the sons of big land owners after coming out of such institutions, enter Government service instead of showing to the poor ryots the advantages of adopting new methods and implements of agriculture by adopting them in their own lands and thus giving the benefit of their education to the country.

6. To improve the quality of the *kumpla* easily and without much expense, I humbly suggest Government be approached for passing a law prohibiting such of the cotton growers as are found to have spoiled the quality of their *kapas* by omitting to adopt the improved method of picking from again sowing cotton seed in their lands and communicating same to the ryots of all the villages through the proper channel. This may for some time cause trouble to the ryots but the advantages to the country will, I think, outweigh this.

7. I have been in the cotton business for the last twenty years and have fully realised the loss caused to our country by our not adopting suitable methods of growing and picking *kapas*. So I approach you with a request that you will give this matter your kind consideration and do what is deemed expedient.

8. I beg to offer my sincere thanks to Meherman Lieutenant Nawab Abdul Majidkhan Sahib, Diler Jang Bahadur, Savanur, for his having kindly granted to me a fifty years' lease of about 200 acres of State lands and encouraging me to turn my attention to agriculture and also to Mr. L. McIlwrick of the Gokak Falls Mills for having spared time out of his valuable time to test and make his report on the cotton sent to him for the purpose.

9. I beg to mention here one more point in favour of the improved method inadvertently omitted in the report by Mr. McIlwrick. At a personal interview on the 30th ultimo, he gave me to understand that at the spindles it took the same time to spin seven ounces of yarn from *kumpla* picked according to the improved method as it took for six ounces from ordinary *kumpla*.

10. Government are trying to improve the quality of the Indian cotton in order to secure for it a place in the European markets as good as the one for the American cotton, which owing to its established quality, is much in demand there. But unless Government pass a law, as suggested in paragraph 6 above, I think their other efforts in this direction will not have the desired effect.

Enclosure I.

Letter from Sardar Mahabooob Ali Khan, Savanur, to the Director of Agriculture, Poona, dated the 2nd June 1915.

I respectfully beg to submit a few suggestions regarding the improvement of the quality of the *kumpla* cotton. This is grown in abundance in our district. The quality of the *kumpla* now arriving in the markets is deteriorating year by year and if things are allowed to continue the *kumpla*, reckoned as second only to the much valued Broach in quality as well as in staple, will, in the next five years or so, lose its name and consequently the ryots, as growers of cotton, will have to suffer greatly. I should like to point out here that during the last decade, the *kumpla* has been gradually diminishing in value with the Bombay purchasers. The difference between the prices of the Broach and the *kumpla* was Rs. 10 ten years ago but now, owing to the deterioration of *kumpla*, the difference has widened to Rs. 40.

There are various reasons for the present fall of our *kumpla* in quality, prominent among them are the following, which, if not treated as calling upon the immediate attention of Government in their Agricultural Department, would certainly grow very serious and the results are too obvious :—

- (1) It is a custom with the ryots growing cotton on this side of our district to pick cotton after the whole field has the pods fully open. Many times the *kapas* merely hangs from the pods entirely at the mercy of the gusts of the wind which, as a matter of course, bring the hanging *kapas* to the ground. The *kapas* while being picked gets invariably mixed up with dirt and mud. The plants dry up and thus a good deal of leaf-dirt finds its way into the *kapas* for the above reason. And now-a-days this leafiness of the cotton has been the main cause of the fall in quality of the *kumpla*.
- (2) I will deal later on as to how this leafiness becomes the bane of the *kumpla*.
- (3) In order to improve the present deteriorated quality of the *kumpla*, immediate steps should be taken to warn the ryots not to pick the cotton all at once after the whole fields have burst but gradually as the pods open. There are two advantages by this picking method. (i) Labourers will be always available as there would be no simultaneous picking with a rush of every field in a village. (ii) There will be no loose *kapas* hanging from the pods to be shaken by the winds to the ground and thus getting mixed with the earth rendering the *kapas* quite dull in colour. This dullness of colour will certainly be avoided if picking of the pods as they open is introduced. Also the picking should be done from daybreak to early noon, i.e., till 11 A.M. There is no fear of the dirt or leaf sticking to the *kapas* as each pod is gathered carefully by a limited number of coolies engaged for the gradual picking of the pods. The whole village, under the present method of picking, always has a clamour for want of a sufficient number of coolies to gather the *kapas* because everywhere the fields are quite ready for picking. The wages consequently run high and even in spite of a decent payment coolies are not to be had. The picking of the *kapas* is thus belated and the consequence is that much of the produce is necessarily left ungathered on the plants and often times the standing crop had to fall open to early and untimely heavy showers. The loose *kapas* on the pods are damaged by far and the same being marketed with the one that is gathered early spoils the whole lot

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by giving it extreme dullness and blackness of colour. The picking method now obtaining renders the *kapas* leafy as above stated. Now the dullness of colour and leafiness go to run the quality very low down when placed side by side with the clean and clear Broach.

- (4) Another improvement may also be suggested regarding the picking. The leaves and the pods should not be allowed to get stark dry and the picking should be made while the leaves and the pods are still green. The stalks of the pods would not be severed while picking and thus the *kapas* gathered shall have very little of the leaf in it.
- (5) The Home markets have a special objection to the leaf in the *kumpla*, in that it persistently sticks to the cotton and much of the yarn is injured while spinning. The leaf every now and then intervening the yarn is cut. Owing to the leafiness alone, the Home markets give the *kumpla* twenty per cent less price than they would, had the *kumpla* had no leaf in it.
- (6) Now how much the picking method is to be held responsible for this deterioration can be seen from the above. Unless there is introduced an improvement, as suggested above, the quality is doomed to go from bad to worse and unless those in authority take up the matter seriously and point out to the ignorant ryots their own benefits only if they could take up the more careful and, nevertheless, economical method of *kapas*-picking the *kumpla* will have to lie low in the markets.
- (7) I have been making my individual efforts to bring the improved method of picking to bear on as many ryots as I could induce whenever I could find time but I see no way to get all of them to come to learn the necessity of having recourse to my method of picking *kapas*.

I advocate, as herein above stated, a gradual picking of the fields as the pods open and while the leaves and stalks are still green.

I hope I need not point out the many disadvantages that result by leaving the *kapas* to open fully and hang on the stalks. Rats carry into their holes the *kapas* that falls to the ground and they never leave the field till they gnaw out the seeds sown the following year. The injury done to the crops as they come up by rats is too well known to need any special mention. However, it may be noted for example.

My prayer therefore to all those concerned in the amelioration of the condition of the agriculturists, is that they should make every effort by every means in their power to let the *kumpla* cotton growing ryots know how they have been unknowingly doing permanent injury to one of the most valuable crops their fields yield. If *kumpla* fails by its quality to attract better prices, and measures to improve the same are not taken in good time, *kumpla* growing will be found not at all productive of good results and some time after the ryots will have to discontinue cotton growing. Of course, they will see their mistake when it will be too late, for *kumpla* will have then lost much of its name.

It is the Government that can do something—if not everything—towards the introduction of the improved method of picking wherever the *kumpla* is grown.

Enclosure II.

(i)

Letter from the Manager, Gokak Water Power and Manufacturing Co., Ltd., Gokak Falls, to Sardar Mahabooob Ali Khan, Savanur, dated the 17th August 1917.

With reference to the four bales of cotton you sent us some time ago and which for reference we have called "Savanur Special" though you tell us that the only speciality about it was systematic picking, if this is so, then we congratulate you on your success, for the cotton was extraordinarily clean. The colour was rather whiter than the *kumpla* cotton we are used to, while the staple was equal in length to that of ordinary *kumpla*. This cotton lost in the blow room about five per cent against seven to eight per cent loss in our own *kumpla* ginned *kapas* and about twelve to fourteen per cent of ordinary *kumpla* cotton purchased from outside suppliers.

Inside the mill your special Savanur worked equal to and gave the same results as our average Gokak cotton except that it lost less in the blow room.

Taking your cotton to the spindle we got :—

20s count 20.83 actual count. 70 lb. average test against Gokak *kumpla* : 20s count 20.00 actual count. 72½ lb. average test.

Savanur Special in :—

34s count 33.61 actual count. 33½ lb. average test against our average Gokak *kumpla* : 34s count 34.48 actual count. 34 lb. average test.

So from this you will see that the test, etc., is about equal.

From the above you will see that cotton carefully picked is worth about seven to nine per cent more than cotton ordinarily bought from respectable merchants, though you will for some time find it difficult to get a better rate out of the various markets until buyers fully recognise that your supplies will always be clean.

(ii)

Letter from Mr. J. B. Knight, Professor of Agriculture, Poona, to Dr. H. H. Mann, D.Sc., Principal, Agricultural College (No. 1816-1), dated 22nd September 1917.

Your demi-official No. 3012, dated 20th September 1917. I think the question raised by Sardar Mahabub Ali Khan is principally an economic one. I have no doubt that all good cultivators understand that it is good economy to pick cotton more frequently than is often practised, provided labour is available. I may, however, point out that the gain in price from clean cotton is to a certain extent offset by loss of weight since in dirty cotton the foreign matter adds considerably to the weight. So before the question could be settled the gross returns per acre by the two methods should be considered.

(iii)

Letter from Sardar Mahabooob Ali Khan, Brother Nawab, Savanur, to the Professor of Agriculture, Poona Agricultural College, dated the 29th September 1917.

Your No. 1816-3 of 22nd instant. In your demi-official, dated the 22nd September, to Dr. Mann, you have set out certain points to be considered before enforcing the improved method of cotton picking advocated by me and I beg to explain them as well as I can.

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You mention that all good cultivators practise more frequent pickings, provided labour is available, as they realise the advantages of the same. But the adoption of this improved method of picking by every one will ensure a constant and regular supply of labourers, as pointed out in my original report.

The gain in price from clean cotton is, only to a small extent, set off by the loss in weight, as the foreign matter in dirty cotton has been found to be about two per cent. The gross return per four acres according to the improved method has been found to be about 48 maunds of 28 lb. each and that according to the old method about 49 maunds. At Rs. 240. per *nag* of 48 maunds, the value of one maund comes to Rs. 5 and deducting this amount, there will still remain Rs. 10 per *nag* in favour of the improved method, even assuming that clean cotton will only fetch Rs. 25 more than dirty cotton and there is all possibility of its fetching more if brought to market in large quantities.

Kapas picked according to the improved method does not require to be passed through the opener nor to be cleaned by women by shaking before pressing. So the staple is preserved intact and there is also no fear of its losing in colour, even if kept for a considerable time. The *kapas* picked according to the old method requires to be passed through the opener where it loses in staple and also to be cleaned by shaking where again it loses in staple. This cotton, as it is mixed with dirt, loses in colour when kept for some days during the rainy season. The purchasers, while offering prices for these two kinds, take into consideration the qualities of the first kind and the defects of the second and also the items of expenses of same. Therefore they will offer higher prices for clean cotton on account of its qualities.

The Agricultural Department is trying to extend growing Broach. When a ryot asks for seed of this variety, he is first advised that the *kapas* should be picked only in the morning till 11 A.M. and from time to time as the pods open. Then the seeds are supplied to him. Broach does not suit so well nor is it so extensively grown in all places this side as *kumpla*. *Kumpla* is somewhat inferior to Broach in class and outturn but not in staple.

What I wish done is a similar order should be issued regarding *kumpla*. I note with pleasure that you agree with me in the main and I shall be highly obliged if you can kindly help in getting the needful done in the matter.

Sardar MAHABOOB ALI KHAN called and examined.

2052. (President.) Savanur is 36 miles to the south west of Dharwar. It is a Native State of which my brother is the Nawab. I cultivate cotton and am also a commission agent. I have got lands of my own on which I grow *kumpla* cotton. I have suggested in my written evidence that bad picking is responsible for the deterioration of seed. I do not think improved picking would cost more than ordinary methods, owing to the increased value of the outturn. If cotton were picked when the pods are properly opened, the cultivators would get a good price for their cotton and the quality would be improved. Fifteen years ago they used to pick cotton three or four times. Now-a-days the whole fields is picked at once as soon as the pods open and so the leaves get mixed with the cotton and the cotton is spoiled.

2053. *Kumpla* is not now of the same quality as it used to be. Its deterioration is due to the fact that it has been mixed with other qualities by the merchants, who spoil the class and the staple. But the Bombay market thinks that *kumpla* is the same quality as before. If we send real *kumpla* to Bombay, it gets no better price than the other cotton. Bagalkot cotton is sometimes brought to Hubli to be mixed with Hubli cotton. It is shorter in staple and the quality is inferior. The best *kumpla* is grown at Bankapur, Ranebennur, Karajgi and Hangal. The cotton from all these places come to the Hubli market. Cotton from Bagalkot and Bijapur is also brought to the Hubli and Gadag markets. The price of Hubli cotton is higher than that of Bijapur cotton and therefore Bijapur cotton is brought into Hubli.

2054. Now-a-days as prices are so high, the cultivators never pick gradually. They pick all their cotton at once. Many people complain that they can not get labour. If the whole field is picked at once, they require one hundred to two hundred coolies but if the cotton were picked gradually day by day they would not want so much labour. Labour is scarce in these parts. If cotton is picked clean, the loss in outturn when it goes to the blowroom is much less. In this badly picked *kumpla*, the blow room loss comes to fourteen to twenty per cent. The report of the Gokak Mills which is annexed to my written evidence shows the difference between clean picked cotton and cotton picked in the ordinary way.

2055. Sometimes Bengal cotton is brought to Hubli for mixing. To prevent mixing, I would suggest the prohibition of the transport of cotton from one station to another, except in fully pressed bales. Cotton from Bagalkot is brought to Bailhongal and there mixed with the local cotton and taken to Hubli and there pressed and sent to Bombay. When the Bombay people see the Hubli mark, they think that the cotton belongs to Hubli and say that the Hubli cotton is no good. There is a press at Bailhongal. If the cotton were pressed at Bailhongal, the Bailhongal mark would have to be put on it. I object to the mills selling "fly." "Fly" is brought from Bombay at Rs. 3 to Rs. 4 per maund and is mixed with *kapas* when it is passed through the openers. The mixture is then pressed and sent to Bombay where it is sold to the mills at Rs. 10 per maund. Legislation is required to stop all this.

2056. There is no doubt that co-operative societies will affect the situation in course of time but if the co-operative societies help the cultivators on the condition that they repay the money by instalments and the cultivators cannot pay the instalments, then they would have to borrow money from outside at a high interest. Instead of that it would be better if Government were to postpone the payment of the assessment. The assessment is collected in March and April. Collection should be postponed till the end of May. The cultivators would then be able to sell their cotton and pay the revenue. Under the present system, they have to pay their first assessment in March but at that time they have no money. I believe that collection at the end of May has already been introduced in the Bijapur District.

2057. The ginning factory owners allow merchants to mix. If Government were to take action, mixing could be stopped. I think that gineries should be regulated by licenses.

2058. (Mr. Hodgkinson.) I am purchasing cotton for Messrs. Ralli Brothers. They sent some bales from Savanur to Belgium in 1912. The Belgian firms complained of the amount of leaf in it. I advocate picking between day break and 11 A.M. as the pods open and when the leaves are still green. If this method were followed, scarcity of labour would disappear. If a man has got 24 acres of land and if he has it picked gradually, he will only want ten or fifteen men. But if the whole field were picked on the same day, he would require 100 to 150 men on that day. Everybody else will want men at the same time and consequently there will be scarcity of labour and wages will be enhanced.

2059. Many people say that hand ginned seed is better than machine ginned seed; that is not the case. If the gin is kept in proper order, the seed that is got from it is quite perfect. On the other hand, seed gets

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out when the ginners are in a hurry to increase their outturn. People must insist on the gin owners setting the knives of the gin properly. I have been working at Savanur for the last eighteen years. We have one saw gin with sixty saws in my factory. Saw gins are best for Dharwar American cotton but if either long staple or short staple *deshi* cotton is ginned in saw gins, the staple is injured and the outturn is less. I have tried Dharwar American both in saw gins and double roller gins. If a good class is wanted, then it is better to use the saw gin, but if staple is wanted, then double roller gins are better than saw gins. The double roller gins certainly better for *deshi* cotton. One can gin 2½ *nags* of *deshi* cotton in twelve hours in double roller gins whereas one can gin only 1½ *nags* of exotic cotton in that time. Ranebennur cotton is called *mungari* cotton as it comes in November. It is clean cotton and is always ginned in double roller gins. I have got a gin at Ranebennur and one at Guttal.

2060. One of the causes of the labour difficulty is that now-a-days people prefer begging to honest work. Unless we take special steps we cannot get labour. Now-a-days wages are very high; six years ago we were paying four annas a day; now we are paying eight annas but still we cannot get labourers. We have increased the begging population by indiscriminate charity.

2261. (Mr. Wadia.) I want only one kind of seed given out for the Karnatak. Devangeri seed gives the same outturn and colour here as it does in Dharwar and Devangeri. Bijapur cotton is not exactly the same in staple or quality as Dharwar and Hubli *kumpla*. It is shorter in staple, gives a smaller outturn and the quality is not so soft. There is no difference in appearance between Bagalkot, Bijapur and Dharwar seed. In appearance they are all the same. In all these places, we get the same amount of rain every year. But for Broach cotton we require more rain. Bijapur cotton is classed with "Westerns" whilst *kumpla* is classed by itself. Bijapur and Bagalkot cottons are more like the cotton from Raichur, Guntakal and Adoni in seed. Bellary cotton seed and *kumpla* cotton seed are the same in appearance but they give a different type of plant.

2062. The "fly" produced in the local mills in Hubli and Gokak Mills is sold locally, and used for mixing. The Government should pay some attention to this matter and they would be easily able to stop it. I would suggest the prohibition of the transport of cotton by railways except to ports or mills. Gineries should be licensed and all the cotton pressed should have the name of the station and that of the ginning and pressing factory marked on each bale so that the cotton can be traced. Five years ago, Devangeri cotton used to have a very good name. It has now gone down on account of mixing. Cotton from Bellary is brought in and mixed with it as well as "fly."

2063. My idea is that Government should take over the control of the whole of the seed farm and seed distribution. Reliable gin owners should be asked to gin good seed and to keep it separately. The first and second pickings should be gathered in one place and should be ginned separately and the seed from them should be distributed all over the villages. The seed societies in Hubli and Gadag and other places should undertake this.

2064. Last year I tried improved methods of picking on 36 acres. I had eight acres picked under ordinary cultivator's conditions and 28 acres picked by improved methods. I got 49 maunds from four acres under the old method of picking, whereas under the new method, I got 48 maunds from four acres. I only got a quarter of a maund of cotton extra by the old method, but I got the advantage of Rs. 10 per *nag* in price for the cotton picked by the improved methods.

2065. (Mr. Roberts.) We get an outturn of 120 maunds of 28 lbs. of *kumpla* in 12 hours from a double roller gin, but only 72 maunds of Dharwar American. We get 384 maunds of Dharwar American in twelve hours from a saw gin of sixty saws. To look after a saw gin like this four men are required. I have got a grinding machine to sharpen my knives. There is no difficulty in keeping the double roller gins in order, but it is necessary to have good men to look after them otherwise they cut themselves with the knives.

2066. I have seen the Broach cotton which the Agricultural Department is introducing. It is a good cotton in class, staple and outturn but it has not taken on. It is not a cotton which is going to spread very much. Improved *kumpla* offers more scope than anything else.

Rao Sahib M. L. KULKARNI, Acting Deputy Director of Agriculture, Southern Division,
Dharwar, Bombay Presidency.

EXAMINED AT DHARWAR, FEBRUARY 19TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

2067. (1, 10 and 20). Experience.—I have been stationed in the Southern Division of the Agricultural Department of the Bombay Presidency, consisting of Dharwar, Belgaum, Bijapur, Satara and Sholapur Districts. I am an inhabitant of this Division. Having served in the Agricultural Department in the Deccan and Gujarat, for about twelve years, I am now in this Division for about thirteen years. I am in actual touch with cotton cultivators to a great extent, as I have been distributing good seed of local and new varieties of cotton, advising them to adopt improved methods of cultivation and organizing auction sales of new varieties of cottons grown by cultivators. Thus, I have been doing the duty of a *dalal* (commission agent) as if appointed by Government, between cultivators and cotton-buyers (mill-owners, agents of petty local dealers in cotton).

2068. (2, 11 and 21) Varieties.—In this Division, almost all the varieties of cottons, viz., *deshi*-short staple, *deshi*-long staple, newly-introduced long staple cottons and also once acclimatized and newly-introduced exotic cottons are grown. The newly-introduced varieties of *deshi*-long staple and exotic are yet on very small scales. The following are the names of the varieties with the localities in the Division where they are being grown :—

(i) *Deshi*-short staple cotton (*waradi*)—

The whole of Sholapur District and part of Bijapur adjoining Sholapur.

(ii) *Deshi*-long staple (*kumpla*)—

(a) The whole of Belgaum District

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- (b) The whole of Bijapur except a small portion adjoining Sholapur, where the short-stapled cotton (*waradi*) is being grown, and some area where exotic cottons, Dharwar-American and Cambodia are being grown.
- (c) About three-fourths of Dharwar District.
- (d) A small portion of Satara District and the Native States of Sangli, Miraj, Jamkhadi, etc.
- (iii) Newly-introduced long staple cotton (Broach, Navsari and *kumpla* cross)—
Only portions of Dharwar and Belgaum Districts are suitable for the former variety, and it is grown under departmental efforts in the Dharwar District on a very small area, viz., about 5,000 acres. The latter is yet on a very small scale.
- (iv) Acclimatized exotic variety (Dharwar-American)—
It is grown on a fairly large area in the Dharwar District and a small area in Bijapur. This variety is grown both as *kharif* and *rabi* crops.
- (v) Newly-introduced exotic variety (Cambodia)—
The tract suitable for Dharwar-American is considered to be suitable for this new exotic variety; in some places it thrives well, while in others it fails. It is yet under trial. Present area is only about 5,000 acres.

2069. (3, 12 and 22) **Size of holdings.**—The size of the holding in the cotton tract varies very much, viz., from twenty acres to 100 acres. The average may be taken to be about fifty acres. In the cotton tract, the proportion of area under cotton to all other crops put together is two-thirds to one-third.

2070. (4, 13 and 23) **Yields and profits and comparative returns.**—The average yield of cotton of the different varieties is as below :—

	Lbs.
(I) <i>Deshi</i> -short staple (<i>waradi</i>)	500 to 600
(II) <i>Deshi</i> -long staple (<i>kumpla</i>)	350 to 450
(III) Newly-introduced long staple (Broach and <i>kumpla</i> cross)	400 to 500
(IV) Acclimatized exotic variety (Dharwar American cotton)	400 to 500
(V) Newly-introduced exotic variety (Cambodia)	400 to 500

(2) Profits from cotton cultivation depend upon the market prices for cotton. In recent good years for cotton, the net profit may be calculated at Rs. 20 to Rs. 30 per acre. The cost of cultivation comes to from Rs. 15 to 25.

(3) It is not possible to compare the return to cultivators from the different varieties of cottons as they are grown in different tracts by different cultivators. The different tracts are suitable for different varieties only. However, when *kumpla* and Dharwar American are grown, the latter gives slightly more profit to the cultivators. Similarly, where *kumpla* and Broach are grown, the profit from Broach is more, owing to the higher price it fetches in the auction sales organized by the Agricultural Department. In the same way the profits from Cambodia compare better than from the acclimatized exotic, viz., Dharwar American. In the absence of auction sales held by the Department, the *deshi*, *kumpla* and the acclimatized exotic, Dharwar American, are better than the newly-introduced Broach or Cambodia.

2071. (5, 14 and 24) **Rotations.**—The usual rotation, where *deshi*-long staple (*kumpla*) is grown, is a two-year one, viz., cotton and *juar*. Sometimes a three-year rotation is followed. In this case, wheat is the common crop grown in rotation. Sometimes gram is grown instead of wheat.

(2) With regard to the acclimatized long staple, viz., Dharwar American cotton, no rotation is observed. It is found by experience that the indigenous varieties (short or long staple cottons) do not grow well, if grown continuously without rotation, though the fields are manured; while the exotic Dharwar American cotton grows well without any change in the crop, if the fields are manured. In some places there are examples of Dharwar American cotton being grown in the same fields continuously, year after year, for the last fifteen to twenty years without any diminished yields. But the fields are manured.

(3) The rotation observed in the case of the *deshi*-short staple cotton is *juar* or *til*.

2072. (7, 15 and 25) **Conditions affecting increase in area.**—The area under *deshi*-short staple cotton (*waradi*) is gradually increasing in the Sholapur District, which is suitable for this variety, where cotton was not hitherto grown to any appreciable extent. The area under cotton in 1892-93 in the Sholapur District was only 6,500 acres. In the year 1914-15, it went to 117,840 acres. Owing to the increased demand for *waradi* cotton at high rate, the area is still increasing. Similarly, the area under long staple cotton in the Division is gradually increasing, which will be seen from the following table :—

Serial No.	Year.	AREA UNDER COTTON.			Total area in three districts.
		Dharwar.	Belgaum.	Bijapur.	
1	1890-91	4,71,404	1,43,871	3,85,814	10,01,089
2	1895-96	4,94,922	1,97,552	3,37,673	10,30,147
3	1900-01	4,29,695	1,48,253	2,98,330	8,76,278
4	1905-06	5,30,633	1,29,316	5,64,864	12,24,863
5	1910-11	6,85,729	2,77,686	6,41,095	16,04,510
6	1915-16	5,35,319	1,65,988	4,54,429	11,55,736*

* N. B.—The decrease of area of cotton in 1915 is due to sudden fall in price for cotton in 1914 on account of war.

2073. (8 and 18) **Uses of seed and seed selection.**—Cotton-seed is only used as food for work and also for milch cattle. Hitherto, cotton-seed was one of the cheapest concentrated foods for cattle, but since the exportation of cotton-seed began, its price has gone very high, viz., from 100 lbs. per rupee in 1904 to forty lbs. in 1916. A large quantity of seed is going to the Madras Presidency for being used there as cattle-food.

(2) No selection of seed is practised and no hand-gins are used for ginning *kapas* for seed purposes. The petty dealers in cotton (buying *kapas*, ginning the same in hired gins and selling lint immediately) with small

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home or borrowed capital, in villages and big towns, are the suppliers of seed to cultivators. Any surplus seed remaining unsold in the ginning season with these dealers is distributed as seed. There may be a few dealers who keep seed from good *kapas* separate for seed purpose. But such are only few.

2074. (9, 19 and 29) **General economic conditions.**—Owing to very high rates obtained for cotton, year by year, during the last ten years, the cultivation of *deshi* and exotic long staple cotton has almost reached its maximum limit of area. I do not think there is any great scope in the regular cotton tract for any appreciable extension of area under cotton without corresponding decrease in the area under food and fodder crops. In the transition tract, however (between Mallad and *Desh*) there are yet some uncultivated good lands which, if brought under cultivation, might, with its rainfall, and other conditions, be suitable for extension of the newly-introduced Broach cotton. Similarly, on the borders of Mallad, there is, in my opinion, good scope for introduction of the *deshi*-short staple cotton (*waradi*). But it would not be advisable to introduce this cotton here, as it would be giving more scope for the already existing fraudulent system of cotton trade. In Sholapur, there is yet scope for the extension of the *deshi*-short staple cotton (*waradi*) without affecting proper rotation, etc., as the proportion of suitable area under cotton is much less when compared with that under *juar*. Timely rainfall at sowing time is, however, one of the important difficulties in the way. But this can be surmounted, if the practice of sowing cotton with irrigation, as is practised in some parts of Sholapur, is introduced wherever facilities for irrigation exist.

2075. (26) **Suitability of existing varieties.**—After careful study of the soil, rainfall and other conditions in the whole Division, it has been decided to introduce certain varieties of long staple cottons, *deshi* and exotic, in certain parts of the Division only. Efforts are accordingly being made by the Agricultural Department to push these varieties on. Similarly, efforts are made to extend the cultivation of a better type of short staple cotton in Sholapur. There are, however, great difficulties in the way of this work of the Department, as the staff is very limited and the work involves great responsibility. Any efforts of the Department alone would not be of much use in pushing up long stapled cottons, unless the spinners for whom the long staple cotton is intended start reliable buying agencies at different important cotton centres. It is this want of proper buying agency that has retarded the progress of Broach cotton in this Division.

2076. (17 and 27) **Prevention of mixing of different varieties.**—The mixing of long and short staple cottons, indigenous or exotic, is done, for various reasons, by the small and big merchants (between the cultivators and spinners) and sometimes in the mill itself. This is due to a great extent to the forward contract for clean cotton and for thread. There is, however, a certain amount of mixture in the field by cultivators. This is not intentional. It is for want of pure seed supply. This can be remedied by supplying pure seed. But it is difficult to stop the intentional mixture by merchants in the factory. Forward contract seems to me, is somewhat responsible for this. I do not know how to stop this system of forward contract.

2077. (28) **Importation of seed.**—I do not think that importing new seed from America would do any good, as experience shows that new American varieties take a long time before they become acclimatized to the conditions here. It seems to me that there is great scope for improvement by selection in the existing varieties of local and also exotic. No Egyptian cotton is grown in this Division.

II.—COMMERCIAL ASPECT.

2078. (31) **Standardization of commercial names.**—The present commercial names are as below :—

- Kumpla* (Local cotton of Dharwar District).
- Saw Gin (Dharwar American cotton *rabi* crop in Hubli Gadag, etc.).
- Mungari* (Dharwar American cotton *kharif* crop, Ranibennur).
- Bagalkot (*kumpla* grown round about Bagalkot up to Bijapur).
- Miraj or Western (*kumpla* grown round about Miraj, Kudchi Sangli, Shedbal, etc.).

2079. (30) **Local trade customs.**—In the Southern Division, Hubli and Gadag are the important cotton markets of long standing. Recently, as the cultivation of *kapas* has increased to a great extent, a number of ginning and pressing factories have been put up at various places, either on railway lines or in the interior and some of these places, though without regular cotton markets, have become important centres for cotton trade. Thus, next to Hubli and Gadag, the following places are known as centres for cotton trade :—(1) Bagalkot, (2) Bijapur, (3) Bail-Hongal, (4) Savadatti, (5) Dharwar, (6) Miraj, (7) Athani, (8) Nargund, (9) Savanur, (10) Ranibennur. There are some other places, but they are not of importance to mention here. A good deal of cotton business takes place at places mentioned above and others, and the details of business are as follows.

(2) There are a number of established *dalals* at the big places known for cotton trade through whom alone *kapas* or cotton is bought by buyers, whether they are mill-owners in this country or are exporters. The reason for buying through *dalals* appears to be that the buyers cannot afford to waste their time in striking business with individual cultivators or petty dealers who take *kapas* or cotton to the markets in small quantities. The *dalal's* main business is therefore, to collect as much *kapas* or cotton as possible from the cultivators either direct or through sub-*dalals*, so that the buyers will readily have large quantities in one place. To induce the cultivators to sell *kapas* through them, the *dalals* advance money direct to cultivators, or to village petty merchants who deal in *kapas*, or to persons who buy standing crops. The object in all these is to get as great a quantity as possible for sale through them, as they get certain commission per *naga* both from the sellers and buyers. The rate of commission charged varies at different places. At Dharwar the following are the rates on *kapas* :—

	Rs.	A.	P.
From the cultivator	0	12	0 per <i>naga</i> .
From the buyer	1	4	0 per <i>naga</i> .
From the cultivator	0	6	0 <i>ham-ai</i> .
From the cultivator	0	1	6 charges per <i>naga</i> for charity

(3) Cultivators near big towns usually bring *kapas* for sale to the markets through the *dalals*. The petty village merchants dealing in cotton buy *kapas* from cultivators in villages and resell it in big markets, either as *kapas* or get the same ginned in village gins, and sell the cotton. Usually, they do the latter, as there is scope for more profit in selling ginned cotton.

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(4) When a cultivator wishes to sell his *kapas* in a cotton market, he has first to get *bardan* (gunny) to pack his *kapas*. For this he has to go to his *dadal*, who sells the gunny on credit, the object being to bind the cultivator to sell the *kapas* through him. A cultivator will then pack all his *kapas* in *docras* each weighing from ten to fifteen maunds (of 28 lbs. each). When the *kapas* is brought for sale in *docras*, it is sometimes weighed in the presence of the cultivator if there is demand for it at that time. But usually such is not the case. The cultivator, therefore, has to leave the *docras* to the charge of the *dadal* until the *dadal* gets a customer. If the *dadal* is himself honest and his servants are honest, then there is no chance for fraud. Otherwise, there is great scope for fraud which is usually done. There is always a great difference in the weight actually put in each *docra* by the cultivators and the weights found at selling time by the *dadals*. How this difference occurs in the godown is not possible to account for; some say it is due to shrinkage, and others say that it is due to wastage and so on. Then comes the item of weight of *bardan*. The actual weight is eight to ten lbs. if the gunny is new. If it is old, the weight is only seven or eight lbs. But weight of fourteen of *bardan* (gunny) lbs. is usually deducted from each *docra* for *bardan*. If unfortunately there is rain, the weight of *bardan* is calculated as much as twenty to twenty-five lbs. In some cases, it goes up to thirty lbs. In addition to the weight of *bardan*, a weight of two lbs. is allowed for sample purposes. Thus, the cultivator has to lose a good deal in weight. The gain in weight of *bardan* sample, etc., goes to the buyer and not to the *dadal*.

(5) Now the question of rate. If the *dadal* is an honest dealer, only doing the business of *dadali*, the cultivator would get the real rate which his *kapas* got from the buyer. If the *dadal* is both a merchant and a *dadal*, dealing in cotton, in addition to the *dadali* business, the cultivator is sure to get the lowest price in the period during which the *kapas* was lying unsold with the *dadal*. Thus, the position of a cultivator is very unsafe in selling his *kapas* through *dadals*. But there is no way to sell it otherwise, as the merchants do not buy it direct from the cultivators.

(6) In the villages, the cultivators are usually in the hands of the petty cotton dealers. They are in some or other way bound to sell the *kapas* to these petty dealers. These petty dealers advance money to the cultivators and thus bind them to sell the *kapas* to them (petty dealers). Here *kapas* is not packed in *docras*, it is weighed loose by maunds. Thus, for weighing a *naga* of *kapas* there will be about 48 weighments. Each time the *kapas* side of the scale will be lower by at least half a pound. Thus, there will be a lot of extra weight gained by the petty merchant in one *naga* of *kapas* weighed in this way. Now with regard to the question of rate in villages, there would always be a difference of about Rs. 16 to Rs. 20 per *naga* from a market-place. This is explained in various ways by the petty merchants to the cultivators, viz., cart-hire to market-places, price of *bardan* to fill the *kapas* to be sent, *dadali* to be paid, etc., etc. The *kapas* thus collected by the petty merchants from individual cultivators is either sent as *kapas* to market towns, or ginned in village gins and the ginned cotton sent for sale. But usually the latter is the case. In this business, an honest petty dealer gets all the cotton seed as his profit. If there is any more profit, it is made through fraud, viz., by mixing different varieties, superior or inferior quality, or by allowing more seed to pass along with cotton, or by damping, etc., which spoils the quality of the cotton. The cultivators in their turn try to deceive the *dadals* or petty village cotton dealers in several of their own ways. They intentionally damp the *kapas* before weighing, mix earth with the *kapas*, or sometimes actually put stones in the middle of the *docras*. Many *dadals* are ruined by advancing money to cultivators with the object of getting commission for selling their *kapas*. A cunning cultivator brings a large amount of advance money from a *dadal* on a false promise of selling a large quantity of *kapas* through him. But at selling time, he sends the *kapas* with his brother or some other body to quite a different *dadal* and receives full value of the *kapas*. The *dadal* who originally advanced money has to wait for another season, or to go to the Civil Court. There are instances in which *dadals* have lost a good deal of money by advancing to cultivators. Thus, it will be seen from the above that both the cultivators and the *dadals* are ruined by the existing method of selling *kapas* or cotton. Besides, the quality of cotton is spoiled to some extent either by the cultivators or by the *dadals*. It is, therefore, absolutely necessary to find out a new method by which both the cultivators and the *dadals* will be saved from mutual fraud and the quality of cotton will remain good.

2080. Suggested remedy for the prevailing evil of adulteration of exported Indian cotton.—The mischief played in cotton is by two agencies, viz.:—

- (a) By petty *dadals* who buy *kapas*, gin the same in hired gins, and sell lint locally to the middlemen. Their object is to get by any means a higher outturn of lint. For this purpose they do the following:—
 - (i) They allow more seed to pass along with the lint while ginning.
 - (ii) They mix inferior short-stapled variety of *kapas* with the good long-stapled one while ginning, as the former is cheaper and has a higher outturn of lint.
 - (iii) They also mix, while ginning, all inferior refuse, such as soiled *kapas*, pickings from market or station-yards, etc., which is auctioned at cheap rates.
- (b) By the middlemen who buy *kapas* and lint in large quantities, gin and press the same into bales and send the same to Bombay for sale and export from there.

These middlemen are mostly Gujarats. Their way of mischief is as below:—

- (i) They mix cheaper short-stapled lint with the dearer long-stapled one.
 - (ii) They mix "fly" or blow-room waste, bought from mills with the lint while pressing. They buy this from several mills locally, or bring it from Bombay and Sholapur, etc.
 - (iii) They damp cotton while pressing.
- (2) The malpractices of the *dadals* and middlemen can be stopped by the following measures:—
- (i) By strict legislation, which is not possible for the reasons given in letter No. 9164 from the Deputy Secretary to the Government of India.
 - (ii) By organization of a system of certifying the purity of cotton as suggested in the concluding portion of paragraph 4 of the above letter. In this connexion, my humble suggestion is that the system of certifying should begin from ginning and pressing stations, instead of from exporting ports only, as in the latter case it is difficult to detect the fraud played at the original centres. This would prevent damping and mixing of inferior or short-stapled cottons with long-stapled ones.

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- (iii) By co-operation of mill-owners in India, a good deal of the quantity of cotton exported outside, can be improved. The mill-owners should be requested to destroy the "fly" or blow-room waste instead of selling it to any irresponsible middlemen. The mills may lose a little by destroying this dangerous produce of their mills. But the benefit from such destruction of the product to spinners in other countries would be very great. If it is to be disposed off at all, it must be sold to responsible firms only, who use it for manufacturing goods only from it, and not for mixing and reselling in a good bale of cotton.
- (iv) By introducing a system of certificate for transport by railway of *kapas* or cotton from short-stapled centres to long-stapled ones, except by manufacturers.
- (v) By introducing a system of putting a mark at railway stations or presses at which the cotton bales are first booked or pressed. This would check the present practice of selling in Bombay cotton of one place by the name of another. For example, the Bagalkot cotton is first booked to Gadag or Hubli and rebooked from there even without delivery being taken to Bombay from Gadag or Hubli, to be sold there as Gadag or Hubli cotton, instead of Bagalkot, as the latter is known to be inferior to the former. Thus, the inferior Bagalkot cotton is sold in Bombay by the name of the superior Hubli cotton.

Rao Sahib M. L. KULKARNI called and examined.

2081. (Mr. Roberts.) For the last ten or twelve years, we have been trying to introduce new varieties of cotton. Our first idea was to introduce Broach cotton all over the *kumpla* tract, but we found that it was only suitable for certain tracts. It has been successful in some places only. For various reasons it has not been taken up by the cultivators. It requires early rainfall and fresh seed has to be brought every year from Gujarat. There is also the difficulty of marketing. People have to bring their *kapas* for sale from long distances to one auction depôt, organized by the Department. There has also been no competition among buyers. The only buyers up till now are Messrs. Tata and Sons. Even if there were five or six buyers at the auctions, the others did not bid, knowing that Messrs. Tata and Sons would pay a higher price. For these reasons, the area fell off. Broach was first introduced on the Dharwar Farm in 1904. We tried it on the Farm for three years and then we gave out seed to some members of the Dharwar District Agricultural Association in 1907 and it was also tried on cultivators' fields on small scale. The first auction sale was held in 1908-09. It was part of our district work to buy the seed, give it out to the cultivators, inspect their crops, inform them of the dates of the auctions, collect all the *kapas* and sample it. We used to take 100 *tolas* of *kapas* from each *docra*, hand-gin it, and class the *kapas* according to the ginning percentage. Later on the samples were machine ginned. The biggest quantity sold by the Department was in 1913-14, when it was about 900 *nagas*. In addition to that, a lot of *kapas* was sold by the cultivators direct to the merchants at Hubli, Dharwar and other places. The rate for the first class Broach in that year was Rs. 190 when the local *kumpla* was selling at Rs. 145. The highest profit was Rs. 40,595 in 1913-14, which is, of course, on the supposition that the yield of Broach was equal to that of *kumpla*. Since then, the profit has been going down. The sales have been going on still, but not on a very large scale. In certain tracts, it is worth while going on with Broach. I think that, in parts of Dharwar and Belgaum, there are about 60,000 to 60,000 acres suitable for Broach cotton, provided there are facilities for disposing of the produce in the nearest markets. The auctions should be held on different dates. The quantity sold at the auctions fell for various reasons. In the first place, there was difficulty in obtaining seed from Surat, which was very costly. Then people had to come long distances for seed. In 1914-15, there was not sufficient early rainfall for sowing the seed in time, and also there was a big fall in prices. Broach cotton ought to be sown at the beginning of July; if sown later, there is risk of anti-monsoon rains at picking time in April and May. The difficulties in the case of Broach are rather great; it requires a great deal of organization to get seed; some fresh seed has to be brought in every year. As long as Government continues to import seed and holds auction sales, Broach cotton will continue to be grown. Otherwise it will not.

2082. As regards the improvement in *kumpla* cotton, selection work on *kumpla* cotton was first commenced in 1904. We have been selecting and endeavouring to find out whether the selected strain was superior and whether it gave a higher percentage of lint. The Cotton Supervisor took up the work of individual plant selection in 1911. Three or four years ago, we tried the selected strains on a field scale on the Dharwar Farm. Samples of the cotton grown were valued and it was found that Dharwar No. 1 was superior in yield and in the percentage of lint. It was, therefore, thought suitable for introduction in the district, and last year a small quantity of seed was given out to cultivators. In 1916, we gave out enough seed for thirty or forty acres in the Dharwar District. We also gave out some seed to the Bijapur District. Here in Dharwar, we got all the *kapas* back from the cultivators; we sent our own men to supervise the picking of the *kapas* and brought it to the farm. We got it ginned. The lint was sold and the money given to the cultivators. We bought all the seed back. It was about 8,000 lbs. and was ready for distribution. That seed has been sold to the co-operative seed societies. It will be enough to grow about 900 acres in this District and Bijapur. We are trying to collect the produce from this seed under departmental supervision and get back as much seed as possible. I have asked my assistants to inspect the fields. We shall have to find out merchants who will buy the *kapas* at a proper higher rate. We shall have to promise to buy the seed back from them at a slightly higher price. When we pay higher prices for the seed, we sell it at a higher price to cultivators so that we do not make any loss in the bargain. We get money from Government for buying seed. The Director of Agriculture advances the money; when we sell the seed the amount is recouped. We must collect all this *kapas* in one place, bring the cultivators there, and hold auction sales and show them the difference between this and the ordinary *kapas*. We should bring buyers and show them samples; there is an appreciable difference between the *kapas* grown from our seed and that from the ordinary *bazaar* seed. It has a higher ginning percentage and uniform quality of lint. I think that the sale of the cotton grown from selected seed must be managed departmentally for some time. We must invite buyers to attend the sales. If we collect the *kapas* at one place departmentally and if we guarantee them one or two per cent more of lint, the buyers will buy the *kapas* at a higher rate; they would also sell the seed back to the Department. Instead of this arrangement, if the Department itself undertakes to buy the *kapas*, gin the same and keep the seed, it would require an experienced staff. The lint would have to be disposed off every day because it would be risky to keep it long as the prices would be fluctuating. The crop from selected seed is doing better this year than the ordinary *kumpla* variety in several places in Dharwar and Bijapur Districts. Next year's area will depend upon the seed we can collect and distribute this year. We want

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to distribute it as far as possible in five or six villages only, so that it would be convenient for inspection, etc. That would mean about 20,000 acres. If we can get all the *kapas* back of this year's crop and get it ginned the seed will be sufficient for that area, but it depends on the actual seed we get.

2083. We could spread the seed of the selected variety very rapidly through proper organization. I consider that the Agricultural Department is much better qualified to handle these sales in the early stages than the Co-operative Department. Co-operative societies entrust much of the responsible work to their clerks who are paid only Rs. 15 or 20 a month; and for the classification work, they are dependent on the Agricultural Overseer. If the grading and classification work were left to the members, they would not find time to do it. There have been complaints about weighments; some of the people who brought their *kapas* to the co-operative sale society, had weighed it in their own houses. They were not satisfied with the Society's weighments; so they took it back and sold through a *dalal*. Enquiries were made by the organizer who said that there ought to be greater check on weighments. I consider, therefore, that the Agricultural Department could manage things better, with its trained and qualified subordinate staff under a responsible officer. There must be some expert staff to do this kind of work. Co-operation at present means that everything is left to one man who takes an interest in the work. Other members do not do any work. I do not consider the co-operative organization to be a good one for pushing on new varieties, as it requires special technical knowledge to distinguish different varieties, etc., in standing crops. I would therefore suggest that all the seed we grow on the farm must be given to registered seed growers and that all their crops must be inspected by the expert staff and the produce then collected at one place for sale. The Agricultural Department must then arrange sales and get the cotton ginned under departmental supervision and buy the seed back. The pure seed thus obtained might be given over to the co-operative seed societies for distribution among members and for sale of the produce through sale societies, etc., without any restriction of getting back seed, etc., for distribution by the Agricultural Department for further multiplying pure seeds. Co-operative societies are not a suitable organization for maintaining purity of seed, etc., as such work requires technical knowledge and careful supervision of fields of seed-growers, which the societies, as at present, are not able to do.

2084. The improved *kumpla* is suitable for all parts of my Circle. However, I think that owing to climatic conditions, it might deteriorate in the Bijapur District and would not remain there of the same quality as in Dharwar. We would have to supply fresh seed from Dharwar at intervals. It would be an improvement on the local cotton.

2085. As to Cambodia, it was found that it had a higher percentage of lint on the Gadag farm, and so it was given out on a small scale to villages near Gadag. At the auction sales, the price of Cambodia went very high; Rs. 150 was the price for Dharwar American, while Rs. 220 was paid for Cambodia. There was a very great demand for Cambodia cotton seed and we bought all the seed back and gave it to the cultivators. Unfortunately, the conditions in the following year were quite different and the crop failed altogether. Many people were put to loss by growing Cambodia in that year. So, in the third year, we told the people that we did not guarantee the yield of Cambodia as the experiments were not complete. However some seed was given for trial to cultivators at their own risk. They tried it on a small scale in that year. They arrived at a conclusion that a year of very heavy rainfall was not suitable for Cambodia and also that it must be sown a little earlier than Dharwar American. Holkot and Kurtkot in the Gadag Taluka and Sudi in the Ron Taluka are the best villages for Cambodia. There the people have entirely taken to it and three quarters of the area at Sudi is now under Cambodia cotton. The total area in the District is not more than 3,000 acres. That is a small thing. Whether it is going to extend or not, depends on the auction sales. As long as we hold these auction sales, the cultivation of Cambodia will continue, otherwise it will not.

2086. It would be a wiser policy to concentrate on the Upland type of Dharwar American cotton. The two types of Dharwar American, viz., New Orleans and Upland, have been separated. The Upland type is less liable to leaf curl than the New Orleans and gives a better yield, and has also a higher ginning percentage. The staple of the two types is about the same. Pure Upland seed was given out last year to two members of the Agricultural Association at Kurtkot. We have again distributed it on a small scale at Hulkoti and Kurtkot villages. We have given out seed sufficient for about thirty acres. If this variety proves successful it can take the place of the existing mixed variety of Dharwar American cotton.

2087. Selection in *kumpla* and Dharwar American are the two most important lines of work. They are two very sound cottons. Cambodia and Broach are rather uncertain and require special conditions for success.

2088. Field tests have been made on the Dharwar Farm on plots from ten *guntas* to one acre in extent. This year the whole of the Dharwar farm has been sown with selected *kumpla* cotton. I do not think that it is necessary to make any more field tests. The selected variety never gives less than the ordinary *kumpla*. It has always given a heavier yield on the Dharwar farm. No more trial regarding yield seems necessary. The lowest yield of the improved variety on the Dharwar farm has been fifty pounds per acre more than that of the ordinary variety.

2089. (Mr. Wadia.) If mixed *kapas* is brought to a ginning factory, it can be very readily recognized as the two types of cottons, viz., *kumpla* and Dharwar American, are quite different from each other. After the *kapas* has been ginned, it is difficult to distinguish the lint of the two varieties. Even one per cent of Dharwar American *kapas* could be distinguished in *kumpla kapas* in bulk and vice versa as the seeds of the two are quite different. Certification of purity must begin at the ginning factories. The certificate would be valuable to check approximately the percentage of mixture of the two varieties, viz., Dharwar American and *kumpla*. It is impossible to detect a mixture of *kumpla* with *kumpla*.

2090. Some of the factory-owners purchase "fly" and make a lot of money by mixing it with *kapas* before ginning. The remedy, I would suggest, would be that "fly" should be sold to licensed buyers only. It should be given only to such persons who would make *bona fide* use of it. I think all these evils would be overcome by a system of licensing ginners. If a merchant or a ginner were found adulterating cotton with fly or different varieties, his license should be withdrawn.

2091. I had to take fourteen lbs. as tare at our auctions, otherwise merchants would not buy the *kapas*. We did not want to take so much tare, as the weight of the tare was only eight to ten lbs. But it is the local custom to deduct fourteen lbs. and we had to follow that custom. All that extra weight of tare goes to the buyer. The *dalals* cheat the cultivators with regard to rates. If he is a *dalal* as well as a petty merchant, i.e., if he himself buys *kapas*, gins it and sells the lint to bigger merchants, he would intentionally retain with him that cultivators' *kapas* unsold for one or two weeks or even more, and then pay the cultivator the lowest price prevailing during that period. He would say that the *kapas* was sold on such and such a date during

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the period when the price was low. But in reality he sells it on the day when the price is at its highest. He keeps the difference for himself. There ought to be licensed *dalals*.

2092. (Mr. Hodgkinson.) Some of the cultivators intentionally damp their *kapas*. They sprinkle a little water on the ground and keep the *kapas* over night there until morning. They even sprinkle a little water in the middle while filling in the *docras*, and also damp the gunnies before filling the cotton into them. In this way, the *kapas* absorbs up to two or three per cent of moisture. They also put stones inside. At the Broach auction sales, a lot of stones were found in the middle of some *docras*. The weight of a *docra* is usually twelve to thirteen maunds but in some cases the *docras* weighed as much as sixteen maunds. I suspected the extraordinary heavy weights and got them opened, and found stones in the middle. The excuse was that the *kapas* had fallen, owing to wind, on the ground in the field before picking and the stones came in along the *kapas* while picking. The intentional putting of stones or earth is due to the fact that the *kapas* comes in *docras* and not loose. Such fraud is usually detected by the merchants who put their hands right into the *docras*.

2093. The petty dealers who buy *kapas* generally gin it and sell it to the merchants. Some crushed seed is intentionally allowed to pass with the lint while ginning. The gins are so adjusted that a systematic mixture of crushed seed goes on with the lint while ginning. The gins are adjusted according to the wishes of the man whose cotton is being ginned. I have seen the cotton being damped with a spray before pressing in one of the pressing factories at Hubli.

2094. I do not believe in daily picking of *kapas* from the field for cleanliness. I am in favour of the present practice with slight modifications. The *kapas* from a crop is usually picked in three or four pickings. The labourers are paid in kind in certain proportion of the quantity picked. If they picked only a very small quantity, they would not get enough wages. They are usually paid one-eighth of the quantity picked. The pickings take place at intervals of ten or twelve days and all the pickings are over in a month and a-half. If the labourers were to pick every day, they would only pick a very small quantity, and if one-eighth of that were given them, the quantity obtained as wages in kind, would be very little and no labourers could be got to do the work. The highest quantity picked by a woman in a day is between forty to fifty pounds, the picking being done at intervals of ten or twelve days. If the cotton were picked three or four times instead of picking once during a particular period as is done now, the labourer would only pick about ten or twelve pounds at a time, and one-eighth of which, paid as wages, in kind would be too little. They would thus ask wages in coin which would be very heavy for the quantity of work done. The usual custom is to pick the *kapas* and to heap it in the middle of the field of the ground until the end of the day. If the *kapas* were heaped on a cloth or put direct into a cart, it would improve the quality. If the picking were done early in the morning and finished before 11 A.M., it would also improve the quality as the leaf would not be so dry as would easily be adhered to the *kapas* when being picked.

2095. (Mr. Roberts.) Experiments have been made on the farm in regard to good sowing and it has been found very effective. People have not yet taken to it, though they know its advantages. Their method of sowing results in about twenty to thirty per cent of their fields being left blank and even for that sort of uneven sowing, they use more seed than we do. They do not fill in the blanks later. Cotton on this side is usually sown with a two or three coultered drill. Cotton seed is not put directly into the seed bowl as is done in the case of *juar* or wheat. Sowing of cotton seed is done through tubes attached by thin ropes to the tines of the drill about four feet behind the same. As many women are required to sow the seed as there are tubes attached to the tines of the drill. The women sowing the seeds hold the tube in position, with one hand and sow the seeds with the other. When the seed in her hand is finished, she has to take a fresh quantity from the stock which is tied to her waist, in a piece of cloth. Whilst she is doing so, the bullocks walk a few paces and consequently certain lengths in rows remain unsown. The blanks thus caused sometimes amount to twenty to thirty per cent of the total area sown. To avoid these blanks, we are trying to introduce the improved two coultered Gujarat cotton drill, in which cotton seed is put direct into the seed bowl. The man or woman, who is feeding the bowl, has both hands free so that, before the seed in one hand is finished, the other hand is ready with fresh seed. In the fields sown with the Gujarat drill, there are practically no blanks. We have found by experiments in Kurtkot, that ploughing by the Sabul plough for cotton crop gives better results than the local plough; but the people have not taken to it very much. They are, however, using deep going ploughs for removing the *hariali* (*Cynodon dactylon*) grass. Improved implements worth about Rs. 38,000 were sold in the Southern Division during the last year.

ANNEXURE.

Statement showing the progress of the auction sales of Broach cotton at Dharwar from the year 1910 to 1917.

Serial No.	Year.	Broach cotton sold in the auction sale in <i>nagas</i> (1,344 lbs.).	Probable area on which this cotton was grown.	Rate on the date of auction sale per <i>naga</i> (1344 lbs.)			Actual total amount realised by the sale of Broach cotton.	Amount for the same quantity of cotton at rates for the local varieties.	Amounts of extra profit to cultivators.
				Highest grade of Broach.	Lowest grade of Broach.	Local <i>kumpla</i> .			
			Acres.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	1909-10	654	2,616	190	163	145	1,11,455	94,830	16,625
2	1910-11	171	684	220	191	153	37,069	26,163	10,906
3	1911-12	430	1,720	203	173	146	81,545	75,680	5,865
4	1912-13	595	2,380	200	161	138	1,09,393	82,110	27,283
5	1913-14	865	3,460	190	155	129	1,50,180	1,09,585	40,595
6	1914-15	315	1,260	150	124	107	41,460	33,705	7,755
7	1915-16	116	928	190	165	150	19,782	17,400	2,382
8	1916-17	265	1,060	257	214	185	63,559	49,025	14,534

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Mr. S. V. DESAI.

Mr. S. V. DESAI, Inamdar, Dharwar.

EXAMINED AT DHARWAR, FEBRUARY 19TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

2096. (10) **Experience.**—I am a Vatandar Desai of Dharwar, the headquarters of the district, and I am residing there since my birth. For the last 25 years and more I have been in touch with a number of cotton cultivators round about this place, most of whom are my tenants. I have also maintained on my own account an agricultural farm and every year I grow cotton on an area varying from 20 to 25 acres of black soil.

2097. (11) **Varieties.**—*Kumpla*, *kumpla* cross and Broach are the varieties of *deshi* long staple cotton grown on my land.

2098. (12) **Size of holdings.**—The average size of a holding in which cotton is grown, is twenty acres. From 33 to 50 per cent. of the holding is ordinarily under cotton.

2099. (13) **Yields and profits and comparative returns.**—The average yield per acre in ordinary black soil area not much infested with *hariali*, when not manured, is 300 lbs. of seed cotton for all the varieties mentioned in paragraph 2086 above. The net profit per acre is about Rs. 20 for *kumpla*, Rs. 22 for *kumpla* cross and Rs. 25 for Broach. I must, however, mention that I have calculated the profits from prices current two years ago; because, in my opinion, the prices obtained last year and more so, the prices expected this year, are abnormal and cannot be safely taken as a permanent basis. As I have no first-hand experience of *deshi* short staple cotton, I am not in a position to compare the prices of the varieties.

(2) The average yield per acre of other *deshi* crops, viz., *juar* and wheat is 500 lbs. and 300 lbs. giving a net profit of Rs. 10 and 12 respectively.

(3) The average yield per acre of the Dharwar American cotton is 350 lbs. and the net profit therefrom is about Rs. 22 per acre. Latterly Cambodia cotton is being introduced in the Gadag and Ron Talukas in this district. The average yield of this variety is 450 lbs. and the average net profit is Rs. 30.

2100. (14) **Rotations and manures.**—Generally no manure is applied to the cotton crop. Cotton is generally grown in rotation with *juar* which receives farm-yard manure.

2101. (15) **Conditions affecting increase in area.**—It is only the high prices that are obtained from the cotton that tends to increase the area under its cultivation. As far as my experience of professional agriculturists goes, there is a natural reluctance on their part to increase the area under cotton. Their opinion in this respect is—and I think that they are not far from wrong therein—that continuous cotton growing exhausts the soil. But unfortunately as the average cultivator is very poor, he cannot resist the temptation of filling his pockets at least for some time as the demands of the *sahu ars* and the Government are very pressing. In this part of the country, cotton is nowhere grown under irrigation. Climatic conditions do to a certain extent affect the area under cultivation but they cannot be anticipated. The length of the ginning season and supply of labour do not appreciably affect the area.

2102. (16) **Suitability of existing varieties.**—This district is particularly situated for the *kumpla*, *k. mpla* cross and Broach cottons. The cultivation of *umpla* cross and Broach varieties should in my opinion be extended and in this direction efforts are being made by the Agricultural Department and the District Agricultural Association. But more systematic and better organised efforts should be made.

2103. (17) **Prevention of mixing of different varieties.**—There is not much danger of the *deshi* long staple being mixed with short staple as the latter is not grown in this district. I understand however, that there is a practice in the Hubli market of importing, *deshi* short staple purposely with a view of mixing, with long staple. This practice should be discouraged. *Deshi* long staple is being mixed with exotic varieties though not intentionally in the field. In the factories, however, systematic mixture is to some extent carried on. To prevent the mixture in the fields, as it is not intentional, the only remedy is to supply the cultivators with pure seed. I am not just now in a position to say definitely what step should be taken to prevent mixture in factories, as I have not carefully considered the question.

2104. (18) **Uses of seed and seed selection.**—In this district, there are only three ways of disposing of the seed; firstly, for the purpose of cultivation, secondly, for feeding the cattle, and thirdly, for selling in the market for the purpose of extracting oil, etc. The actual cultivator does not, as a rule, select his seed. For the last few years, the Agricultural Department and the Dharwar District Agricultural Association have undertaken to distribute pure seed to the members of the Association, who bring their cotton to the Association, which in its turn gins the cotton and distributes the seed amongst a larger number of cultivators. In course of time if this practice is kept up, the Association hopes to start seed-depôts at important places in the district which are bound to give entire satisfaction to the cultivators. The seed, specially selected for sowing, is not generally hand-ginned.

(c) Exotic cotton.

2105. (21) **Varieties.**—Dharwar American and, very recently, Cambodia in parts of Gadag and Ron Talukas are the varieties of which I have experience.

2106. (22) **Size of holdings.**—The average size of holdings, in which the above exotic varieties are grown, is fifty acres and nearly two-thirds of the area is under cotton.

2107. (24) **Rotations and manures.**—In the greater part of the area in which Dharwar American and Cambodia are grown, cotton is grown in successive years from ten to twenty years. Farm-yard manure is usually supplied every year to such areas.

2108. (26) **Suitability of existing varieties.**—The only efforts that are needed are towards extending the cultivation of Cambodia more systematically.

2109. (28) **Importation of seed.**—It is not, in my opinion, necessary to be importing every year seed from America as the seed once acclimatized here will yield good results if proper care is taken in the selection of pure and healthy seeds. The Egyptian variety is not grown in this district.

2110. **General recommendations.**—(a) **Research.**—With regard to the research in the improvement of plant, I am of opinion that the real wants of the cultivators and the mill-owners should be properly ascertained and the lines of research settled accordingly. For this purpose, a greater number of specialists should be

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employed, who should thoroughly study the existing circumstances and be given sufficient facilities and encouragement in their work. Any improvement effected should, however, be given a thorough trial before it is recommended to the cultivators.

(b) **Agricultural education.**—I would also urge the extension of agricultural education by the starting of the agricultural classes in principal centres. This question, however, is closely connected with the extension of compulsory primary education without which the instruction imparted in the agricultural classes would not filter to the mass of the real cultivators.

(c) **Supply of good seed.**—The question of establishing seed farms would no doubt be highly beneficial. But until that is done, the practice followed by our District Agricultural Association of asking its members to grow crops for the purposes of the seed may be extended and encouraged. And an Agricultural Overseer for each cotton growing *taluka* should be maintained in charge of a seed-depôt wherefrom the cultivators will obtain their supply of seed. In this respect I might give it as my firm opinion that the cultivator though illiterate is sharp enough to realize the benefits of really good seed for which he will certainly go in even at a little bit higher cost. The regulation of buying agencies and ginning factories is an intricate problem on which, not having made a careful study, I am not prepared just now to offer any opinion.

Mr. S. V. DESAI, called and examined.

2111. (President.) Unless better prices are offered for long-staple cotton, there may be a decline in its cultivation. I do not think that the cultivators are particularly keen about cotton as a rule. The reason is that it exhausts the soil. On account of the present high prices, the cultivators are, however, going in for cotton. To prevent admixture in the field, I would suggest Government farms distributing selected seed with the aid of Agricultural Associations. That is, the Agricultural Association would grow the seed through its members or other selected growers who are not members. There would be a central depôt from which ordinary cultivators would get their seed, i.e., both members of the Agricultural Associations and cultivators who were not members. That would solve the problem so far as it affects mixing in the field. I cannot suggest any remedy for stopping mixing in the ginneries and presses. I am in favour of a very large increase of the Agricultural Department and think that the number of seed farms and experimental farms should be largely increased.

2112. I grow Broach, *kumpla* cross, ordinary *kumpla* and selected *kumpla* on my land. If Broach is well cultivated, well manured and sown in proper soil it gives much profit. The soil must also suit where it should be grown. *Kumpla* cross is a little better than the ordinary *kumpla*.

Mr. CHANBASAPA SHIDRAMAPA SHIRAHATTI, Cotton Merchant, Hubli.

EXAMINED AT HUBLI, FEBRUARY 21ST, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

2113. (10) **Experience.**—I am an inhabitant of Dharwar District and I have been connected with the cotton trade as commission agent and purchaser for the last twenty years, and have also my agricultural establishment since about twenty years. I am growing cotton myself and am in touch with cultivators since then.

2114. (11) **Varieties.**—*Kumpla* cotton is grown in three-fourths of the cotton area in the district.

2115. (12) **Size of holdings.**—I divide the cotton area into two portions: "Gadinad" (i.e., Dharwar, Hubli, Bankapur, Ranabennur and Karajgi) and "Yerinad" (i.e., Navalgund, Ron, Gadag and Nargund). In the former, the average holding is from sixteen to twenty acres and in the latter it is from thirty-two to forty acres. Fifty per cent. of the area in Gadinad and about 75 per cent. of the area in Yerinad is under cotton cultivation. In the cotton area of Yerinad, there are examples of growing cotton every year without any rotation. But manure is applied almost every year.

2116. (13) **Yields and profits and comparative returns.**—In Gadinad, we get on an average 336 lbs., worth Rs. 32 at 128 per *nag* average price of seed cotton per acre, and in Yerinad we get 224 lbs. worth Rs. 22 per acre. In the former we can have Rs. 15 to Rs. 18 per acre and in the latter about Rs. 10 to Rs. 12 per acre profit. There is no short-staple cotton for comparison. Other food crops like *juar* and wheat yield four to six rupees less per acre than cotton. Exotic cotton, viz., Dharwar-American and Cambodia, may be said to give equally good yield per acre as that of *kumpla*. But both these having two to three per cent. more ginning percentage might give Rs. 2-8-0 to Rs. 5 per acre more than *kumpla*. In the case of Cambodia, the profit may go as high as Rs. 15 to Rs. 20 per acre more.

2117. (14) **Rotations and manures.**—There are two kinds of rotations: (1) *juar* and cotton, (2) *juar*, wheat and cotton. The latter practice is good. Manure is given only to *juar* and not to cotton. But in Yerinad, where Dharwar-American is grown, manure is applied to cotton. Only cattle manure is used.

2118. (15) **Conditions affecting increase in area.**—No increase in the area under cotton can be expected. It has already reached its maximum limit. But to some extent the area can be increased in Ranabennur and Haveri Talukas under irrigation. If proper rotation and keeping land without *hariali* be done, the yield might increase.

2119. (16) **Suitability of existing varieties.**—In my opinion, *kumpla* cotton is the right variety for our district. It only wants selection and maintenance of purity. The Broach cotton introduced by the Agricultural Department is of superior type, but, as the rumour goes, it impoverishes the land to a great extent. Cambodia seems to have a better reputation than Broach.

2120. (17) **Prevention of mixing of different varieties.**—There is no other way to prevent mixing than strict legislation. In the Factory Act we should have regulations for not allowing to gin and press mixed *kaps* and cotton. The name of the factory should be stamped on each pressed bale to detect adulteration.

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Mr. CHANBASAPA SHIDRAMAPA SHIRAHATTI.

[Continued.]

2121. (18) **Uses of seed and seed selection.**—Cotton seed is used in India as cattle food. About 75 per cent. of seed is exported. No seed selection is observed and it is not hand-ginned. Before the advent of ginning factories cotton was hand-ginned.

2122. (19) **General economic conditions.**—The present condition of land is very bad owing to its being affected by *hariali* and having the holdings not in one place. All the operations of the field should be conducted on co-operative principles, for example, the work of ploughing, harrowing, harvesting, etc., should be done by the help of co-operation. If this method be adopted, the purity of cotton might remain intact and the yield would increase to a great extent. The cultivation charges would be comparatively less by the introduction of proper machinery, which would solve the problem of scarcity of labour and high wages. If the land is made free from *hariali* by the help of Government and if good rotations and cultivation are practised, there is every possibility of improving the economic condition. Seed depôts in suitable centres of *talukas* should be established under the supervision of agricultural experts. Each *taluka* should have two officers to look after the seed depôts and for field inspection. If mixture is found, they should advise the uprooting of the mixed plants and suggest other important facts for keeping cotton quite pure.

(c) *Exotic Cotton.*

2123. (21) **Varieties.**—Dharwar-American and Cambodia are the varieties grown.

2124. (22) **Size of holdings.**—Each holding in case of Dharwar-American is from 32 to 40 acres. Cambodia is a newly introduced variety. 75 per cent. of the holding is under cotton every year.

2125. (23) **Comparative returns.**—The average yield per acre comes to about 336 lbs. of *kapas* at 124 rupees per *nag* on an average, giving a profit of Rs. 15 to Rs. 18 per acre on an average. Kundgol, Saunsi, Gudgeri, Laxmeshwar side and Hubli, Ron and Gadag Talukas are the centres of Dharwar-American cotton. This cotton is better in class and ginning percentage. It gives about two to three per cent. more yield of cotton. Hence it might give Rs. 3 to Rs. 5 more profit than *kumpla* when the rate of Dharwar-American is high. Other food crops of *juar* and wheat give Rs. 4 to Rs. 6 less profit than this cotton.

2126. (24) **Rotations and manures.**—Wheat cotton, *rabi*, *juar* are the rotations followed. Cotton is manured generally. Cattle manure is used.

2127. (25) **Conditions affecting increase in area.**—The abovementioned locality is only suitable for Dharwar-American cotton. It has already reached its maximum.

2128. (26) **Suitability of existing varieties.**—Dharwar-American cotton seems to be suitable. Cambodia introduced by the Agricultural Department is no doubt better than Dharwar-American. But it cannot totally replace Dharwar-American. The only way that seems to me is that rigid seed selection and opening selected seed depôts in the various centres should be brought in force.

2129. (28) **Importation of seed.**—It is learnt that exotic seed, if sown without acclimatisation, does not give satisfactory yield. If it be so, Government seed farms should be opened in suitable localities and the acclimatised seeds should be distributed. Moreover, seed selection should always be practised.

II.—COMMERCIAL ASPECT.

2130. (30) **Local trade customs.**—*Dalals* are middlemen for disposing of cultivators' produce. They have their own establishments in Dharwar, Hubli and Gadag markets. Besides these, there are also petty village middlemen who transact business between *dalals* and cultivators. The following are the trade customs prevailing on this side: (1) whole fields are sold even before the cotton is ripe, (2) the cotton grower sometimes fixes the price per *nag* before the crop is cut and takes away the price thus settled, (3) he sometimes gives interest in kind, i.e., one or two lbs. of seed cotton per rupee he takes as loan, (4) by exorbitant rate of interest he takes loans on security of *kapas*. Rates are fixed on 1,344 lbs. of *kapas* and 336 lbs. of cotton.

2131. (31) **Standardization of commercial names.**—Bankapur, Savanur side, Savadatti side, Navalgund side, Dharwar side are commercial names of cotton in this district. If the cotton of each side were separately ginned and pressed, it would have a good reputation.

2132. (32) **Buying agencies.**—At present neither the ryot nor the *dawal* does any kind of mixing. Very few, say, one or two out of hundred, mix dirt or earth in *docras*. The chief mischief-mongers are middle buyers, who buy *kapas*, gin it and press and sell the same to millowners. They actually mix "fly" cotton seed and short-staple cotton which is generally available at low rates. The only possibility that now seems to me is to do away with these middle buyers. Every millowner should depute his own men for purchasing the cotton. Now, for example, Messrs. Tata & Sons, Sir Thackersey Mulji, Ahmedabad Mills, and many others are sending every year their own agents for purchases and thus they get pure quality and better staple cotton without any adulteration. They always pay high prices for better quality. This will do for Indian millowners. In case of foreign millowners, I think they should have their purchases through the local co-operative sale societies. They should supply capital to these societies and ask them to purchase the quantity they require. A special man of the foreign mill may be on the spot in each society to look after the transaction of the purchases and classification.

Mr. CHANBASAPA SHIDRAMAPA SHIRAHATTI called and examined.

2133. (President.) I am a *dalai*, that is a dealer in cotton and I buy cotton from ryots direct. We generally give advances on condition that the ryots should bring their *kapas* to us and sell it through us on commission. We find buyers for them. The prices here are fixed on the basis of Bombay quotations. We get back the advances from the cultivators after we have sold their *kapas* when we deduct it from the proceeds. We charge interest which is generally at the rate of twelve to eighteen per cent. per annum. I do not find that the cultivators damp their cotton. It is pretty clean when it comes to us. We sell it again to the ginneries. All the selling is done in the market here. I have suggested in my written evidence that in order to restrict mixing and adulteration, legislation is necessary to control the ginneries. In Hubli town, the practice of mixing is very common, "fly" and other inferior cotton being imported from Bombay and other places in fully pressed bales as well as in loose *docras* for this purpose. This has spoilt the name of our cotton in Bombay. It seems to me that something should be done to prevent these practices. To my mind, the only way of doing this is to stop the importation of "fly" and inferior cotton from places where the "fly" is made or the lower quality of cotton is grown. The name of the pressing factory should be stamped on each bale.

2134. The cultivation here is very bad on account of the *hariali* grass. I think that the cultivation might be improved. Steam ploughing should be developed. It is an efficient method, and it does not matter

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whether it is done by Government, by co-operation or by a company. I think that co-operation might also help in removing the abuses connected with marketing.

2135. (Mr. Wadia.) Mixing and adulteration are carried on both in the ginning and pressing factories. I would only have the name of the pressing factory stamped on the bale. The number of the bale would be recorded in the press factory and that would enable the ginner to be traced. Every year about 10,000 to 15,000 bales of Khandesh cotton come into Hubli and Gadag as well as 3,000 to 4,000 bales of "fly" and other waste. The total production of the Hubli is 60,000 to 70,000 bales and that of Gadag is 50,000 to 60,000 bales. The total production of the two is therefore 120,000. That means that about 20,000 bales of "fly" and short staple are mixed in 120,000 bales. We also get about 15,000 bales of cotton from Bijapur, Bellary, Bhagalpur, etc. That makes a total of 35,000 bales in all. So that our mixing amounts to about 25 per cent. This year (1917), the total pressing at Hubli is about 80,000 bales. It was formerly estimated at about 60,000. But as cotton is imported from Bijapur and other places, the actual pressing comes to nearly 80,000 bales for Hubli alone. We get 20,000 bales from outside. We get loose cotton even from Gadag. I would suggest that millowners should have their buying agencies to buy pure cotton.

2136. (Mr. Roberts.) Our ginning charge is Rs. 9 per *nag* or Rs. 23 per *khandi*. The pressing charge is Rs. 8 per bale. The total actual cost of ginning used to be Rs. 4 or Rs. 5 per *nag* but now it comes to Rs. 6. The actual cost of pressing is about Rs. 5 but we charge Rs. 8.

2137. I put in a statement in regard to the work of the cotton sale society in Chanaia Handigol of which I am Secretary.

ANNEXURE.

Statement showing work done by the Hubli Group Agricultural Co-operative Purchase and Sale Society, Limited, Hubli.

	Rs.
Nominal capital	5,000
Subscribed capital	955
Number of members 101, of whom 75 are pure agriculturists, 20 merchants and agriculturists and 6 merchants.	
The Society has done the following work since its establishment:—	

	PURCHASE.		SOLD.		PROFIT.
	lbs.	Value.	lbs.	Value.	
		Rs. A. P.		Rs. A. P.	Rs. A. P.
Selected <i>kumpla</i> cotton seed	228,200	6,440 2 9	228,200	7,364 11 4	924 8 7
Selected sawgin American cotton seed	7,802	210 10 7	7,802	275 3 4	84 8 9
Selected Broach seed	1,070	64 4 10	1,070	65 4 10	1 0 0
Profits secured from above					1,010 1 4
<i>Kapas</i> (288,733 lbs.) and cotton (3,376 lbs.) sold on commission from buyers at Rs. 0-12-0 per 1,344 lbs. and Rs. 0-8-0 per 344 lbs.					149 14 6
Commission from ryots on cotton Rs. 4-6-0 and <i>kapas</i> Rs. 121-8-3					5 0 3
Commission secured by insurance					125 15 0
Received interest					15 0 0
					17 0 0
					1,322 15 1
Loss expenditure since establishment					768 12 9
					PROFITS
					554 2 4
Received entrance fee					101 0 0
					NET PROFIT SINCE ITS ESTABLISHMENT
					655 2 4

Mr. NARAYAN RAMA RAO HUILGOLKER, Landholder, Gadag.

EXAMINED AT GADAG, FEBRUARY 22ND, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(g) "Deshi" long-staple cotton.

2138. (10) **Experience.**—I am a native of Gadag in the Dharwar District and have been in touch with cultivation and cultivators for the last twenty years.

2139. (11) **Varieties.**—There are two varieties of *deshi* long staple cotton in our district, namely, "Dharwar-American" and *kumpla*.

2140. (12) **Size of holdings.**—The average size of holdings in which cotton is grown is about 25 acres. The proportion of holding of cotton varies with the fluctuations of the market. The proportion of holding of cotton is nearly three-fourths in the cotton-growing districts provided the price of cotton is normal.

2141. (13) **Yields and profits and comparative returns.**—The average yield of *deshi* long staple cotton per acre is about 100 lbs. and the net income per acre will be about Rs. 8 in normal years and when compared with other crops the income of cotton is nearly double.

2142. (14) **Rotations and manures.**—*Juar*, *kharij* or *rabi*, is the principal rotation for all sorts of cotton. *Rala*, *tila*, wheat and gram are also rotated with cotton. The majority of cultivators do not manure their

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[Continued.]

lands for want of manure and wherever it is used it is chiefly farm-yard manure. Night-soil is used rarely even in some municipal towns. No green manure is used.

2143. (17) **Prevention of mixing of different varieties.**—Establishment of cotton sale and seed societies will to a great extent prevent the mixing up of cotton in the field by the ryot and regular inspection of factories in the cotton season will put a stop to mixing up in factories to a great extent.

2144. (18) **Uses of seed and seed selection.**—Only a small quantity of cotton seed is used as cattle food and the rest is exported. Till the establishment of experimental farms by Government, no selection of seeds was practised by the ryot, due to his ignorance, but of late Government have established seed societies which sell selected and tried seeds in various Government farms to the ryot. Since the introduction of power gins, the practice of sowing hand-ginned seed is not existing.

(c) *Exotic cotton.*

2145. (21) **Varieties.**—The only exotic cotton, that is grown in our district, is Cambodia cotton. That too is grown in a very limited area and only of late.

2146. (23) **Comparative returns.**—The average yield per acre of Cambodia cotton is about 250 lbs. because the land, in which it is grown, is good. When we compare the yield of Cambodia cotton to that of Dharwar-American and *kumpla* it is less; but the price it fetches is one and a half times greater than Dharwar-American and *kumpla*. I have already mentioned above that the yield of *deshi* long-staple cotton is 100 lbs. and that of Cambodia is 250 lbs. but this may look rather irrelevant. What I mean to say is this: if the Cambodia cotton is grown in the average soil in which the *deshi* long-staple cotton is grown, the yield of Cambodia cotton will be much less. The Cambodia cotton gives a ginning outturn of 39 per cent. while the others give 29 per cent. and 25 per cent. respectively. The income of the Cambodia cotton when compared with those of other *deshi* crops is more than double.

II.—COMMERCIAL ASPECT.

2147. (30) **Local trade customs.**—The cotton is brought to the marketing centre in *docras* to an agent. It is not possible to sell them directly without the aid of these *dalals*, who supply the cultivator with godowns. Generally these *dalals* do advance some money to the cultivators but there is no system of future buying or contracts. The commission agent or the *dalal* charges the cultivator one rupee per *nag*, i.e., 48 maunds of seed cotton, and eight annas per *nag* (twelve maunds) of lint. He charges one rupee per *nag* of seed cotton and twelve annas per *nag* of lint to the purchaser.

2148. (31) **Standardization of commercial names.**—The commercial names of the various grades of cotton in vogue are Dharwar-American, *kumpla* and Cambodia, but the *kumpla* is again classified into two names—*gin* and *paivani*. This cotton is imported from Gadag, Navalgund and Ron Talukas and Bijapur and Bellary Districts and a portion of the Nizam's dominions.

Mr. NARAYAN RAMA RAO HUILGOLKER called and examined.

2149. (President.) I am the Secretary of the Cotton Sale Society here. The cultivators receive money to pay the Government assessment and to meet sundry expenses from the credit society in the village. Those cultivators who receive money from the credit society are bound to bring in their cotton to the Sale Society and to sell it through the Society. When advancing the money to the cultivators, the Society takes a written bond that they should bring in their cotton and sell it through the Society. Only the members of the credit society are members of the Sale Society and no others. The cotton is brought to the Sale Society in carts and is stored in the Society's godowns. If the cultivator wishes to sell his *kapas* the same day it is sold in his presence but if he wishes to keep it for some time, it is kept as long as he desires. If he permits the Society to sell his goods in his absence, they are disposed of accordingly. If he writes to the Society that his goods should be sold in his presence, the Society waits till he is present. The *dalal* or agent of the Society has to bring an honest purchaser and to strike the bargain in the presence of the Honorary Secretary and the cultivator or only the Honorary Secretary or a member of the Managing Committee of the Sale Society. When a bargain is struck, weighment is made in the presence of the Honorary Secretary according to the system of the market. The Secretary does not make the bargain. His presence is necessary. It is the duty of the *dalal* to strike the bargain in the presence of the Secretary. The weighment is made in the presence of the Honorary Secretary or the owner of the cotton or one of the members of the Managing Committee. The *dalal* is responsible for the money from the purchaser. He has to collect the money and keep it with him and when the Society's clerk goes to the *dalal*, the latter pays him and the money is brought to the Society and then it is paid to the cultivator. If the cultivator wants the money on the very day on which his *kapas* is disposed of, a deduction of annas four per hundred rupees is made from the price paid to him, as the system of this market is that the purchasers who buy cotton do not pay the money on the day of purchase but only after two, three, four or sometimes eight days. The Society is therefore not in a position to pay the cultivator on the same day as it has not got the funds. It has to borrow the money from its agent if it is wanted the same day. This four annas counts as interest up to seven days. After three days, the cultivator receives the full amount. The maximum limit is one week. This interest is paid to the agent or *dalal* of the Society. This was the system last year. This year we are going to do away with the discount system. The *dalal* has agreed to that. The Society is going to make provision to pay the cultivators on the same day. The Society cannot sell at a higher rate than the market rate or at a higher rate of commission. The commission agents charge the cultivator Re. 1 per *nag* whereas the Society charges four annas per *nag*. The *dalal* is a member of the Society. He holds 25 shares. He supplies the Society with a free godown. He also supplies the weighing apparatus.

2150. The question of grading has not come up yet, but we intend to grade the cotton this year and keep the grades separate. We are going to take over the auction sales of Cambodia and to sell Dharwar-American *kumpla* separately. We shall have the cotton graded by a competent committee. We are going to take over the auction sales of Cambodia and to have auctions of Dharwar-American and *kumpla* as well. If the cultivator wishes his stuff should be sold on the same day, we will do so. It will all depend on the wishes of the cultivators whether the cotton will be sold by auction or day by day sale.

2151. (Mr. Roberts.) We used to charge the cultivator four annas per *nag* and the purchaser eight annas per *nag* last year, but, owing to the rise in prices, the rates have been increased by the merchants and we have to follow the same system. Now the purchaser is charged Re. 1 per *nag* of seed cotton and twelve

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Mr. RAMCHANDRA KRISHNA ITGI.

annas per *nag* of lint as the price of cotton has gone very high. We used to pay ten annas to the *dalal*. In the past, we had a profit of two annas per *nag* of *kapas*. Last year we sold 700 *docras* of local cotton, i.e., of Dharwar-American and *kumpla* and 1,700 of Cambodia. A *nag* is 48 maunds of 28 lbs. and there are three or four *docras* to a *nag* so that we sold about 450 *nags* of Cambodia and 200 of local cotton. The *dalal* commission which we got at the auctions of Cambodia cotton was Re. 1-8, Re. 1 from the cultivator and eight annas from the purchaser per *nag* of seed cotton. We cannot say whether for ordinary cotton sales by auction are more profitable than day by day sales as they have not been tried. We have tried auction sales in the case of Cambodia only. We are going to try this year with ordinary cotton. We cannot say whether the auction system pays better. It depends on the buyers. If there are many purchasers on the spot who raise the bids, well and good but if they do not buy at the auction sales then there is trouble. Last year we got much more for selling Cambodia than for the day by day sales of ordinary cotton.

2152. Our total expenses were very small. Our establishment charges were one clerk on Rs. 12 a month and a watchman on Rs. 9 a month and we did not pay anything for the hire of godown. Our *dalal* has got 25 shares in the Society. We are prepared to issue 5,000 shares of Re. 1 each altogether but 395 shares only have been sold so far.

2153. (Mr. Wadia.) I have already stated that this year we are not going to charge discount and that the Society will arrange to pay the cultivator on the same day. We can arrange this by selling more shares. If we could get 2,000 or 3,000 rupees in this way, we could borrow another 2,000 or 3,000 rupees from some bank and then we could manage.

2154. On ordinary cotton we made a profit of Rs. 2 last year and on Cambodia we made a profit of Rs. 1,400. That Rs. 1,400 has been deposited in the Urban Co-operative Credit Society. We did not declare any dividend this year. Next year we may do so, as we are allowed to do so under the rules. 25 per cent. of the net profit goes to the reserve fund. It is not mentioned in our bye-laws what the limit of dividend should be or what proportion of profit should go to reserve fund.

2155. (Mr. Roberts.) At the auctions we charge Re. 1 from the cultivator on account of commission for sale of his *kapas* and eight annas from the purchaser. We have fixed this low rate from the cultivators to induce them to have their *kapas* sold through us. We charge a higher rate of commission for auction sales and a lower rate of commission for day by day sales because, in auctions, we have to take a lot of trouble in the way of grading and working out ginning percentages. We have also to engage a big staff for a month or so. Last year the staff was lent to us by the Agricultural Department and this was the reason why we made a profit of Rs. 1,400.

Mr. LINGANGOUDA, Landholder, Hulkoti, Dharwar District.

EXAMINED AT GADAG, FEBRUARY 22ND, 1918.

No written statement was submitted by the witness.

2156. (President.) I am a cultivator. I have got 400 acres of land, all cultivated by myself. I grow cotton and *juar*. I do not grow wheat. I grow Cambodia and Dharwar-American. I do not grow any *kumpla* cotton. I have been growing Cambodia for the last four years. I like Cambodia cotton and all the cultivators in my neighbourhood like it. I got the seed from the Bombay Department of Agriculture from the Gadag farm. Cambodia is quite as good as Dharwar saw-ginned and the profit from it is one and a half times as great as from Dharwar saw-ginned. The outturn of both is the same but Cambodia fetches a better price owing to its higher ginning percentage. I sell my cotton at the Gadag auction sales. I keep my Cambodia and Dharwar-American quite separate. I get new seed every year from the Government farm. We do not get back the seed of the *kapas* which is sold by auction. I have been growing Dharwar-American every year for the last 25 years. The present Dharwar-American is not so good as it was 25 years ago. It is getting shorter in staple. I have been using ashes and farm yard manure as much as I could get for my land. The cost of farm yard manure is Rs. 4 per cart. I keep sixty cattle, out of which sixteen are bullocks and the rest are buffaloes and cows. Out of my 400 acres of cultivated land, forty acres are under *juar* and 360 are under cotton. I feed *juar* to my cattle. I keep buffaloes and cows for milk, butter and manure.

2157. (Mr. Roberts.) I have 360 acres under cotton, of which 100 acres are under Cambodia and the rest is all under Dharwar-American. I am gradually increasing the area under Cambodia. I am not quite sure about the yield. I say "gradually" because it is still in an experimental stage. There are a good many people who are growing Cambodia in my village this year. They have sown double the area of last year. Out of the total area of 1,600 acres under cotton in the village, one quarter is under Cambodia and three quarters under Dharwar-American. All the Cambodia which is grown is sold at the Government auction sales. The seed does not get mixed with the ordinary Dharwar-American. The seed not used by the Agricultural Department is fed to cattle. I am going to increase the area under Cambodia next year. It has proved better than Dharwar-American this year. I have been growing Dharwar-American successively on the same land for the last 25 years without giving any rotation. I have been giving farm yard manure once in six years. The yield is increasing every year. If I were to give a rotation, it would decrease the yield as it would mean red leaf blight. Cambodia did not at first give as good a yield as Dharwar-American but it is now improving.

Mr. RAMCHANDRA KRISHNA ITGI, Overseer, Government Farm, Gadag, and Chairman, Betigeri-Gadag Co-operative Seed Society.

EXAMINED AT GADAG, FEBRUARY 22ND, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "*Deshi*" long-staple cotton.

2158. (10) **Experience.**—I have been stationed in Gadag for the last ten years. I have been in actual touch with the cultivators.

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Mr. RAMCHANDRA KRISHNA ITGI.

[Continued.]

2159. (11) **Varieties.**—There are no short-stapled cotton varieties in the district. The following are the varieties growing here:—(1) *Kumpla*, (2) Dharwar-American, (3) Cambodia. The first is the local cotton growing in the tract. The second is the acclimatised American introduced by the East India Company in 1840. Cambodia was introduced in 1909 and seems to be a suitable variety to replace the Dharwar-American in certain tracts only. There is also selected Dharwar-American (Upland type) which may replace the ordinary Dharwar-American. The yield of this type is more than of the local type. Cambodia fetches a price one-and-a-half times as much as ordinary Dharwar-American, and yields even more. This division, part of Gadag and Ron Talukas, is grown with Dharwar-American and Cambodia, while Navalgunda, Nargunda, Mundargi, and part of Gadag Taluka are grown with *kumpla*.

2160. (12) **Size of holdings.**—The average size of the holdings is about 25 acres. There are some cultivators who are growing 200 acres, and some only five acres.

2161. (13) **Yields and profits and comparative returns.**—The average yield is 200 lbs. per acre. There are some localities, where the yield is 500 lbs. per acre, while some yield scarcely 100 lbs. per acre. In normal years, the net profit is Rs. 20 per acre, but in a year like the present, the net profit would be Rs. 40.

(2) *Juar* is the principal rotation crop with cotton. Wheat and gram are also rotated with cotton. In some places, cotton after cotton is grown for several years, but the variety tried is Dharwar-American or Cambodia as the roots do not go deep in the ground like *kumpla* or Broach. Farm-yard manure at the rate of ten cart-loads per acre (five tons per acre approximately) is applied to the crop of *juar* followed by cotton. Some cultivators apply manure for cotton also at ten cart-loads per acre. This quantity seems to be sufficient. In many cases, ryots do not get sufficient manure. No top dressing is practised. A few cultivators use night-soil manure for cotton. We have no experience of top dressing for cotton.

2162. (17) **Prevention of mixing of different varieties.**—I would recommend that foreign varieties or mixtures should be pulled up in the field and ginning should be done separately.

2163. (18) **Uses of seed and seed selection.**—The seed is used for sowing, feeding cattle and for export trade. No seed selection is practised. All seed is ginned by machine.

2164. (19) **General economic conditions.**—The present deterioration of cotton is due to the fact that the middleman purchases small lots of *kapas* from different villages and sells the mixed stuff in the market. Here the merchant mixes short-stapled cotton brought from outside picking and other inferior stuff to obtain better price for the inferior stuff and gins the cotton. The seed is then distributed for sowing. This is how the seed degenerates.

(2) Secondly, the method of cultivation is very unsatisfactory. The land is only scratched and sown with cotton, and till the picking season approaches, the cultivator very occasionally visits the farm. In order to improve the quality and yield, it is necessary that seed societies should be started at least one in each *taluka* and some form of co-operative farming established to show how better results can be obtained by co-operation which will enable the ryots to cultivate their lands on improved methods.

(3) The practice of paying wages for picking cotton in kind should be legally stopped as the picking is done indiscriminately, and dried bolls, leaves, etc., are also mixed in the *kapas*. In the case of ginning, an officer should be appointed to see that the gins work with the proper speed. Something might be done by a local Chamber of Commerce which would create a higher standard both in the production, picking and selling of cotton.

(c) *Exotic cotton.*

2165. (23) **Comparative returns.**—The yield of Cambodia is sometimes more than of local cotton. It may safely be assumed that the yield is the same as of local cotton. Cotton is always a better paying dry crop than any other. The cultivation is very easy. Hence its cultivation is increasing.

2166. (28) **Importation of seed.**—The seed should be selected here. American or Egyptian seed would take many years to be acclimatised.

2167. (29) **General economic conditions.**—Lands are leased out for a very short time, say, one year and the tenant having no permanent interest in its improvement only scratches it, without cultivating it properly and thus gets the land depreciated. As an example, there is a garden of three acres with a good well with a continuous supply of water, but owing to the poverty of the owner is let out for Rs. 140 a year which sum the tenant can hardly raise owing to his being too poor to cultivate it properly. The yearly income from a garden situated in a town ought to be very considerable, at least Rs. 500 net profit. Greater interest ought to be stirred up by the agricultural schools.

II.—COMMERCIAL ASPECT.

2168. (30) **Local trade customs.**—The local trade customs of Gadag are as under.

A receipt is passed showing the number of *docras* received by the cultivating owner. The cotton is sold according to the market rate as desired by the owner. The following charges are made:—

- (1) *Dalali* (commission) Re. 1 per *naga* of 4 *docras* (48 maunds of *kapas* 28 lbs. of each) from the merchant and Re. 1 per *naga* from the cultivator; Re. 0-12-0 per cotton of twelve maunds from the owner; Re. 0-12-0 per cotton of twelve maunds from the merchant.
- (2) *Pinjrapol* Re. 0-0-6 per *docra*.
- (3) *Dharmadava* (charity) Re. 0-1-0 per *naga*.
- (4) Weighing charges Re. 0-0-9 per *docra* of *kapas*.
Do. Re. 0-0-6 per *docra* of lint.
- (5) *Lingayat* boarding Re. 0-0-3 per *docra*.

It is weighed when the transaction is made and the amount is paid to the owner in two or three days.

The merchant gets the *docras* ginned and pressed into bales, and sends them to Bombay for sale. In Hubli Taluka, the cotton crop is purchased by local buyers. Advance is made here on the cultivation of cotton and interest charged is nine per cent.

2169. (31) **Standardization of commercial names.**—The commercial names of the cotton of this tract are:—

	Grade.
Machine ginned <i>kumpla</i>	1
<i>Payavatni</i> from Bijapur	1
Saw-ginned Dharwar	1
Cambodia	1

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[Continued.]

They come from the Nizam's territory, Bellary District, Native States and Gadag, Ron, and Navalgunda Talukas. I do not suggest any alteration in the commercial names.

2170. (32) **Buying agencies.**—I recommend sale societies as the best agency.

IV.—MANUFACTURE.

(a) *Ginning and pressing.*

2171. (36) **Type of gin.**—Platt's Brothers double roller gin and American Eagle and Gullet saw-gins each are the types of gin in use in this tract.

2172. (38) **Saw gins versus roller gins.**—The staple is not broken in double roller gin, while in saw-gin the staple becomes shorter.

Mr. RAMCHANDRA KRISHNA ITGI called and examined.

2173. (President.) I joined the Agricultural Department in 1905. I did not go through any College course. I have been trained in practical work. I was trained on the Dharwar Farm under Mr. Fletcher for 3 years. I was transferred to Gadag in 1908 and since then I have been holding independent charge. Most of my work has been on cotton and *juar*.

2174. The American varieties tried on the Dharwar Farm suffered from red leaf blight and consequently all the experiments were transferred to Gadag Farm in 1908, when the farm was opened. I got the varieties from Mr. Kottur. I did the scientific work on them myself with the help of the cotton branch. At first, I was cotton fieldman on the Dharwar farm. My principal work here is on Cambodia, the reason being that it had a higher ginning percentage than the local variety and a higher value.

2175. (Mr. Roberts.) As to the function of seed societies, the seed society here was started in 1912 with the object of distributing better seed to the cultivators at a normal rate. I put in a report on its work. The Managing Committee consists of five members, of whom one is Chairman. Three members form a *quorum*. I am the Chairman. We get seed from registered seed growers to whom seed from the Government farm has been given. We get the *kapas* sold through the co-operative sale society and get the seed back. We arrange for supervision of ginning and getting the seed back. The society sells seed to the members as well as non-members at a cheaper rate than the market rate. We purchase seed at the time when cotton is ginned when seed is selling cheaper and sell it at the sowing time when seed is dear. The profit thus obtained enables us to sell the seed at a price below the market rate. The seed society pays for seed at the time of ginning. The society is a registered society with unlimited liability and has 162 members. The entrance fee is Re. 1. There is no share system. We have got deposits from members on which we pay interest at the rate of 6½ per cent. and with that money we buy seed. All the profits go to the reserve fund, which now amounts to Rs. 1,180. We have been selling pure seed of *juar* and *tur* but we mainly sell cotton seed of three different varieties, *kumpla*, Dharwar-American and Cambodia. The *kumpla* seed is simply ordinary seed from outside. The Dharwar-American seed is from the farm and is the selected strain of Upland type. The seed society works over a radius of ten miles. 446 bags of Cambodia of 100 lbs. each have been distributed, 310 bags of Dharwar-American of 100 lbs. each and 8,500 lbs. of *kumpla*. Dharwar-American Upland seed has been distributed this year for the first time. In previous years, the seed of Dharwar-American distributed to the members of the society was the ordinary farm seed. That seed was multiplied by the members who returned seed to be given out again the following year. This year we have given out seed of the selected strain, Dharwar-American Upland type No. 1. This type would be suitable for the whole of the Dharwar-American tract.

2176. There are only two places suitable for Cambodia in this tract—Hulkoti and Sudi including Kurtkoti. The total area under Cambodia grown from seed purchased from the seed society is 5,000 acres. Besides, some cultivators have purchased seed locally. I have been giving out Cambodia seed since 1912. The yield is at least equal to that of the local cotton. I base my remark on farm reports as well as the yields obtained by the cultivators. One year it was a failure.

2177. I think that the introduction of wheat into the rotation instead of *rabi juar* would be a great improvement. Wheat and cotton is not a common rotation. I cannot suggest any other improvement.

ANNEXURE.

A note on the Gadag Betigeri Co-operative Seed Society.

This society was started in 1912 by the Reverend Canon C. S. Rivington, Betigeri. The object with which the society was started was briefly as under:—

Object of the society.—The seed which the ordinary cultivator is sowing is very impure and much deteriorated. He purchases any quality of seed available in the bazar at the sowing time. No selection has ever been practised by the cultivators. In the case of cotton seed, the supply is very unsatisfactory. Old and new *kapas* of good and bad quality, different varieties and pickings are mixed and ginned. The percentage of unripe seed is also great. Thus many gaps are observed in a common cotton field. The percentage of mixtures also varies from twenty to fifty per cent. There is no agency dealing with seed for sowing purposes. Common seed in the ginning factory is sold at the sowing time as seed. Our object is therefore to see that the whole tract is sown with selected pure seed.

Difficulties met with and how they have been overcome.—The society had to meet with the following difficulties in the beginning (1) want of proper room, (2) A good Secretary and (3) getting pure seed. We could not get any suitable house wherein to preserve our seed. For a short time the seed was kept in the old *kacheri* building belonging to the Agricultural Department. Then we applied to the Collector to give us some space close to the building which was kindly given at a nominal value. The owner of the *kacheri* has built a room for the society and the rent is paid by the society.

In the first year Mr. Chinnapa Hulmany, School Master, Betigeri Mission, worked as an unpaid Honorary Secretary. After his transfer from this place, a temporary Secretary was appointed for a season. Since last year, there is a regular Secretary who does the duties of—

- (1) attending to ginning of cotton;
- (2) taking weightment of seed purchased;
- (3) inspecting the fields of members;
- (4) selecting seeds and keeping accounts.

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[Continued.]

The next difficulty was of getting pure seed. Some of the cultivators to whom pure seed was distributed from the farm did not return us the seed but multiplied the seed for themselves and are doing the duty of a seed society. Some of the members who were willing to return the seed were obliged to sell the produce as *kapas* for difficulties of securing gins, etc., and an arrangement was required to be made with the merchant to gin separately the *kapas* and sell the seed, but since the cotton sale society is started, the difficulty of getting pure seed is removed. They have organised auction sales and arranged with merchants to gin for us the *kapas* from lots and sell us the seed.

Working capital.—The working capital is made up of—

- (1) deposits on which interest of 6½ is paid to the depositors;
- (2) entrance fee. The fee was only four annas in the beginning but has recently been increased to Re. 1.
- (3) loans which are taken whenever necessary for only a short time.
- (4) donations.

Sphere of operations.—The villages selected are within a radius of ten miles from Gadag and as the transactions are in cash no inconvenience has ever been experienced. The present number of members is 162.

Purchase of seed.—The society is dealing in *juar*, wheat, *tur* and cotton seed. In the case of the first three varieties, there was not much difficulty in getting pure seed as the seeds are threshed by the cultivator himself. The Managing Committee members select the fields and after the fields are passed, we purchase the seeds. With regard to *juar* seed, Mr. Powlapa Kolhan, Betigeri, who is also a member, has been kindly supplying the society with pure and selected seed from his own field, but in the case of cotton seed, we experienced great inconvenience as already described.

Localities from which the seeds are purchased.—We are usually purchasing *juar* seed from Harti, Kanvi and Betigeri. The seed from these localities is superior. The type of seed we distribute is "Hasara Bija." Last year in the Jamakhandi exhibition, this type has won the first prize. Cotton seed is generally purchased from merchants who purchase the *kapas* from our selected fields. The villages known for growing good Dharwar-American cotton are (i) Hulkoti; (ii) Binkad Katti; (iii) Asundi, Mulgund Malsamudra in the Gadag Taluka and almost the whole of the Ron Taluka. Sudi and Hulkoti are also growing the best Cambodia cotton. The whole of Naragund Taluka and parts of Gadag Taluka and Nargund Petha are known for growing the best *kumpla* cotton. Broach is not growing well here and hence we are not ordering the seeds.

Preservation of seed.—After the seeds are purchased, the first operation in the case of *juar* is to grade the seeds through sieves. The small inferior seed is sold in the bazar. Thereafter drying the seeds thoroughly, we are preserving them in a wooden box. Till the month of June no operation is done, but then we are fumigating the seeds with carbon bisulphide which kills the insects thus preventing a second brood. This year, we are going to try vapours of sulphur and other cheap drugs as the price of carbon bisulphide is increasing considerably. Soon after cotton seed is purchased, we are removing small and undeveloped seed through sieves and sell them (the small seeds) as feeding stuff. Lint, dried bolls and dirt are handpicked. This operation costs about three annas per bag of 150 lbs. We are preserving cotton seed on double mats spread on the floor till the sowing time. No fumigation is carried on in cotton seed. Other seeds being unimportant are not mentioned here.

Sale of seed.—We are selling all the seeds below market rate and no seed has ever remained without being sold. The demand is gradually increasing. During the year, we have been able to get registered seed growers to whom last year 1,125 lbs. of Dharwar-American, 1,100 lbs. of Cambodia, and 64 lbs. of *juar* seed have been given on condition that they should return us the seed at market rate in the season. Special arrangements will be made to keep the varieties pure. The selected seed being very limited, will take two years more for distribution on a large scale. These successful varieties have been tried on the Government Farm, Gadag, for three seasons and have given better yields, higher ginning percentage and have been valued as stapled cotton. There is good scope for these varieties. I think about 100,000 acres are suitable for growing Dharwar-American cotton every year in the tract. In some places of this tract there is good demand for Cambodia cotton. Selected Dharwar-American will take the place of ordinary Dharwar-American. With regard to selected *kumpla* seed, I beg to state that the seed will be ordered from Dharwar and given to our members so that the object of the society will be achieved in the near future.

We are selling the seeds to members as well as to non-members, the former getting the seeds cheaper than the latter. The seed is sold from 6 A.M. to 6 P.M. and no cultivator has ever been inconvenienced. A regular receipt is passed at each transaction.

Before we sell the seed, its germinating capacity is tested, and except on one occasion for *kumpla* cotton the germination test has been very satisfactory. The seed which was found to be poor was sold as feeding stuff.

Accounts are kept in vernacular Canarese accounts and are open for inspection of the members. I give below a statement showing the reserve fund of the society from the beginning :—

Year.	Capital.	Reserve fund.
	Rs.	Rs. A. P.
1913-14	1,711	125 2 9
1914-15	1,960	100 2 3
1915-16	1,487	87 11 7
1916-17	1,317	242 11 0
1917-18	2,525	624 8 9
	9,000	1,180 4 4

Extension of work.—The work will be extended by distributing the pure seed in a selected area. We will take one village so as to enable us to attend to sowing and picking. We will gradually increase our selected area and as the seeds are multiplied, we will take indents for our seed from the village co-operative societies. We think from the experience of the past five years that this would be a better system of extending our business rather than supplying the seed to the individual cultivator.

Bombay.]

Mr. R. G. GORDON, I.C.S.

Mr. R. G. GORDON, I.C.S., Talukdari Settlement Officer, Ahmadabad.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

Note on cotton cultivators in the Dhanduka Taluka, Ahmedabad.

2178. *Preamble.*—1. Dhanduka is the largest *taluka* in the district, containing some 150 villages, all of which are engaged in cotton cultivation.

2179. *Varieties.*—There are four kinds of cotton grown :—

Mathio	short staple
Vagadia	long staple.
Lalio	"
Ambli	"

The latter is the best and sells at about Rs. 2 per maund over the next best which is *lalio*.

(2) The short-stapled *mathio* is grown in the hill-tract to the west and the villages in the western middle and southern tracts with shallow soils. It has only been introduced within the last fifteen years or so : previous to that the long-stapled cottons alone were grown. It has been popular—

- (a) because it ripens earlier and so enables the cultivator to get his money sooner;
- (b) because it requires a smaller rainfall and so is more easily grown in shallow soils.

It is universally supposed, however, to exhaust the soil and every cultivator states that the rotation crops of *juar* and *bajra* yield far less when *mathio* is grown. For this reason the Wadhvan, Dhrangadhra and other Darbars have prohibited the cultivation of *mathio* in their States and also in their villages in British territory.

2180. *Cotton cultivation.*—Cotton cultivation in the *taluka* is bad—

- (a) because the cultivators are slack and content themselves with careless cultivation over a wide area instead of carefully cultivating a smaller area. This is made possible by the small population of the *taluka*;
- (b) because no trouble is taken in seed selection (except to a certain extent in the Bhal tract) the seed being bought indiscriminately from any *bania*;
- (c) because labour is lazy and dear and hence the fields are not properly weeded, which makes an enormous difference in the production.

(2) In order to provide for weeding and other preliminary expenses, the poorer cultivators are compelled to sell part of their crop forward at low rates. Sometimes in order to obtain advances they are compelled to sell more of their crop than they desire at this low rate.

2181. *Sale of cotton.*—The sale of cotton is almost invariably effected in the villages themselves. The largest buyers are Messrs. Whittle and Company, who have gins at Ranpur, Dhanduka, Dholeera and Barvala and presses at Ranpur, Dhanduka and Dholeera. Their procedure, I understand, is that their representative visits the village in company with a *bania* agent as assistant and bargains with the cultivator on the spot. I am told and from my own enquiries believe that cultivators get a good price for their cotton. There are agents at Wadhvan and other places who send out daily postcards for a subscription to villages giving the Bombay rates and many villages receive such cards. The cultivators are therefore well up in prices as a general rule and hold till they get a fair rate.

2182. *Seed selection.*—As regards seed selection, I believe that a good deal could be done through Messrs. Whittle and Company. When cotton gins out at a good percentage the seeds are kept in their gins and I am told that the cultivators round Dholeera make a practice of purchasing these good seeds to the great benefit of their crop. They also do this at their other gins, but the cultivators are stated not to come and purchase. I think this idea could be worked up with much effect. Cultivators should be persuaded to reserve a portion of their best crop for ginning at the gin on their own account, the cotton being sold to Messrs. Whittle.

2183. *Mixing.*—As regards mixing, I do not think much is done in this *taluka*. Messrs. Whittle are not only ginner but buyers also and gin almost entirely their own cotton. Hence they are very careful to guard against mixing. I am also told that last year they refused to gin mixed cotton at all, even for outsiders, and the effect must have been excellent.

2184. *Establishment of Government farm.*—I think that a small Government farm should be established in this *taluka* for cotton cultivation. The methods of cultivation could undoubtedly be much improved and there are a number of good *talukdars* who would be only too glad to be shown improved methods. The Agricultural Department, in my opinion, has not paid nearly enough attention to this large *taluka*.

2185. *Advances to cultivators.*—One further necessity is some option of giving advances to poorer cultivators for the expenses of weeding, etc., at the beginning of the season in order to save them selling forward at low rates as they have to do at present.

2186. *Selling agencies.*—I do not think that any special selling agencies are necessary as I think that fair prices are obtained at present.

Supplementary Note.

2187. *Seed selection.*—In my humble opinion, the right method of attacking this question at any rate in Dhanduka is through the gins. For Government to attempt the annual distribution of seed without guarantee of any permanent improvement resulting therefrom seems to me rather a hopeless business. I should rather prefer to take the local cotton and endeavour gradually to improve its quality through the gins. The method I would suggest for this *taluka* in which I am pretty sure Messrs. Whittle would co-operate is as follows. When the cotton from the villages is brought to the factory to be ginned, Messrs. Whittle would keep the seed of that cotton giving the best ginning percentages. Seed associations would then be formed in the villages to whom the seed would be distributed according to the needs of each cultivator. If necessary, it could be distributed as *takavi* (Government loans) to the associations, Messrs. Whittle preferring a bill on Government for the whole amount and Government recovering from the associations on the joint bond

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systems. Perhaps, however, this would hardly be necessary, cotton seed being so comparatively cheap. The same system would be adopted in the next year and thus we might expect a gradual all round improvement in the quality of the seed. The same methods might be applicable to any improved form of seed introduced by the Agricultural Department. If properly worked, the system would be automatic and Government would be saved all the unnecessary trouble of seed distribution annually. If other gin-owners would come in, the system could be made universal, it might even be made a condition of granting a licence to work the gin, when such licences are made compulsory as they certainly should be. I should add that Messrs. Whittle do keep at present books showing where all the cotton ginned by them comes from and the ginning percentage. Others could easily do the same.

2188. *Advances to cultivators.*—Co-operation has so far proved a failure in Gujarat owing mainly, I think, to the extreme diversity of the population and hence the difficulty of getting them to combine for any purpose whatever. The *takavi* (Government loans) system is not a good one either for this purpose on account of the long delays incidental thereto. The only method I can suggest is in fact what I would call a system of guaranteed recoveries by which Government would sanction advances through a certified merchant on the understanding that they would use their statutory powers of recovery on his behalf if other methods failed. I would introduce a measure of co-operation by making the villagers, or perhaps better caste groups in villages, enter into a joint bond for re-payment and also by making the village or group responsible for paying what should be advanced to each individual. Joint responsibility would then perhaps ensure that grants were made only for necessary objects and not, as might otherwise be the danger of the system, for other than agricultural purposes. I may add that this system of guarantee is one that is even now commonly employed by the *talukdars* of this district in order to obtain advances to cultivators and I have also used it more than once in the case of estates under my management.

2189. *Long staple versus short staple.*—I have already noted that the short staple cotton is supposed to exhaust the soil here and that consequently its cultivation has been partially forbidden. I am not an agricultural expert, but I venture to suggest that the reason is because the short-staple cotton has a short tap root and consequently in its quick growth exhausts the plant food at the surface which is also the food of the short rooted millets which follow it in rotation. The long-staple cotton on the other hand has a long tap root and grows slowly. Hence it derives its sustenance from the lower strata of the soil and does not exhaust the upper layers. It would be interesting to see if this soil exhaustion has been noted elsewhere.

(2) I cannot help feeling doubtful whether the offer of a premium on long-stapled cotton would have much effect in this part of the world. I am not aware how a premium system would be worked, but I presume that it could only amount to a small sum as the cost would otherwise be prohibitive. Now the cultivators in this part of the world are only small men and the premium, even supposing it could be guaranteed to them, would hardly make so much difference on their small outturn as to outweigh the advantages of early payments and in the case of years of short rainfall of a secure crop which they enjoy with the present short staple.

2190. *Marketing of cotton.*—I perhaps expressed rather too confident a view as to the knowledge of the cultivator of the prices of cotton in my first note. I should like to modify by saying that in the poorer villages with more Koli cultivators they are probably rather at the *bania's* mercy though, even there, I doubt if they are much cheated. I doubt, however, if the auction system would succeed here. The larger talukdars do auction their cotton and the cultivators could have their cotton auctioned at the same time, but they don't do it. It would also mean a great change in their habits for them. Cultivators here do not do their own carting to market: that is done by one caste in particular, the Boras of Dhanduka. I don't think the people would change as they are very conservative. They also prefer the present village to village system because the cotton is sold on the village weight and the village *bania* always favours the cultivators as against the purchaser.

2191. *Mixing.*—Mixing should certainly be prohibited by law and gins fined where it is done. It can thus be easily stopped.

Mr. H. M. CHIBBER, Second Economic Botanist, Bombay.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

2192. *Improvement of cotton and Mendelian laws of heredity.*—Bombay occupies the premier position in India with regard to cotton, occupying, as it does, an area of 7,000,000 acres (including the Native States). The *neglectum* types (i.e., Khandesh cottons) occupy nearly half of this area. If one could add to it staple without materially reducing its yield, it would mean adding millions of rupees to the wealth of the country annually. Though efforts in the past have not come to much, the possibilities of effecting remarkable results are very great as may be seen from what follows. I am certain that pure cultures in sufficient numbers—pure with regard to economic characters as well as physiological characters and not flower colour or leaf-shapes—have not been produced, nor crosses made and subsequent generations raised under strictly controlled pollination, and the results of the shuffling due to crossing fully analysed and the right plants picked out which may be one in a thousand. Furthermore, we have so far only touched the fringe of Mendelian laws; many of its possible intricacies remain yet to be discovered. The corner stone of the Mendelian interpretation of heredity is technically styled "segregation" which means independent inheritance of various characters. (No doubt certain characters are inherited in a group but these groups are also known to fall to pieces, "linkage and cross-over" as they call it.) Even this well-known law of independent inheritance of characters is not always accepted when one speaks of cotton. For I am afraid, the idea is still current in India that "the longer the staple of cotton, the lower must be the yield," though Lawrence Balls, well known the world over for his researches on cotton, wrote in 1915 (The Development and Properties of Raw Cotton, page 40) that that dictum had been relegated to limbo like several other venerable fictions. Another pre-Mendelian notion which I find still current in connection with cotton is contained in the belief that differences in soil and climate alone explain the phenomena of acclimatization and deterioration. I shall put the Mendelian view in the words of Lawrence Balls:—

"If the differences between the components which go to make up a commercial variety were confined to mere structure and colour, there would be very little material for natural selection to lay hands upon;

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but since there are also physiological differences, it follows that some kinds of plants flourish best in one locality, and produce more seed, with the result that the sowing of the next season contains more of these plants, and the general properties of the variety alter accordingly. The name given to this alteration varies: if the change does not spoil the lint, it is called 'acclimatization'; if the lint of these flourishing plants is inferior the change is called 'deterioration.' (*Ibid*, p. 129.) And again: "There is nothing magical or unpreventable about the deterioration of cotton varieties, and every case known can be explained in terms of crossing, seed mixture, and natural selection" (p. 17). The actual expression of a character is the resultant of two forces acting jointly. One is constitutional; the other is environmental. The economic characters of cotton are not only constitutionally independent of one another like any other hereditary characters but environment also acts on each of them separately, as has been proved by the researches of Balls. The *ginning percentage* which is very largely a matter of the number of hairs to a seed, is influenced by environment when the hairs are sprouting, and this happens only on the day the flower opens. The *staple* could be affected only when the hairs are elongating, and this happens about a fortnight after the flower opens and the process is then mainly restricted to about five days. The strength of the individual hairs is mainly, if not wholly, a matter of thickness of the walls. This thickening takes place some three weeks after the hairs have attained their full length. All thickening is practically over in three days. In contrast to the number of hairs which as, just stated, is determined in one day, the seed-weight goes on increasing all the days the boll is developing, some fifty days or so. The length of periods mentioned relate to a particular strain of Egyptian cotton, but this fact does not affect the general proposition that environment does not act on the economic characters simultaneously. A short spell of adverse weather may affect the ginning percentage or the staple or the strength according to the stage of the growing crop which it happens to coincide with. The published reports do not show that this periodicity has been noted and taken into account in conducting cotton work in this part of India at any rate. I need not add further to what has already been stated in support of my argument that the absence of results in the past does not justify a pessimistic view regarding the future possibilities.

Mr. BACHROJI RUPCHAND SHET, Cotton Dalal and Merchant, Pachora, East Khandesh.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short-staple cotton.

2193. (1) *Experience.*—I have been the resident of a village in the Pachora Taluka of the East Khandesh District for nearly 65 years, i.e., from my boyhood. I am an agriculturist myself and have been in actual touch with agriculturists.

2194. (2) *Varieties.*—In our part, nearly one-third of the total area is under cotton. The Khandesh cotton, as it is called, contains the mixture of six varieties of cotton, viz., *Neglectum roseum*, *neglectum roseum culchicum*, *neglectum verum*, *neglectum verum malvense*, *Hinganghat* and *Dharwadi*. The first four of these are *deshi* short-staple ones.

2195. (4) *Yields and profits.*—The soil of the district being especially suited to the varieties named above, the produce from one acre ranges from nearly 80 to 300 lbs. The produce on the Government farms is much more than the figures given, but there never has been so much produce realised on the common agriculturist's farm. Excluding the expenses, the net profit per acre goes from one to five rupees. *Hinganghat* and *Dharwadi*, if grown side by side with the *deshi* varieties, give nearly half the produce while other foreign varieties do not thrive at all.

2196. (5) *Rotations and manures.*—Cotton is rotated with *juar*, *bajra*, wheat and other *rabi* crops and in cases where the soil can be manured every year, cotton after cotton for several years, is not unusual. The manure used is generally farm-yard manure and, wherever possible, the sheep are encamped in the fields for several nights.

2197. (7) *Conditions affecting increase in area.*—As compared with other crops, cotton for some years is fetching better prices. Its price for the last few years is going very high and naturally the agriculturists have a great temptation to go in for it with the result that the area under short-staple *deshi* cotton is increasing, but if any variety of the long-staple cotton be proved suitable to the condition of this district, people may also go in for it in preference to the present short staple varieties.

2198. (8) *Uses of seed and seed selections.*—Seed is used for feeding cattle, but a large part of it goes out of Khandesh. The six varieties given above are all different from each other in leaves and flowers. The selection in seed is therefore made while the plants are in the fields according to the leaves and flowers. No other method is in practice. In the seed itself the selection is made according to the weight of seeds in one *tola* and those which weigh very heavy are taken for sowing purposes. Some years ago, hand gins were used for ginning cotton required for seed purposes but, at present, labour, length of the ginning season and the marketing having altogether given a different turn to the cotton trade, the use of the hand gin does not pay. But it must be said here the seed got from the hand gins has a greater germination percentage than that obtained from the roller or saw gins.

2199. (9) *General economic conditions.*—Khandesh is a cotton-growing district and from the higher prices cotton fetches it is generally believed that this district is richer than other non-cotton districts. But really it is not so. In fact there is a great rush of labour from outside districts into Khandesh but it is due to the greater quantity of labour required for cotton crop and not to the riches of the district.

2200. *Suitability of exotic cotton to Khandesh.*—As regards long-staple cotton and both *deshi* and exotic cotton from outside Khandesh, I would say that these varieties do not thrive in our soil so as to become paying as compared with the present variety grown. It is my own experience and it is on that that the statement is based.

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[Continued.]

II.—COMMERCIAL ASPECT.

2201. (30) **Local trade customs.**—There are at present four ways of marketing cotton in vogue :—

- (1) *Arat*.—After the cotton is ready for disposal, the owner takes it to his *aratya* who disposes it on the same day or keeps it. If it is disposed of on the same day, the *aratya* will keep an advance of nearly eighty per cent of the price, charging interest at nine per cent. per annum. When at the suggestion of the owner, the *aratya* disposes of the cotton, he will credit the amount in favour of the owner and charge eight annas per cent. as his *arat*. On failure of the owner to give notice of sale to the *aratya*, the *aratya* will dispose of the cotton without the permission of the owner if the market is so falling as not to give him what he has paid.
- (2) *Jalap*.—The owner agrees in writing or orally to give a fixed quantity of cotton in maunds or *pillas* at the rate fixed and receives the amount. No interest is charged. After the cotton is ready the owner is bound to give the fixed quantity.
- (3) The rate is fixed before the cotton is actually ready for disposal. Such transactions generally take place two or three months before the season commences. Rs. 5 are given as earnest money and after the delivery of cotton the owner receives payment. The owner is not in any way affected by the rise or fall of the market. If the owner does not give delivery or if the purchaser does not take delivery, the cotton is to be disposed of according to the market rate, the loss or profit whatever it may be being borne by the party in default.
- (4) The owner of the cotton borrows money on condition fixed orally that he will give cotton to the lender worth the money he borrowed and then he is under an obligation to give his cotton to the lender and to no other.

2202. (31) **Standardization of commercial names.**—Cotton is named "superfine," "fine," "fully good," "good" according to its various grades. The same names are in use in all the markets and it is difficult to change them. There were different names for different grades some twenty years ago in order to make grading convenient and exact. I think that some more names suitable for more grades should be introduced so also the cotton in each part to have a fixed grade according to the general conditions in that part.

III.—STATISTICAL.

2203. (33) **Improvement of cotton forecast.**—The forecast, as it is published, is far from accurate as the information is collected while the crop is standing and passes through the hands of officers who are little concerned with the cotton trade but are mainly concerned with the land revenue. In order to bring the forecast nearer accuracy, local committees should be formed and be asked to publish their own forecast of cotton side by side with the official one. All other information as it is published does not really reach the hands of the local merchants but if proper provision be made for this the merchants will really make the best use of it in their trade.

2204. (35) **Publication of Liverpool and Bombay prices.**—The daily publication of Liverpool and Bombay prices generally control the prices in up-country markets and if any authorised publication is issued by Government it will to a certain extent check the bad effects of speculation.

IV.—GINNING AND PRESSING.

2205. (36) **Type and number of gins and presses.**—I have one Duncan's press and 44 Platt's gins in my factory.

2206. (37) **Size of bale.**—One pressed bale of cotton is four feet in length, nineteen inches in breadth and seventeen inches in thickness.

2207. (38) **Saw gins versus roller gins.**—As regards labour and convenience, there is every facility in the saw gins while from the mechanical point Platt's gins are much too inferior to the saw gins. The out-turn from the latter is much more than the former. The only drawback that has prevented the saw gins from displacing the Platt's ones, is that the staple of the *deshi* cotton is much injured by saw gins and therefore the saw ginned lint does not pass in the market. But as regards the seed, it comes out in a much better condition than that in the Platt's gins.

2208. (40) **Factory labour.**—As regards labour, I have never experienced any difficulty in obtaining it except when there was plague and the labouring class deserted the town. During the ginning season generally there is a large import of labourers called *hamals* from the Deccan who for want of labour during that particular season in their district come to Khandesh and return before the rains.

2209. (41) **Condition of cotton.**—Great ignorance prevails amongst the cultivators of cotton as regards the grades of cotton, therefore no attention is paid to picking the cotton clean. Besides the cotton passes through different hands before it reaches the factory for ginning and therefore is generally dirty. Regular institutions and agencies such as the cotton markets are therefore very necessary to bring the cultivator, that is the producer, and the manufacturer together so that the former may realise the latter's necessities and try to satisfy him by picking his cotton very clean and thus to bring it to a very high grade so that the cultivator may be entitled to demand high prices for his produce and the manufacturer may find it convenient to pay that much. Secondly, to place the cotton in a much higher grade before the manufacturer, there are in each ginning factory openers for cleaning cotton and if it be enforced that the cotton brought to the factory be put in the openers first and then on the gin-platform, it will surely give a higher grade to the lint and besides save much to the gin owner.

2210. (42) **Effect of replacement of short-staple cotton by long staple.**—Even if the present short-staple cotton be displaced by a long-staple variety, no alterations will be required in the machinery except a few modifications according to the size of the seed and the tightening of the rollers.

V.—GENERAL.

2211. (46) **Attitude of buyers to improved cotton.**—From my experience of the market, I can say that the purchaser feels the necessity of improved cotton and that higher rates are offered for good cotton wherever it is available.

2212. (48) **Desirability of alteration in water rates.**—Cotton is not irrigated in this part so there is no question of water rates, but I must say here that those rates ought to be changed to afford greater facility for undertaking irrigation.

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2213. (49) **Effect of tenure of land.**—The present tenure of holding land in this Presidency is in no way convenient nor profitable to the cultivator. Changes in land revenue after every twenty or thirty years prevent the holder from investing more money and labour in his holding, as he is under the apprehension that the profits of his investments are to go to the Government at the revision which the cultivator knows must increase the land revenue. It is therefore necessary in the interest of the agriculturists and in their general progress that the *malkihak* of the land should be given to them and the settlement of the revenue be made permanent.

VIII.—Madras.

Mr. G. R. HILSON, Deputy Director of Agriculture, I-III Circles, Madras.

EXAMINED AT NANDYAL, FEBRUARY 27TH, 1918.

Written statement.

I.—NORTHERNS COTTON.

2214. **Area under "Northern" cotton.**—The name "Northern" as applied to cotton in Madras Presidency is given to the indigenous cotton which is grown in the taluks of Dhone, Kurnool, Nandikotkur, Nandyal, Sirvel, Koilkuntla and Markapur in Kurnool District, the Native State of Banganapalli in the same district, Jammalamadugu and Proddatur taluks in the district of Cuddapah, and Tadpatri taluk in Anantapur district, the produce of which is brought into market at Kurnool, Nandyal, Proddatur and Tadpatri. A small amount of cotton from the Nizam's dominions also comes into the Kurnool market.

2215. **Cultivation of cotton.**—The crop is cultivated on both black and red soils and is always drilled. On the former soils it is usually sown in August-September with a small admixture of horsegram (*D. biflorus*) and is succeeded in the following year by *sorghum* mixed with green gram (*P. mungo*). On the latter soils, it is sown a little and is usually mixed with Italian millet, two lines of millet to one of cotton. In this case also, the succeeding crop is usually *sorghum* mixed with one or more pulses.

2216. **Picking of cotton.**—Picking normally begins in February and continues into April. The operation is without exception done very badly. Work does not begin until about 10 A.M., when leaf, bract and boll are very dry, and no care whatever is taken to try to pick the cotton clean. On the contrary, the writer has seen capsules, leaf and small branches deliberately included in the pickings. Moreover, each coolie collects his or her pickings in one heap which is placed on the bare ground, thereby ensuring that a certain amount of mud shall be removed with the cotton. It is therefore not to be wondered at that this cotton has an unenviable reputation for dirtiness. Mill reports show that on the average the blow-room loss with this cotton is about eighteen per cent.

2217. **Composition of Northern cotton.**—As normally grown by the cultivator, Northern cotton is in the main a mixture of varieties of the two species *G. herbaceum* and *G. indicum*. On the black soils *herbaceum* is, as a rule, the predominating species in the mixture though sometimes *indicum* occurs to as great an extent as fifty per cent. On red soils, *indicum* is the chief ingredient of the mixture frequently to the almost entire exclusion of *herbaceum*. Other cottons are also found but only to a slight extent. These are chiefly *G. hirsutum* (Cambodia and Dharwar-American) and *G. neglectum* (*Gogu patti*—Telugu; *Pulichai*—Tamil).

2218. **Northern cotton at the Nandyal agricultural station.**—Both of these cottons, *herbaceum* and *indicum*, have been kept under observation at the Nandyal Agricultural Station ever since it was opened in 1906. From the experience thus gained it is possible to classify broadly the characters of the produce of these cottons as follows :—

	Lint.	<i>G. herbaceum</i> .	<i>G. indicum</i> .
Length		¾ in. to 1 in.	¾ in. to 1 in.
Strength		Weak to strong.	Strong.
Colour		White to creamy.	Red.
Feel		Very harsh to soft.	Fairly soft.
Ginning outturn		22 to 32 per cent.	22 to 26 per cent.
Seed		Clean to fuzzy.	Clean to fuzzy.

The term "clean" is applied to seed in which the fuzz is restricted to a small tuft at each end. It has also been noticed that the types with strong lint are always more difficult to gin and that types with clean seed give into which is long, strong, small in quantity and, where the plant is of the *herbaceum* species, white.

(2) The yield of each of these species has varied according to the season and the field on which it has grown. Comparisons, made under experimental conditions of the two best strains of *herbaceum* and the best strains of *indicum* with the local mixture, have given the following results :—

	Yield per acre in lbs.	
	Kapas.	Lint.
Local mixture	290	72
No. 2 (<i>herbaceum</i>)	280	84
No. 60 (<i>herbaceum</i>)	330	100
No. 14 (<i>indicum</i>)	340	86

These figures are the average over the last three seasons 1914-15, 1915-16 and 1916-17.

2219. **Ginning of cotton.**—The produce of the local crop, after being harvested, has a more or less varied career before it reaches the buying firms, who purchase cotton for spinning purposes or for export and sale to spinners. Ginning is done in native-owned gins either out in the district or in the market town itself. These are badly managed and as the owners keep a sharp eye on the daily outturn, the lint is

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frequently damaged and always contains a fair amount of seed, all of which helps to make the blow-room loss as great as it is. The use of an opener before ginning is a rarity, and owing to careless feeding, *kapas* is frequently mixed with the lint.

2220. *Colour of kapas*.—*Kapas* produced on black soils usually gives a fairly white lint, while the produce on red soils gives a distinctly red lint. The lint is, therefore, sold under two names, "White Northerns" and "Red Northerns," the difference in price usually being Rs. 5 to Rs. 10 in favour of the former.

2221. *System of trade at Nandyal*.—At Nandyal, the trade runs on the following lines :—

Parties concerned—

- (i) *The producer*.—(a) The small ryot, who at the time of harvest, is badly in need of money, who therefore, cannot wait his time for selling and has to sell his produce as *kapas* and at a low rate. In this class are to be found a few ryots who have taken advances from middlemen and have contracted to sell their produce at a rate agreed upon, which is generally considerably lower than that ruling at the time when delivery is made.
- (b) The bigger ryot, who can afford to wait for his price or to have his produce ginned and is, therefore, in a better position to bargain than are members of class (a). Some members of this class are village middlemen.
- (iii) *The village middleman*.—He buys *kapas* and has it ginned and is mainly responsible for the mixing that is done, either because he does not take the trouble to keep different qualities apart or because he purposely mixes a good quality with a poor to make a larger sample, which will pass as good or will be only slightly allowed. The middleman sells on contract to the dealer and to the firms but also sells on ready delivery.
- (iii) *The dealer*.—The dealer makes contracts, on the one hand, with firms to deliver and, on the other hand, with middlemen or ryots of class (b) to receive cotton of a certain quality, at a certain rate on or before a given date. He also buys cotton and speculates on the market.
- (iv) *The firms*.—There are three European firms, two of which own presses, and one Indian firm which owns a press and a ginning factory, but which is really only a combination of dealers, who sell to any of the other firms. Buying is also done by agents of other Indian firms and Japanese firms who, however, cannot be considered regular buyers.

(2) *System*.—The system is the pressed bale system, i.e., the firms deal in lint and do not make final payment until the lint has been cleaned and pressed and weight of the bales made. Advances are given when lint is brought but cannot be pressed for some time.

2222. *Manner in which lint reaches the firms*.—The firms make forward contracts on the lines indicated above, chiefly with dealers to whom some firms pay brokerage, but also with ryots and with middlemen. Warning is usually issued about a week before the final date on which delivery is to be made and if it is asked for, an extension of time is generally given, but if delivery is not made, the firm can buy in the open market on the day on which the contract expires and charge the contractor with the difference between the contract rate at which they bought or they can demand the difference between the contract rate and the rate prevailing on the day on which the contract expires.

(2) The ryot or middleman watches the market. When he thinks the price is high enough to suit him, he brings his cotton for sale. He leaves his cart on the roadside while he goes round making inquiries as to what the rates are and who is likely to pay him the best price. Having decided whom he will try first, he brings his cotton into the compound and offers it for sale. It is examined and rejected or the bargain is struck. If rejected, the ryot will try elsewhere and may get a dealer to offer the cotton against one of his own contracts. The dealers who have bought on speculation also watch the market and will tender cotton which they have stored in their godowns, either against contracts or for separate sale, whichever may be more profitable to them.

2223. *System of trade at other markets*.—At the other markets, except for the few differences noted below, the conditions of trade are very similar.

Tadpatri.—Direct dealings between producer and buying firms are practically non-existent.

Kurnool.—Direct dealing between producer and firms are fairly common, and, as the market is small, the village middleman is much less in evidence. Buying is on the loose bale system.

Proddatur.—As Kurnool, but both systems are in vogue. When cotton is bought loose, the buyer retains the gunnies in which the cotton is packed and is entitled to make the following deductions : about 1½ per cent. on the gross weight for dirt, and one per cent. on the net weight for sample.

2224. *Quantities of cotton dealt with*.—The quantities of cotton coming into these markets are approximately as follows : Nandyal, 30,000 ; Tadpatri, 10,000 ; Proddatur, 8,000 ; and Kurnool, 6,000 bales of 400 lbs. each.

2225. *Suggestions for improvement*.—The above gives, in broad outlines, the position that must be attacked if it is desired to bring about any improvement in the present state of affairs. By improvement is meant here an alteration which shall result on the one hand in an increased profit per acre to the producer, and on the other in the buyer being offered a better article. Such improvement may follow one or more of three main lines :—

- (1) improvement in the methods of cultivation, harvesting, etc.; (2) improvement in the plant itself and (3) improvements in the method of marketing.

2226. *Improvement in the method of cultivation, etc.*—It is difficult to devise changes in the present methods of culture, manuring, harvesting and preparation of produce for sale which will bring any solid benefit to the cultivator. The seed-rate used is not excessive, and topping, thinning and growing unmixed with horsegram have not shown any advantage over the local practice.

(2) *Manuring with cattle or sheep manure or by preceding the crop with a crop of Bengal gram* all improve the yield. The cultivator is, however, debarred from adopting these practices extensively owing to the fact that cattle and sheep manure are to be had in only limited quantities and because Bengal gram is an uncertain and not very profitable crop, and its introduction into the rotation would necessitate cotton being grown once in three years instead of every other year as at present. The practice of growing groundnuts, is, however, extending rapidly and it is likely that this crop will play the part that Bengal gram has failed to do.

(3) With regard to harvesting, a very great improvement might be effected if the coolies were paid daily wages in grain or in money instead of a definite proportion on the day's picking, as at present, and if picking could be started in the early morning while the bracts and leaves are still damp with dew. This arrangement

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if the pickers were carefully supervised, would result in very little leaf being picked with the cotton. Unfortunately with Northerns cotton, picking is not a gradual process ; the bolls mature rapidly and evenly, and, as a rule, three pickings with an interval of about a fortnight between each will see the harvest finished. The demand for labour at these times is, therefore, very keen, particularly so as the cultivator has to bear in mind that if he does not pick his crop himself some unauthorised persons will do it for him. As labour is scarce, the pickers can more or less dictate their own terms, and as they are usually women and have to attend to household duties before going out to work in the fields, it suits them to start late, work through the heat of the day and return early. They prefer to be paid a fraction of their daily picking as wages, as they can in this way earn higher pay. This arrangement also suits the cultivator as he is relieved of the necessity of keeping his labourers up to the mark, and is able to get his crop harvested quickly. It is probable that a few isolated cultivators would be able to make the change described above, but it is improbable under present conditions that they would profit by so doing.

(4) As regards the preparation of the produce for sale, an improvement might be brought about if the cultivator could be induced to market his crop in two qualities. This he could arrange to do either in the field, by having two gangs of coolies, one to pick the good well opened bolls and the other to pick the stained and badly opened bolls, or by picking the crop over after it has all been harvested. The whole system of marketing is unfortunately against the adoption of this practice. The writer has tried this plan more than once, and has found it to result in a loss every time. When offered two qualities like this, all the buyer does is to calculate what he would have to pay for the same total quantity at the ruling rate, and then offer a rupee or two more for the better quality and a considerably lower rate for the second quality so that he pays a little less or at least no more than if the lot were all one quality. The seller is left with a loss equal to or greater than the extra cost of preparation.

(5) Under this head, preparation for sale, defects in or connected with ginning must be considered. These are usually four in number. In the first place the mechanic, who is responsible for the proper working of the plant, is usually changed too frequently. For motives of economy, his services are dispensed with at the end of the season until the next working season, when the same man may be employed or not as the case may be. A ginners ordinarily pays well enough to enable the owners to retain the mechanic's services throughout the year. It is false economy not to do so. An extension of the working season would obviate this difficulty. With the spread of the groundnut crop many gin-owners are fitting up decorticators, and are so making a more economical use of their plant. Secondly, only a few ginners have openers, and those who have do not use them properly. The main reason for this is that the cultivator looks askance at any operation which involves the loss of weight which the proper use of an opener undoubtedly does. A remedy which some of the firms are adopting is to offer a slightly enhanced rate for cotton known to have been ginned at a ginners where an opener is in use. Thirdly, the gins are, as a rule, run too fast and with improperly set knives, the lint is damaged, the seed is broken and is carried through with the lint. The only satisfactory remedy for this at present is for firms which are particular on this point to buy *kapas* and do their own ginning. Lastly, the godown accommodation at these ginners is exceedingly limited, and every year much lint is spoilt owing to the *kapas* having been exposed to rain and ginned while still damp. The only remedy for this is to compel gin-owners to provide sufficient godown accommodation for the produce brought to them for ginning.

2227. *Improvement of the plant*.—In attacking this problem, the object to be aimed at is the production of a cotton which will meet the requirements of (1) the ryot who sells his produce as *kapas*, (2) the ryot who sells as lint and (3) the final buyer. The wishes of the first two parties are easily diagnosed ; neither care very much what the quality of the cotton is provided that it is readily saleable ; both wish a heavy yield of *kapas* per acre and the second wishes a high ginning outturn in addition. It is when considering the requirements of the third party that puzzling features arise. A careful study of the market drives the observer to the inevitable conclusion that class, i.e., colour and cleanliness, are of much importance than quality, i.e., length and strength of staple. Evidence of this is to be found in the difference in price between Red Northerns and White Northerns, the former of which is lower in class because of its red colour, but better in quality. A cotton, however, which, combined in itself high yield of *kapas*, high ginning outturn, good class and high quality, would satisfy everyone and would attract more buyers. With the object of finding such a cotton the work at Nandyal has been carried on.

(2) The method adopted in doing this work is as follows :—

Seed of the local mixture is obtained from a cultivator and is sown on a separate plot. When the crop is in flower, it is examined and a number of the most prolific plants are marked. As many flowers as possible on each of these plants are selfed. This is very simply done by sowing up the apex of the unopened corolla the evening before or on the morning of the day on which the flower would naturally open. The produce of each plant is then collected separately, the *kapas* from selfed and unselfed bolls being kept apart. This is examined both as *kapas* and after ginning and the best plants are kept for further examination. Next season, the seed of these single plants is sown in small plots, giving a spacing of two feet each way for each plant so that it may have full opportunity to develop and show its type of habit. These plots are then watched to see if each strain is pure, and as many flowers as possible in each are selfed. If any of the strains are impure, selection is made as in the beginning. The produce of the pure lots is again examined and a further weeding out takes place. In the third year, there is usually enough seed of the final selection to make a comparative test and to sow a plot to give seed for next year's sowings. The comparative test is made by sowing three lines (long enough to make a plot of four cents) of each strain in succession, and repeating the series five times. The seed plots are sown as far from one another and other cottons as possible, and picking for seed purposes is done from the middle of the plot only. The comparative test is carried on for at least four years and as soon as enough seed is obtained the selections are sown on a large enough area to give sufficient lint for a spinning test to be made.

(3) The defects that have occurred in this system are inability to deal with anything but a limited number of selections, and the omission of hybridization. Either because of this or because the ideal plant described above exists only in the imagination, the fact remains that the results obtained have not been very satisfactory. It has been possible to get three out of the four good qualities required combined in one plant, but not all four. For example, No. 50 combines high yield, high ginning outturn and good class but poor quality, and No. 14, high yield, good quality and good class but low ginning outturn. The problem is big enough and important enough to occupy fully the energies of one man.

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2228. *Present methods of trade.*—The outstanding features of the present methods of trade are—

- (1) the system of making forward contracts, (2) indirect dealings between firm and producer through the agency of middlemen and dealers, (3) direct dealings between firms and producer, (4) the pressed bale system, and (5) the loose bale system.

2229. (i) *The forward contract system.*—Buying on this system is carried on practically right through the season. It has this advantage, provided that the dealer is reliable and financially sound, that the buying firm is enabled to make fairly certain that, whatever conditions prevail, they shall have a share of the crop before even it comes into the market. Cases however occur when the dealer finds that it will pay him (for the time being at any rate, whatever may be the result in the long run) to default and hold his cotton for sale at a later date.

(2) The system has the defect that the buyer does not see what he has bought until the cotton is tendered against the contract. In theory, this does not matter very much. All that the buyer has to do is to reject or heavily allowance the cotton, if it is not up to the contract quality. In actual practice, this cannot be done to any great extent. Any single firm which seriously adopted this attitude would find that they could not get cotton. If all the firms concerned would agree upon what qualities they would reject and upon what allowance they would make for qualities below their standards, and at the same time would agree to pay more for qualities above their highest standard, they would get better quality. As the system works at present, not only does the standard differ from year to year as is to be expected, but it differs from time to time during the season. Cotton is, in fact, passed, rejected, heavily allowance or lightly allowance, as much on the need of the firm concerned for cotton and on the ability of the seller to stand out against allowance, as on anything else. The system is in fact a direct encouragement to the dealer in *kapas* to mix as little as possible of a good quality with as much as possible of a poor quality in order to get a big lot of lint which will be passed with little or no allowance. This he does with great regularity. Red Northerns sells at Rs. 5 to Rs. 10 less than White Northerns. The middleman buys up *kapas* of our No 2 cotton, which is white and mixes it with *kapas* of Red Northerns in the proportion of about 1 : 2. He sells the lot as good White Northerns.

2230. (ii) *Indirect dealings between firms and producer.*—The main advantage of this method of doing business is that the firm deals with only a few men, which allows fairly sound reliable men being chosen, who contract to supply large quantities of cotton. It has the disadvantage, however, that it places the dealers in a position which will permit them to hold up cotton and prevent a firm from getting any if they so desire. A further disadvantage is that the dealer has not much interest in seeing that cotton tendered is of good quality, and the system lends itself to fraud. Unless a dealer tenders against a contract cotton which he has purchased outright, when he will fight tooth and nail against allowances, he has little personal interest in what happens to the cotton, so long as it is accepted by the firm. The reason for this is that if the firm accepts the cotton with an allowance, the deduction is made from the dealer's client and the dealer himself is not affected.

2231. (iii) *Direct dealings with ryots.*—This method has the disadvantages that transactions for small quantities have to be entered into, and it is not always easy to get at the ryot if he happens to fail to fulfil his contract. It has the advantages that it is easier to get at the truth about a cotton from a ryot than from a dealer, that a good connection can be built up among ryots, and that while the ryot would gain more by the elimination of false weighments the firm would not pay quite so high a price. With the practically total cessation of the practice of hand-ginning now, it is more difficult than formerly to get into direct communication with the ryot. The gin-owners are, as a rule, also dealers, and prefer to gin for their own middlemen and other dealers. Unless therefore a ryot is a man of some standing, he finds it difficult, if not impossible, to get his *kapas* ginned at a power gin, unless he consents to part with the lint to a dealer.

2232. (iv) *The pressed bale system.*—The advantage of this system is that the firm does not pay for the cotton until it has been cleaned on the cots. There is therefore no risk of the firm buying sand, stone, weights, etc., at the price of cotton. It has the disadvantage that it does away partly with the benefit of doing business with dealers, as the latter are no more prepared to take the risk of buying other things than cotton than are the firms. All the small lots bought by the dealers' clients have therefore to be pressed separately and the dealer pays on the cleaned weights just as the firm does. When this has been done, the firm gets the bales but, in the meantime, has had to put up with the inconvenience of baling a number of small lots instead of one large consignment. With this exception, the disadvantages are on the side of the seller and his clients. Until the lint is pressed, final payment cannot be made. The ryot who has sold direct or is a dealer's client has therefore to wait about until the cotton is pressed before he can finish his business and get back to his land. He frequently has to wait for some time, which means trouble and expense to him, and it may interfere with his preparatory cultivation.

2233. (v) *The loose bale system.*—This system has the advantage over the pressed bale system, in that the buyer does not need to bale a lot of small quantities separately, and the seller has not to wait until pressing is over before he can complete his business. The deduction made for dirt is calculated to cover approximately the loss which is incurred in cleaning prior to pressing. The other two features, the gunnies becoming the property of the buyer and the deduction for sample, appear to be accidental grafts on to the main system. In the first case, the practice appears to have arisen out of the desire of the ryot to have the transaction completed and done with, so that he does not need to return and cover his gunnies. No doubt the value of the gunnies was and is included in the price paid for the cotton, but the practice has had this result, that in very many cases, the cotton is packed in very loosely woven poor quality gunnies, which the buyer finds difficulty in getting rid of. The practice of making a deduction for the sample is one that there appears to be little justification for, and which the seller might well object to allow. The loose bale system has the disadvantage that the buyer has to take the risk of foreign materials being added to make up weight. As however, each man who tenders cotton is known, this trick is one which cannot in general be played more than once and results in a very handsome deduction being made next time the perpetrator brings cotton for sale. To the ryot the loose bale system appeals strongly, as he is not kept hanging about for a long time together before his business is finished.

2234. *Defects of present system of marketing.*—These then are the main features of the present system of marketing. It will be seen that the main defects are—

- (1) the lack of real competition owing to the liability of a greater or less proportion of the crop being "bound" before the actual season begins and the seller having to come to a buyer instead of all the buyers to the seller, (2) the prevalence of mixing, and (3), in the case of the pressed bale system, the delay in settling business.

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2235. *Suggestions for improvement.*—The question has now to be considered as to whether any other system could be substituted for the existing system.

(2) Freer and more open competition would be gained if the sellers brought their produce to one place where each man's lot would have to stand comparison with his neighbours and to which buyers would come to make purchases. This indicates the necessity for the establishment of an open market.

(3) Mixing can best be detected before ginning. The produce must therefore be sold as *kapas* and by the producer. So long as there is difference in rates, as there is at present between Red Northerns and White Northerns, and so long as the produce is brought and sold as lint, so long will the middlemen mix these two qualities together and endeavour to sell the mixture at the higher rate. The ryot must therefore be induced to bring his *kapas* into the market for sale. Another reason for having cotton brought for sale in the form of *kapas* is that, until the Agricultural Department can produce a cotton with all the four good points mentioned above, it will be necessary for the firms to offer higher prices for a good quality cotton, defective in yield or ginning outturn. Unless they buy this cotton as *kapas* and gin it themselves, they cannot be sure that they are buying a pure article and in addition will have to put up with the cotton being damaged in ginning. With this system, the ryot could either sell outright or on the condition that his seed be returned to him and he be paid on the lint obtained. In the first case, his business would be completed in the day, if he sold the day he brought the cotton to market, and in the second he would, if he had to wait at all, have to wait no longer than he does at present for ginning. He would be spared the second wait for pressing.

(4) With this question of the open market is bound up the question of honest weighment. There is no doubt that there is considerable dishonesty over this operation. The ryot is in the habit of hand-ginning a small portion of his produce in order to test the ginning outturn. If, therefore, he could be sure of the weights of his *kapas*, he would have a fairly shrewd idea of how much his lint ought to weigh after the *kapas* was ginned. The most feasible plan would therefore seem to be to have the *kapas* weighed publicly in the open market (probably a platform machine with a dial as used in auction marts at home would be most satisfactory) and frequent check of weights used outside the market.

2236. *Summary.*—To sum up, the requirements for the improvement of Northerns cotton are (1) more time and research to be given to the improvement of the plant, (2) better harvesting and preparation for market, (3) better ginning, (4) establishment of an open market to which cotton would be brought as *kapas* and (5) the establishment of ginneries properly fitted and constructed, either owned or controlled by the buying firms. (1), (3), (4) and (5) are well within the bounds of possibility; (2) will require a large amount of spade work to be done by the Department backed by substantial aid from the buying firms before any improvement along this line is likely to be brought about.

II.—WESTERN COTTON.

2237. *Area under "Westerns" cotton.*—This name is given to the indigenous cotton grown in Bellary district, Pattikonda taluk of Kurnool district, Gooty taluk of Anantapur district, and such cotton grown in the Nizam's dominions as finds its way into Adoni market. The two chief markets are Bellary and Adoni. Lesser markets are Guntakal and Timmancherla.

2238. *Cultivation of cotton.*—As in the case of Northerns, the crop is grown on both black and red soils. In the latter case the crop is sown in July-August either pure or mixed with Italian millet and in the former case in August-September almost invariably mixed with the cereal. Again, like Northerns, it is usually followed by a mixture of cereal and pulse and is never grown two years in succession on the same land. As the crop on red soils is sown early, it is termed the *mungari* (early) crop, the crop in the black soils sown late being termed *hingari* (late). Picking of the *mungari* crop begins in October, and as it is in boll during wet weather, the produce is usually stained. Picking of the *hingari* crop begins in February as in the case of Northerns. In both cases the same remarks regarding carelessness of picking apply.

2239. *Composition of Westerns cotton.*—There is the same mixture of varieties and species as described for Northerns. On the black soils, however, there is less *indicum*, as in normal years this species does not seem to do well in Bellary district, while on the red soils the position has become complicated by the introduction of short-stapled "Akola" cotton, which has practically ousted the longer stapled but lower yielding Westerns.

(2) The produce of the red soils is, irrespective of its species, sold as *mungari* and of the black soils as *hingari*. Before the introduction of Akola cotton, *mungari*, because of its stain, always sold at a slightly lower rate than *hingari*. Now the difference is great.

2240. *System of trade.*—The conditions of trade are very similar to that described under Northerns, with certain outstanding differences. The system is practically throughout the loose bale system. At Bellary, the state of the trade is worse than at Nandyal and, at Adoni, rather better. The reason for this is as follows. In both cases, there is the same chain of hands through which the cotton passes before it reaches the big firms. At Bellary, however, there are at the bottom many more poor ryots who take advances of seed from middlemen (who borrow money from dealers) and many better off ryots who borrow money at twelve per cent. from dealers. When an advance of seed is taken the ryot agrees to pay one maund (26 lbs.) of *kapas* for 2 to 2½ maunds of seed and to sell his produce to the middlemen, the rate being fixed at the time the advance of seed is made. This rate is usually considerably lower than what the produce would bring at the proper time, in some cases as much as sixteen per cent. lower. When money is advanced, the borrower agrees to sell his produce through the agency of the dealer at the market rate; but has also to pay commission, if *kapas* is sold, four pies per rupee of the sale-proceeds and, if lint, one rupee for every *naga* (312 lbs.). Again the ryot, who has not taken any advance of seed or money, usually sells through the agency of the dealer, paying three pies per rupee of proceeds in the case of *kapas* and eight annas per *naga* in the case of lint. Thus the dealer has the market by the throat and there are practically no direct transactions between firms and producer.

(2) At Adoni, there is a semblance of a cotton market. Ryots bring *kapas* and lint to one place in Adoni to which all buyers come and sell lint direct to firms or to dealers who sell again to the firms. The village middleman is, therefore, less in evidence, as is also the commission agent type of dealer, who here does not advance money but merely acts as a go-between and for a consideration pretends to see that the ryot is not cheated. Creditable rumour, however, has it that although the prices are fixed in the open market, these are not always adhered to when the cotton is brought into the compound for weighment, and that here is a considerable amount of dishonesty over weighments.

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[Continued.]

(2) There is the same system of allowancing at both markets as at Nandyal, and there is the same resort to mixing, a practice which the introduction of Akola cotton will increase.

2241. *Recommendations.*—The recommendations made regarding the manner in which improvement can be brought about apply equally to this cotton as to Northern.

III.—CAMBODIA COTTON AND DHARWAR-AMERICAN.

2242. *Cambodia cotton.*—This crop has been a disappointing one in Telugu tracts. When first introduced the crop did fairly well, even as a dry-crop, both up in the Circars where the rainfall is generally good and in the Ceded Districts in good years. This was unfortunate in that it encouraged the ryots to continue the cultivation of this crop on dry land despite the warnings issued by the Department that the crop should be grown on land capable of being irrigated. Latterly, however, the yield and quality has decreased and, owing to the *kapas* usually coming into the market stained and mixed with other cottons, buyers have practically ceased to deal in this cotton. Good lots clean and picked free of stain still find a sale.

(2) This cotton must be grown on land which can be irrigated. In some years and on certain kinds of soil irrigation may not be necessary until the first picking is over, but if a second flush is desired, irrigation has to be given. On black cotton soil with only a moderate rainfall, this cotton, like other exotics, is hopeless, and in the Ceded Districts where it has been grown most largely in my division, I have only rarely heard of the heavy yields reported from the south being obtained. At Hagari, I have ceased to cultivate this crop as I never got more than 600 lbs. of *kapas* per acre, usually less, and it did not pay as well as chillies. At Sirvel, it is still being tried.

2243. *Dharwar American cotton.*—My knowledge of this cotton is not extensive. It was grown in my district, chiefly in the western *taluks* of Bellary district on red soils, but is now reported to be spreading into the Northern tract. I have tried it on black cotton soil and found it to be of no good there. It is sown at the beginning of the south-west monsoon like *mungari* Westerns and behaves like that crop.

2244. *Defects of exotic cotton.*—The main defects about all these exotic cottons are that they are so liable to be affected by disease and insect pests, aphids, jassid, stem-borer, and leaf-eating caterpillars, and if sown at the beginning of the south-west monsoon, they are likely to be caught by north-east monsoon rains when bolting, which results in a reduction of yield and stained produce. An exotic cotton which could be grown on red soils without irrigation, could be sown at the break of the south-west monsoon, was not greatly affected by disease and pests and which did not begin to open its bolls until the rains had ceased would find favour with both buyer and cultivator and would be cultivated where there is little or no cotton grown at present and where the short-stapled Akola is now finding a vogue.

Mr. G. R. HILSON called and examined.

2245. (*Mr. Roberts.*) The total crop of Northern is about 54,000 bales. The crop of Westerns coming into Adoni is about 40,000 bales and Bellary about 20,000 bales. Of course these are round figures. Guntakal (including Timmancharla) and Tadpatri make up another 10,000 bales. This is for both *mungari* and *hingari* cotton. I have not got separate figures for the two. The Adoni figures include the cotton coming in from the Nizam's Dominions. It goes to Raichur if the price is higher there than at Adoni. Westerns are somewhat more important from the point of view of area than Northern.

2246. What I am aiming at in both tracts is to get a cotton with a staple somewhere about $\frac{3}{4}$ ths of an inch or 24-25 millimetres in length which will give a high yield of *kapas* per acre, possess a high ginning percentage, be of good quality and good class, have a good strong lint giving a test of eighty lbs. for 20s count, and also be of a good white colour. The ginning percentage should be about thirty per cent. If I can get such a cotton, I should be able to please the spinners in this country, please the exporters, please the ryots and in fact everybody. I shall not need anybody to spread the cotton; it will spread itself. In neither the Northern nor the Western tract, have I got to that stage of perfection.

2247. The best cotton I have got at Hagari is No. 25. It is only short in ginning outturn, which is 25 per cent. instead of thirty. The staple is about $\frac{3}{4}$ th inch and the outturn is about 200 pounds of *kapas* per acre against the local average of 150 pounds. No. 25 is a variety of *herbaceum* cotton. I have had it isolated and under observation since 1912-13, when we started with it. In one year, the yield was as much as 327 lbs. per acre. Naturally, when a cotton is promising, I have to grow it on a fairly large scale in order to get lint for a spinning test, but I do not think it really necessary to test the yield on a field scale as I consider my experimental plots good enough. The local cotton gets exactly the same treatment on the farm as the improved strains. If a strain were tried outside with a good cultivator, it might give a particularly good yield, whereas with a bad one, it might give a bad result. I do not consider that the differences in the cultivation on the farm and that of the fields of the ordinary cultivator affects the relative difference between the yields of the cotton on the farm and in ordinary fields. In the past we pushed Selection No. 1, also *herbaceum* at Hagari; the only point about this is that it has a ginning percentage of 27 instead of 25 for the local cotton tract and it is white in colour, but I am not satisfied with it. I do not think it is strong enough; or that it is any better yielder than the local cotton. I have been giving it out since 1913, but I am now giving it up. The maximum area under it has been roughly about 3,000 acres. No. 25 has not yet been given out. It may be given out in the coming year. That depends on whether I can get an increase in price for it as compared with local cotton. The fact that the ginning outturn is only 25 will tell badly against it. If it had been thirty per cent., there would have been no difficulty in spreading it. The ginning percentage of the local cotton is 25 so that in that respect it is equal to the local cotton but it is better in staple. Apropos of the distribution of No. 25, last year, the Bombay Company at Sholapur tested the cotton for me and reported it to give 83 lbs. test for 20s count. This year, Messrs. Binny and Company have tested it and report only 69 lbs. for 19s counts. The 1917-18 season was late and there was a lot of immature cotton, also Madras is exceptionally dry just now, hence the low result. The test, however, is up to the average of Westerns. I therefore do not know how exactly what I shall do with this cotton.

2248. In the Northern tract, we have nothing to give out except No. 14. It is a strain of *indicum*. We have been giving out Sircar No. 2 cotton. The staple of Sircar No. 2 is $\frac{3}{4}$ th of an inch in length and it is white in colour. The yield is practically the same as that of the local cotton. The ginning percentage is thirty instead of 25. It is a strain of *herbaceum* cotton. I should think that half the crop in the Northern tract down the Nandyal Valley is No. 2. I do not know what the ginning percentage of the local cotton

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now but it must have gone up owing to the distribution of Sircar No. 2 and that would make it very difficult to introduce a variety of which the ginning percentage is only 25 which is the case with No. 14. I could put out No. 14 if I could get the price for it justified by its quality. Apropos of No. 14, Messrs. Binny and Company have tested it this year and report an average of 84 lbs for 19s counts. They are exceedingly pleased with it and say it is better than any Cambodia they have got this year. They promise to pay a premium of Rs. 10 this next season for it and we hope to get them to go on with this and put up a ginnery to do their own ginning. I should prefer to have a premium of at least Rs. 10 for this cotton; this would make it go until I got a sufficient area to bring in other buyers and also got the staff necessary. The organization would be the same as at present.

2249. The organization we have, to spread a new cotton, is as follows. The cultivators bring the *kapas* grown from the seed we have supplied to them. I have it ginned on the farm and I buy the seed and give them back the lint. I buy the seed from the money that I get from the cotton improvement grant. At present, we are charging two-thirds of the local rate for ginning but eventually I shall charge the full rate. We only pay the market rate for seed. The ryots dispose of the lint themselves; but we try to help them to do so. We try to make arrangements to get the big firms to buy it, but this has not proved very satisfactory. We have not held any auctions of our cottons. Last year we sold our seed at the rate of twenty lbs. to the rupee as against 25 the year before last and against 35 which is the local rate. We have always charged more for our seed than the local rate. No seed has been given out free except to the men who grow the seed for us and sell it back to us. The ordinary man who comes to us for seed pays for it. What I should do with No. 14 would be to buy the *kapas* and sell the lint myself. I could manage that for three years. I have got thirty acres under No. 14 this year, next year I should have 300 acres and the year after next the area would be about 3,000. I can manage to do that for these three years; after that outsiders will have to come in. There would be no trouble in regard to guaranteeing the purity of the crop; the ryots would get the seed from us and we should inspect the crop. Please note I refer to crop and not to produce. For the three years concerned I can guarantee practical purity, afterwards difficulty will arise. We could be quite sure of finding out if the cultivator played any tricks with it. In buying *kapas*, what we do is to give the cultivator his choice of settling up at any time he likes between the time he brings in the *kapas* and the end of August and we pay him according to the local rate. In the preliminary stage, they would not expect any premium; we pay at a rate which remunerates the cultivator sufficiently for his trouble and ensures that he does not lose. This year the man who is growing thirty acres of No. 14 for us is to get Rs. 300 per *khandi* for his lint. I do not know what the market rate is, but that is the rate we have fixed. As regards premium, if we get the Rs. 10 per *khandi* promised by Messrs. Binny and Company I shall hand it over to the ryots concerned in order to encourage them to carry on.

2250. I am decidedly of opinion that a more intimate study of Northern and Westerns is required. I consider that if there had been one man on each of these cottons, we should probably have got a cotton for the red soil tract, the *mungari* tract, which would have been so good that *roseum* would not have had any chance against it. That has been done in Tinnevely where *pulichai* cotton has disappeared.

2251. (*President.*) I consider that the average Deputy Director who has had an all-round training is a better man for this kind of work than the mere botanist who has got to learn his agriculture after he takes up the work. Most Deputy Directors who have taken a full agricultural course have done enough botany to enable them to work up the technique of the particular crop they are tackling. I am, of course, assuming that the man concerned has a bent for this kind of work, if he has not, he is better away from it. An agriculturist, with leanings towards the botanical side, is what is wanted. Even if the three circles I-III of which I am now in charge were divided up and there were a Deputy Director in charge of each, there would be enough work for one man on cotton in the Northern and Western tract. It would still be an enormous job. His circle would not include Coconadas at all; the Coconada tract is in the second circle. The division of the circles approximates to the cotton crop. I would have a Deputy Director for Northern and Western cottons who should do no other work. I think Assistant Directors are the best persons for district work and would keep research work for the Deputy Directors. The work on cotton and *cholam* (*guar*, *Sorghum vulgare*) would be sufficient to keep one man exceedingly fully occupied. I am doing this now and have handed over all the district work to the Assistant Director.

2252. I agree that central markets are necessary and also the standardization and inspection of weights. I heard of one case in Adoni in which a man had three sets of weights; one for the country folk who came in from the outlying villages, another for the people in the town, who were a little more wide awake, and a third *putka* weight for his own agent. It would, however, be very difficult to enforce standard weights and to see that they were being used.

2253. I think, on the whole, the Bombay market influences us most as we have got agencies of the Bombay Company and Messrs. Volkarts' here, both of which buy on Bombay standards and Bombay prices. The only firm which buys for local consumption is Messrs. Binny and Company.

2254. I have got my cotton valued in Bombay, as well as by the Imperial Cotton Specialist. Sircar No. 2 was so valued. As far as possible, I try to get the opinion of the local agents on the cotton.

2255. (*Mr. Hodgkinson.*) The cotton valued at Bombay was hand-ginned; it was clean picked farm cotton. Mr. Gammie got the valuation for us in Bombay. I have sent cotton for test to the Sholapur mills. The mills said that the valuation was being made on the basis of a blow-room loss of eighteen per cent. I saw that they were laying stress on the blow-room loss so I wrote to tell them that as far as I was concerned, tests like that did not count, because when we got a commercial sample, the blow-room loss would be about eighteen per cent.

2256. It would be a great improvement if coolies were paid daily wages for picking. At present the ryot pays them in kind. Payment varies from one-twelfth to one-eighth of the crop and is sometimes even lower. The proportion depends on the amount of cotton there is to be picked. It is so worked out that the coolies get a daily wage of four or five annas. The main cause of mixing is the fact that the middlemen in the villages buy the *kapas*.

2257. There has always been a difference between the price of Red Northern and White Northern, in spite of the fact that the buyer says that he wants quality and does not care about the class. Until this year, Red Northern have always sold at a rate of Rs. 5 to Rs. 10 per *khandi* less than White Northern, although Red Northern are of better quality than White. That being so, the middleman mixes a certain amount of red cotton with the white, so as to get a sample of lint which will be up to the standard of White Northern. There is no system of payment of premium for good colour or anything like that. The buyers contract for a certain quality and if a man brings a cotton which is redder than they consider good Whiter

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Northerns ought to be, they make an allowance. This year Messrs. Binny and Company are paying the same price for both. I do not know if the other firms are going to do likewise. Their standard varies not only from one year to the next but even in the same year. If firms are getting plenty of cotton, they are particular but, if they are not getting as much as they want, they are not so particular about it and the ryot knows that there is always a good chance of his cotton getting through as good White Northerns and of his getting the full rate for it. Hence he has no real inducement to bring cottons of good quality.

2258. The middlemen do not mix lint. They always mix *kapas* because the two cottons—red and white—get more thoroughly mixed in the gin. If the lint were mixed, it would be difficult to mix the two in such a way as to make the result appear to be genuine stuff. The seed of the mixture is sold for seed purposes.

2259. The cultivator could not be induced to market his crop in two qualities. I have tried it. What happened was that the agent made a calculation as to what the whole lot would cost at a particular rate. Then he added a little more for the better quality and deducted a good deal from the lower quality so as to make the result come out the same.

2260. In order to push Nos. 14 and 25, we should want to know how much more Lancashire would be willing to pay for them, i.e., if local opinion was against these cottons and was not willing to pay a premium.

2261. The first thing is to get ready cotton. Clean picking is bound up with the establishment of cotton markets. Dirty picking is perpetuated by the lack of such markets. It would tend to disappear if they were established. There is no premium whatever paid for really clean cotton. The practice is merely to condemn the cotton if it is below a certain standard. The first step is to sell ready cotton, to abolish the forward buying system, to get the ryot into direct touch with the big buyers and to cut out the middlemen and the dealers as far as possible. The big buyers are the spinning mills and the exporting firms. That can be done by the Bombay Company. The Bombay Company buy direct from the ryots in many instances. The middlemen have largely come into being as the result of the operations of big firms like Rallis and Volkarts as it is more convenient for them to have dealings with big men than with a lot of ryots.

2262. (President.) I have not got as big a staff as is necessary for my district but a scheme has been sanctioned which will provide a more or less adequate staff for the work. Our policy is expansion.

2263. I have nothing to do with the crop forecast. All I do is to send in a report to the Director of Agriculture as to what I think the crop is like.

2264. Messrs. Binny and Company paid us a premium for No. 2 cotton the year before last and promised to do likewise last year. Last year owing to abnormal rains amounting to seventy inches, the cotton was bad. All the cotton was bad, but, in spite of that, our cotton answered to a test of seventy lbs. with 20s at Sholapur and they refused to take it; Messrs. Binny and Company got Sircar cotton all right, but they did not get it as Sircar cotton. They refused to pay any premium for it and so the ryots mixed it with a lot of Red Northerns and sold it as White Northerns, at a price about Rs. 10 a *khandi* more than it would otherwise have got. The cultivators sold it to the very people who had refused to take it pure.

2265. I tried to start co-operative credit societies for cotton work, but they were not successful as the people in this tract are very backward.

2266. (Mr. Ashton.) If we could get a good cotton which would remain good and which the firms would buy, then there would be some prospects for irrigated cotton in these tracts. Cambodia was originally good but it has deteriorated and the buyers won't look at it now. The Cambodia which is grown under irrigation is now a mixture of different cottons. It is still grown near the villages where the land is pretty good and if the cultivators think it needs irrigation, they give it. There is no real demand for irrigation for cotton. They try to grow cotton as far as possible without irrigation but some of them do irrigate it. The main irrigated crop is paddy. A certain amount of *rugi*, turmeric and a small amount of sugarcane, mainly for chewing, are also grown under irrigation. There is plenty of water available for irrigating cotton, if it were required.

2267. (Mr. Roberts.) Sircar cotton No. 2 is looking after itself now. The cultivators come to us for fresh supplies of seed. Last year, I sold nearly as much seed as I could have sold. The seed was got from the seed farms. For next year's sowings, I have got 2,000 acres of seed farm. I would not go on with No. 2 if I can push No. 14 because the latter is an infinitely better cotton. I was misled by conditions here with regard to No. 2. I was told that quality was wanted and that the buyers did not care about class but I found that that was not the case. If it had really been the case, they would have paid the same rate for Red Northerns as for White Northerns which they have only just started doing.

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EXAMINED AT MADRAS, MARCH 5TH, 1918.

No written statement was submitted by the witness.

2268. (President.) I think it is no use trying to keep seed separate in the ginneries. The best plan for improving the quality of cotton is to grow large quantities of the seed which you want to propagate year by year, i.e., ten to fifteen per cent. of the crop. I would go for the multiplication of seed farms and for distribution of seed, on a large enough scale to swamp the undesirable varieties. The licensing of ginneries involves the appointment of an underpaid establishment and inspection by them.

2269. As to the stopping of the movement of loose cotton except in fully pressed bales from one station to another, I may say that it has been practically stopped by rail. A large quantity of Cambodia and *upham* goes down by carts to Tinnevely to be mixed with Tinnies because the station masters have been prohibited from booking it as ordinary traffic. If there were a large difference of price, *kapas* might be taken up to 200 miles by cart. When I went into the question many years ago, I found that cotton carts were being taken from Udampet all the way to Virudapatti to get the extra price. The distance was over 150 miles. It was a regular practice.

2270. I think that the Agricultural Department should recognize that the distribution of seed on a very large scale should be one of its ordinary duties. Private enterprise can never take it up in India and unless the Agricultural Department does it it will never be done and you will never be able to maintain a pure strain. The Madras Agricultural Department has been doing it on a fairly large scale but

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not as much as I should like. I would not rely on seed unions. Their successful working depends too much on the honesty of the members of the union and, knowing what people are, one is building on an insecure foundation in that respect. If there were a considerable difference in price between the Agricultural Department seed and the local seed, there would be a strong temptation for the union to adulterate it. I think that the staff that would be required for supervising seed unions would probably be better employed on large seed farms. I am always against interference with trade if it can be avoided and it could be avoided by multiplying seed farms. Interference with ginning factories would not be necessary if the Agricultural Department were to put out an enormous quantity of seed into the market every year. It would not cost Government anything as the seed farms would practically cover expenses. It is only a matter of staff. When the Agricultural Department has a good thing, as it has in Tinnevely, it is almost a mechanical process to multiply the seed so as to influence the whole crop of the district. I am always averse to any restrictions on trade. They are always very difficult to enforce and do a lot of harm. It seems to me that if buyers were any good, they would not buy *upham* in mistake for *karunganni* in Tinnevely. They might adopt the same methods against *upham* as they did against *pulichai*. The *pulichai* agreement is an indication of a course in which the trade is prepared to assist even without legislation. *Pulichai* is a land mark in that direction. I can only speak from my Madras experience. There may be a stronger case for legislation in Northern India.

2271. As to whether there is any field for any further botanical work on cotton in Madras apart from development through Deputy Directors, Mr. Parnell, the Economic Botanist, is not doing any work on cotton. We cannot have too many scientific men in the Department. Mr. Sampson has done extraordinarily good work in Tinnevely but he is a very exceptional man. Most Deputy Directors cannot administer large circles and at the same time carry out detailed botanical work. I do not think that the ordinary executive officer has the particular scientific bent of mind that Mr. Sampson has; I think that there might very well be a special botanist for cotton. There used not to be so much administrative work as there is now. The detailed examination of hundreds of different selections is work which requires a special man. If you select hundreds of specimens which are promising and watch them year after year and grow them on small plots, it involves a frightful amount of work, as it did in Tinnevely. We could do more selection work if we had the staff. When I was in charge of the Agricultural Department, it was recognized that the best method was to select in the field. I am strongly in favour of one or two special men for cotton, i.e., Deputy Director with good botanical training and would make them carry out their experiments on the district farms.

2272. (Mr. Wadia.) I am in favour of measures to restrict adulteration for trade purposes but I have not thought very much about the subject. If it is the case that inferior cottons and "fly" are brought in to mix with better cottons, I think that there should be some means of checking such practices. But, in every case, it would be necessary to examine the circumstances very carefully in order to see whether restrictions did not involve a lot of harm at the same time.

2273. As to the prohibition of the movement of *kapas* or lint except in fully pressed bales, I hardly know enough about the trade to be able to express an opinion. If the trade were in favour of it, I would certainly have no objection. The trade should know whether it was likely to do more good than harm. If there were complaints of fraudulent mixing, it ought to be possible to discover it from the bales themselves and for that purpose they should be stamped with the name of the factory at which the cotton was ginned and pressed. Something of that kind is now being done in this Presidency in connection with the hide trade. Each hide has to be stamped with the name of the tanner and he is prosecuted if it is adulterated. If this succeeds in the case of hides, there is no reason why a similar measure should not succeed in the case of cotton. An enormous improvement has been effected in the case of Madras hides. If there were a few properly paid inspectors, it should be quite all right. A lot of people would not be wanted. For hides we have only three or four men. I think it would be much better, if you are going to legislate, to put in a penal clause. The withdrawal of licenses could be got round by some family arrangement.

2274. I do not think there is any harm in enforcing the use of standard weights. I think that as a rule in Madras, the small village dealer purchases *kapas* from the ryot and takes it to the ginning factory. Until quite lately there was a great deal of hand-ginning done in Madras, but it is gradually dying out.

2275. In regard to steam ploughs, as far as my experience goes, there is no great demand for steam ploughing. I think that the Agricultural Department might well experiment with them. I cannot say anything more than that.

2276. (Mr. Hodgkinson.) In regard to picking, the practice varies in different parts; in one place cotton is picked in the morning and in another in the afternoon. I do not see what the Agricultural Department can do in regard to that. The Tamil gets up in the morning while the Telugu does not. The Tamil gets up extremely early and picks early; the Telugu stays out all day. I should say that picking is a matter for the buyers. They should make proper allowance for clean stuff. It really depends on the habits of the people which are totally different in the Telugu and Tamil districts. The Telugu districts at this time of the year are quite cool and pleasant. The Tamil districts are always hot in the middle of the day. The people in the Telugu districts do not mind making a late start and working for the whole day. It would be a difficult thing to get them to start before 9.30 or 10 A.M. in the morning. What the trade always says is "Why should we pay more for cotton when we can get it at a lower price?" I think that firms should have agents in the districts and find out what it would pay them to give to induce the ryot to pick cotton cleaner. Probably Rs. 10 or Rs. 15 extra per bale would be sufficient to induce the ryots to pick the cotton cleaner. This is a matter for private firms rather than for the Government. The smaller blow-room loss would compensate for the higher prices.

Mr. A. STEEL, of Messrs. A. and F. Harvey, Virudupatti.

EXAMINED AT VIRUDUPATTI, MARCH 9TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(c) Exotic Cottons.

2277. (20 and 21) Experience and varieties.—I have been 26 years in this country and have spent the most of my time in Virudupatti, Tinnevely district (now Ramnad district), and have been in close

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[Continued.]

touch with cotton cultivators. I have been an actual cotton cultivator myself for the last twelve years or so and have had a good deal to do with the introduction and establishing the growth of what is now called Cambodia cotton. In the year 1905 a small parcel of what I considered good cotton in *kapas* was brought into the factory for ginning, the seed of which I preserved and had it sown on my own land. It was first named by me as Tinnevely-American, but it was afterwards changed to Cambodia by the Agricultural Department as it closely resembled a cotton of that name, which was being grown on their farm at Koilpatti. Last year (1917), the crop of Cambodia was approximately 50,000 bales of 500 lbs. or half the total crop. The crop of this cotton in the Coimbatore district is given as 73,000 bales of 400 lbs. for last season. This, I consider, conclusively proves that long-stapled cotton can be successfully grown in this country, provided a certain amount of irrigation is available. If the poorer ryots are assisted with loans for sinking wells in the dry land, the yield of the crop could be doubled or trebled in a few years. Cambodia grows well on dry lands with a little irrigation. Two or three waterings during the growing season are sufficient, and an ordinary well costing about Rs. 400, such as is common in these parts, would be sufficient to irrigate about ten acres.

2278. (22) *Size of holdings*.—The size of holdings vary very much. The common practice in this district is to grow half cotton and half grain crops on each holding, changing the land over each year.

2279. (23) *Comparative returns*.—The average yield per acre on ordinary (well) irrigated lands is about 800 lbs. of *kapas* equal to about 270 lbs. of lint and on heavy manured garden lands 2,000 to 2,500 lbs. of *kapas* equal to from 700 to 800 lbs. of lint.

2280. (24) *Rotations and manures*.—On the ordinary land, little or no manure is used, but, on garden land, back-yard sweepings with a little cow manure mixed are used. The ryot should be instructed and assisted by the Agricultural Department to grow green manure suitable for his land on the off season which could be ploughed in at the beginning of the rains; this in itself would improve the yield on the ordinary dry land. The lack of manure is the principal drawback the ryot has to contend with in improving the yield.

2281. (26) *Suitability of existing varieties*.—I consider the right kind of cotton is being grown and it would be dangerous to introduce new varieties, as they take some years to acclimatize, and until this is done they are liable to disease which would most probably spread to the existing cottons. A most important factor which has hitherto received scant attention is the careful selection of seed for sowing purposes. I, however, understand that the Agricultural Department made a start last year and a number of depôts were opened at various places for the distribution of good Cambodia seed. In order to prove the above contention, I may mention that the *kapas* from which I originally obtained the seed gave a lint ginning percentage of 44 against the present average of 33 to 34.

2282. (27) *Prevention of mixing of different varieties*.—In order to put a stop to the mixing of cotton, either in the field or in the factories, I am in favour of the licensing of press and ginning factories and all irregularities discovered, such as mixing of short with long-stapled cotton, damping, etc., be brought to the notice of the authorities, and the person tendering such cotton severely punished. The news of such prosecutions would soon reach the middlemen and the ryots and adulteration would in a short time be stamped out. I would also make it a penal offence for anyone who allows cotton plants to remain on the field for a second year. All cotton plants should be pulled out at latest by the end of July and the land ploughed and prepared for the following year's crop. All plants allowed to remain on the field after July are liable to disease and if allowed to remain after the new crop has been planted, the disease is passed on to the young plants.

2283. (28) *Importation of seed*.—As already stated, I am not in favour of the unrestricted importation of seed from America or Egypt. Any new seed imported should be first grown under careful supervision and, after it has been thoroughly acclimatized and fit to resist disease, it should then only be given out to the ryot for sowing.

IV.—MANUFACTURE.

(a) *Ginning and pressing*.

2284. (36) *Type and number of gins and presses*.—We use Platt's double roller gins and have 78 in one factory.

2285. (37) *Size of bale*.—The size of bale is 400 lbs.

2286. (38) *Saw gins versus roller gins*.—We have not had any experience with the saw-gin but roller-gins seem to be well suited for the class of cotton grown in this country.

2287. (40) *Factory labour*.—So far we have had very little trouble in obtaining labour, but it is getting more difficult each year owing principally to the prosperity of the ryot.

Mr. A. STEEL called and examined.

2288. (President.) Cambodia first came down in some *kapas* from Ariyalur in the Trichinopoly district. The quantity was small and there was only about 300 lbs. of it. I saw it being unloaded and saw that it was good. So I began the cultivation of it in my own fields. It was not very successful at first but the ryots suggested that it should be irrigated and that proved the salvation of it. It does best on red soils. I have taken a considerable interest in the development of it. The Agricultural Department had something like it on the Koilpatti Farm at the same time. Mr. Benson brought some samples up to me and suggested eliminating it, but I advised sticking to it. The Agricultural Department called it Cambodia. From my knowledge of this tract of the country, I think that the maximum limit of the area under Cambodia has almost been reached but the outturn per acre could be very greatly improved by better cultivation. I have handled this cotton commercially from the time it was introduced. I do not think it is improving. The strength of the fibre depends on the season. If there is good rain, the strength is all right. If there is a shortage of rain, the staple is a bit weak. There has been no real deterioration. If good seed is grown, it is possible to get as good cotton as ever.

2289. I have been in close touch with the Agricultural Department for many years. I would suggest that the Agricultural Department should open small experimental plots at the different centres all over this tract along the railway line such as Virudupatti, Sattur, Tirumangalam, where there are ginning factories and where in consequence lots of people come in and could see the cultivation going on. Government could always rent small plots from five to ten acres. The cultivators there are following my cultivation very closely and, judging from that, I should say, they would follow the cultivation on the Government plots equally closely. There is plenty of scope for increasing the cultivation in districts in which there is no cotton grown at present. I strongly advocate an increase of demonstration.

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2290. The other cottons I handle are Tinnevelles and Salems. I think the cotton from Ariyalur is quite a good cotton. It is as good as Tinnevelles. It is an *upnam* which was probably Tinnevely cotton sent up there originally. The crop is about 20,000 bales in all. It has stopped coming down here. It used to come here loose and hand-ginned in the old days. It is a good quality, three quarters of an inch in staple.

2291. (Mr. Wadia.) My opinion is that no new varieties should be introduced but that the existing cotton should be kept pure. I have had some experience of Company No. 3. It is quite a nice cotton and is better than ordinary Tinnevelles. It is all descended from one plant.

2292. The Agricultural Department is working on the right lines. The distribution of seed should be controlled by the Department more or less all through. To get pure varieties, seed must be kept separate. The ryots have been buying any kind of seed from the ginners. That is the reason why a good deal of cotton is so very inferior. As long as the ryots get Cambodia seed, they don't care what it is. If the Agricultural Department undertakes the supply of good seed, the seed from the ginners could be used for feeding the cattle. I do not think the cultivators would sow their fields with the seed obtained from the ginning factories, if they could get good seed from Government farms. It would pay them to pay an extra price for the Government seed if they could get a good article. The cultivator will not mix seed intentionally for sowing purposes. He wants good seed and won't mind paying a little more for it.

2293. The ginning percentage of Cambodia has gone down from 44 per cent. to 34 per cent., owing, I think, to careless cultivation. A good plant may give more than 34 per cent. but the average plant does not. I think that Cambodia could be got back to its original level by seed selection. If you can increase the ginning percentage of *karunganni* from 25 to 33 per cent. by seed selection, you can do the same in the case of Cambodia. I do not think there is much difference in Cambodia when sown in lines except that it is easier to cultivate if so sown, and the plants are healthier. I do not think the yield is increased.

2294. I was wrong in saying that mixing takes place both in the factories and in the field. I should have mentioned the mixing which takes place in the villages by the village *bania*. Cotton is brought in in small lots. One man buys them and mixes them all up together, puts them into a bundle and brings it to the market. We cannot prevent this being done. We could not stop it in the field but we could detect it when the *kapas* comes into the factories and there catch the man who did it. In this way we could get the right person in the end. It is due partly to carelessness and partly to wilfulness. As regards the factories, it is the presses which mix cotton rather than the ginners. Ginners here gin separately as the practice is to buy lint, not *kapas*, and the cotton ginned does not belong to the ginners until after it is ginned. It is the presses which mix the cotton in order to make certain types. They mix short and long staple in order to get colour and standard. Mixing and damping should be stopped. It is very difficult to tell whether there is ten per cent. or fifteen per cent. mixture in lint, but we can always detect it in *kapas*. I am in favour of the licensing of presses and ginning factories. I want to make ginners, pressers, and tenderers of mixed cotton responsible right back to the field.

2295. The growing of a mixed crop of Cambodia with *upnam*, of course, leads to mixing. Ryots who grow a mixed crop of *upnam* and Cambodia could declare it as such. They actually do grow *upnam* with a fair amount of Cambodia, but not to a very great extent. It is very difficult to get the ryots to pull up plants.

2296. *Pulichai* was being mixed with Tinnevely and not with Cambodia. I have not been able to find out from what place the cultivators got the seed of *pulichai*. I think a shipper down here used to get Bengals to mix with Tinnevelles and send the mixture to Japan as Tinnevely cotton, and that some of the dealers must have got seed of that cotton from him. That is the only explanation I can give. The cotton was pressed with closed doors. Through the co-operation of the trade, the mixing of *pulichai* with Tinnevelles was practically stopped. All the firms combined not to buy *pulichai*. That was the first arrangement. It was afterwards arranged that we should take the cotton and not pay for it. We took *pulichai* mixed with other cottons but we did not pay anything for it. That action on the part of the firms stopped it. It did not pay the ryot to grow it and give it to the firms for nothing. All the *pulichai* grown was mixed with Tinnevelles. There was about two to three per cent. of mixture. It was got rid of in that way. I am certain if one or two prosecutions were undertaken against pressers or ginners it would stop mixing.

2297. I think leaving cotton in the field for more than one season should be made a penal offence; the cultivators should be warned on the first occasion and prosecuted on the second. All cotton should be pulled up by the end of July. Everything should be cleared off the ground before a new crop is started. There are always a lot of foolish people who let Cambodia remain on the field.

2298. (Mr. Hodgkinson.) I think Cambodia grows better on red soils. It seems to grow much better in Coimbatore district where there is better cultivation. With regard to *karunganni*, I would prefer to push it on unirrigated black soils in preference to Cambodia. On irrigated black soils, I would push Cambodia. My firm buys both *karunganni* and Cambodia. Cambodia and *karunganni* are mixed for spinning. For finer counts, a larger proportion of Cambodia is used. People at home will not even look at our cotton when they can get American cotton, on account of its being dirtier. They never know what they are going to get with Indian cotton. It is only when there is a shortage in American crop that they buy cotton from India. I would not call Cambodia a dirty cotton. I believe the people who export Cambodia cotton are the Bombay Company, Messrs. Volkart Brothers and Messrs. Ralli Brothers.

2299. The reason why Cambodia has deteriorated, during the last few years, especially in strength and staple is bad cultivation. The average has deteriorated but there is as good Cambodia to be got as ever. I do not think the deterioration is serious and it can be rectified.

2300. It would be a great improvement if cotton were picked more carefully. The labour is uneducated. The labourers get a share of their pickings as their wages. They take their share of *kapas* to the bazar and barter it for provisions. There is, of course, a possibility of getting seed mixed in that way.

2301. I have no experience of saw gins. The double roller gin is quite suited to the cotton we handle here.

2302. The *kapas* and lint in our factory do not get mixed, as the same door is not used for both. Any *kapas* in the lint is picked out when pressing takes place. I do not think that matters would be improved by having a platform for double roller gins. I think to be fed standing is better for the double roller gin. I do not know whether the labourers prefer it, but it is the best way. We do not find much mixing of *kapas* as a result of our methods.

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Mr. A. BALAKRISHNAN.

2303. (Mr. Roberts.) I gave away all the seed of Cambodia that I had. I started giving seed in 1907. Next year, a little of it went to Liverpool as samples. I paid the same price for it as for ordinary Tinnevely. As to the relative price, there is now a difference of about Rs. 20 per *pothi* of 332 lbs. in favour of Cambodia. Our mills kept it going until it became sufficient for a greater market. We did not pay anything extra for it. It succeeded on its own merits, being a better yielder. The ryots started irrigating it practically after the first year. I have sent some seed of Cambodia cotton to Baroda and other places in India. I have not sent any seed outside India. I have a letter from Mr. Hamilton, Director of Agriculture, Punjab, asking for some of it and I sent it him. I do not know why the seed of Cambodia is lower in price than the ordinary local seed. I got the seed analysed by the Agricultural Department and the report was that as regards the feeding qualities it was as good as *deshi* weight for weight, and yet the price of the local cotton seed is Rs. 13 and that of Cambodia only Rs. 7 per *pothi* of 250 lbs. I think that the differentiation in price is merely due to prejudice. There is a greater amount of fuzz round the seed which is perhaps the reason but, as regards nourishment, one is as good as the other according to the analysis I obtained.

2304. The staple of the ordinary Tinnevely cotton is about $\frac{3}{4}$ ths of an inch and of Company No. 3 which the Department has put out about an inch. The staple of Company No. 3 is certainly at least $\frac{1}{4}$ th of an inch above that of ordinary Tinnevely. It gets a premium from Rs. 15 to Rs. 20 per bale of 500 lbs. of lint. I do not know whether it should get much more than that. I am afraid that this premium induces ryots to mix *upam* with Company No. 3 in order to get Rs. 20 more for it and that this may ruin *karunganni* altogether. I do not buy *karunganni* until I see it. It is no use making forward contracts for *karunganni* and getting ordinary Tinnevelies for it. I do not think that Company No. 3 is worth at least a penny a pound more than ordinary Tinnevely. It means another Rs. 12. I think that is probably too much. I could not tell you what premium they get for *kapas*. Company No. 3 has got eight per cent higher ginning percentage than ordinary Tinnevelies. We do not buy *kapas*. We buy lint.

2305. I have suggested in my written evidence that the ryot should grow green manure suitable for his land in the off season which could be ploughed in at the beginning of the rains. I do not think that means losing a crop. The green manure could be grown in between other crops under well irrigation and used for the rest of the field. At present fodder crops are sown in September or October and harvested about January or February.

2306. (President.) It is a fact that Cambodia grown as a dry crop without irrigation on black soils is extremely precarious. I would go so far as to say that the Agricultural Department should discourage the practice of growing it as a dry crop. Even Cambodia on red soil should be irrigated. Black soil is not so good for it as red soil. There is any amount of variation in black soil. The staple of Cambodia is slightly over an inch. The average staple is about an inch. I have seen Cambodia $\frac{1}{4}$ th inch in staple in Coimbatore.

Mr. A. BALAKRISHNAN, Assistant Agricultural Demonstrator, Sattur.

EXAMINED AT VIRUDUPATTI, MARCH 9TH, 1918.

No written statement was submitted by the witness.

2307. (President.) I am an Assistant Agricultural Demonstrator. I was trained at the Coimbatore College and took my Diploma there in 1916, when I was appointed as Assistant Farm Manager. I was first stationed at the Mangalur agricultural paddy station for six months and then transferred to Madura to do work on green manure. Three months ago, I came to Sattur to do cotton work.

2308. When I came to Sattur, there were already three seed unions. One was started in 1916 and two in 1917. As to the working of seed unions, the procedure is for the department to supply seed to all the seed union members for the first year and sufficient seed of new strains to be grown as a seed farm for next year's use for the seed union members. The seed obtained by ginning the *kapas* of the member is pooled together and distributed to non-members in their village or in the neighbouring villages within a radius of five miles. From the seed got back in 1917 from the union started in 1916, about seventy *pothis* were supplied to villages within a radius of five miles. The other two seed unions were started only six or seven months ago. They will supply seed for sowing this year. The entrance fee to these unions is Rs. 2. The members of the union generally settle the amount to be paid for the reserve fund. This year the members paid Re. 1 per *pothi* of 250 lbs. of *kapas* they got from their fields. For instance, if a ryot has ten *pothis* of *kapas* he pays Rs. 10 to the seed union which goes up to the building up of reserve funds. The seed union which was started in 1916 has by this method got a reserve fund of Rs. 168. With this and with a certain amount of public money, the ryots are building a small school which is also used as a store room as well as for holding their meetings. The second union has a reserve fund of Rs. 140 and the third one of Rs. 37. The Department supplies the seed unions with fresh seeds every year sufficient to sow one-twentieth of the area of the members under cotton. This is grown by one or two of the union members to be nominated in a meeting. This is known as the "Union seed farm." In the second year they use the seed of that one-twentieth to sow the whole of their area. Each year we supply fresh seed for sowing. In order to keep a check on the purity of the seed supplied by the farm, the fields are frequently inspected by the members of the Agricultural Department who advise the cultivators to weed out undesirable plants. The Department lends the services of a cooly who attends to the uprooting of "rogue" plants. In addition, the Circle Demonstrator pay a constant visit to the seed union villages and inspect their crops. We arrange for the co-operative ginning of *kapas* and see that purity of the seed is maintained throughout. We issue a certificate in regard to ginning guaranteeing the purity of the cotton. There are 22 members in one union, 17 in the second and 28 in the third. The union which has got 28 members includes cultivators from two surrounding villages. None of the unions includes all the cultivators in one village. If they are members of the seed union, they must pool their seed together. In that case, they cannot obtain the price of their seed immediately and they have to wait for some time to get it. For this reason some cultivators do not like to join the seed unions. Other villages grow our Company cotton but object to join the seed union on the ground that they do not like to wait for the price of their seed till the next sowing season. They want the money at once. Of the three villages, one has got a co-operative credit society. The members of the seed union are also members of the co-operative society.

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Mr. N. S. KULANDASAMI PILLAI.

Mr. N. S. KULANDASAMI PILLAI, Agricultural Assistant.

EXAMINED AT TUTICORIN, MARCH 12TH, 1918.

No written statement was submitted by the witness.

2309. (Mr. Roberts.) I have ten years' service in the Agricultural Department. I was working for a year and a half at Palur, a year and a half on the Taliparamba farm; I then had a year's work in the wet lands of the Madura district and the rest of the time I have been at Koilpatti. I was in charge of the Koilpatti Farm in addition to the district work.

2310. I have been in charge of the distribution of seed and the work of introducing the drill system of sowing cotton in lines. The difficulty in regard to sowing with drills is that only a certain amount of moisture is required. In the sowing season, from September to November, the rain is often very heavy and the fields get miry and so sowing with drills is rather difficult owing to the land being too moist. If there is not much rain, it is not difficult to sow with drills. In some places, the ryots are in the habit of sending their cattle away for grazing and other purposes as soon as sowing is over, and so they have to get them back for bullock hoeing. There is a certain amount of difficulty about that but it is when the land is hand sown. Some of them use the hand scraper even when the cotton is sown in lines. Ryots who want to keep their land scrupulously clean use the hand scraper as well as the bullock hoe. Black cotton soil begins to crack at the end of February. Then it is not possible nor is it of any use to bullock hoe; but round about Tuticorin where sowing is very late they do so if the plants are far away from each other but this is only in very few cases. They must bullock hoe before the land cracks. Bullock hoeing delays the cracking. There is not much difficulty with regard to the repair of implements. Any village carpenter can do it. Carpenters are in the habit of getting *mamul* (customary dues) in the shape of grain. Some ryots pay extra money for repairs to the bullock hoes. Others do not. This year the area sown by drills is nearly 19,173 acres of which all except 2,330 acres which are under *cumbu* (*Pennisetum typhoides*) are under cotton. The practice has become firmly established in some places. In some villages there are six or seven implements and when they have got the implements, it means that the practice is firmly established, only the season should be favourable.

2311. As regards the distribution of seed, we have fifty acres on the Koilpatti farm under cotton. About ten acres are used for experimental purposes. The rest is used for growing seed of improved types. This seed is given out to seed farms, i.e., under seed farm conditions. There are two systems. One is the system by which we purchase the *kapas* giving a premium and gin it under our supervision and preserve the seed. Under the other system, we give the seed to ryots and the cotton is grown under our supervision. It can be sold to any firm but the *kapas* has to be ginned under our supervision and the whole of the seed is purchased by the Department excepting the quantity required by the ryots for their own sowing; the lint is sold to the firm. Each seed farm ryot may take his seed separately; suppose in a village there are three or four ryots growing cotton under this system, we get all these ryots to gin their cotton on the same day. We take back the seed at a fixed rate; this year we purchased at the rate of Rs. 10 per *pothi* of 247 lbs. i.e., the price of the local seed. The cultivator gins his *kapas* co-operatively with our assistance and gets a premium for the lint. We sell the seed at Rs. 12 to Rs. 15 per *pothi* of 247 lbs. We charge the small premium to cover expenses. This seed farm seed is mainly sold by the Department through depôts at selected centres. We take over all the seed from the seed farms. We engage a depôt agent and pay him a commission of eight annas per *pothi* of 247 lbs. He has to keep a record of the ryots to whom he has sold the seed. These agents are generally influential and honest ryots who have never dealt in seed before. In most cases, they turn out satisfactorily. The demonstrators generally supervise the sale of the seed. Each demonstrator has a 'maistry' and a messenger. The agents charge the price fixed by the Department which pays them their commission. The highest rate last year was Rs. 15 per *pothi*. Seed unions and depôts are different. We start depôts in what we think would be good places for starting seed unions. The depôts become embryo seed unions. In addition to the ordinary seed grown for distribution, we give seed of one of our improved types sufficient for one-twentieth of the area of the seed union for the next year's cotton. This seed is sold to the union members at Re. 1 less than the rate at which it is sold to non-members. The ryots gin their *kapas* co-operatively under our supervision and we give them certificates on the day it is ginned. The seed is taken by the members and kept under the control of the Secretary. Suppose there are thirty ryots with 800 acres. In the first year, we chose one or two of these to run the union seed farm which would be one-twentieth of 800 acres, i.e., forty acres in extent. For that forty acres we give them our special selection seed at a concession rate. That is grown by the one or two ryots chosen for the purpose and the seed is preserved for the next year when the whole of the seed union will use it for the remaining 760 acres of land. The seed farm goes on continuously. We always supply seed for forty acres, the seed from which is sown on the rest of the area. The cotton from that 760 acres is ginned co-operatively and the seed is stored by the union under the charge of the Secretary and sold at the next sowing season to the ryots of that village and the surrounding villages. The area of a seed union includes the whole area under cotton belonging to its members. The ginning is done co-operatively by a big ginner. There are no gins in the villages, where we have seed unions at present. We do not fix the price at which the seed unions can sell their seed. Last year, the maximum price was Rs. 30 per *pothi*. There was a very big demand for seed and they sold all they had. There is no danger at present of the seed being mixed owing to its high price. We have got ten unions at present. If villages are selected carefully and if proper supervision is exercised, there is no danger of mixing. When most of the villages have got the seed, the price may not be so high, but there will always be a demand for the seed of the seed unions as the Agricultural Department is always putting out fresh seed. The ryot is always used to pay extra price for seed for sowing and to get it from distant villages.

2312. Of the two types of cotton, Company No. 2 and No. 3, No. 2, which has a ginning percentage of 30 to 31, is safer, although Company No. 3 has a better yield and its ginning percentage is 33. Company No. 2 can withstand any season, whether wet or dry. It gives late pickings. Company No. 3 and Company No. 2 might be mixed together. The firms prefer Company No. 3 on account of its colour although as regards quality and staple, there is not much difference between the two. No. 3 is cleaner and whiter.

2313. In new villages where they have not got Company seed, we give them seed on condition that they will get their cotton ginned co-operatively and that we will give them a certificate so that they can sell their cotton. We give them this certificate at the time of ginning; we supervise the growing also and we are present at the time of ginning to see if there is any mixture of any other seed. We can get a premium easily for

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improved cotton. It is doubtful if any premium would be given if the whole tract is covered with Company cotton. There was keen competition last year and the year before last and the premium rose from Rs. 7 to Rs. 16 and it even touched Rs. 30 per 500 lbs. of lint. The increased premium certainly helped our work.

2314. I can distinguish the seed of the Company No. 2 and Company No. 3 from ordinary seed. I cannot say what the proportion of mixture is in lint but in seed *kapas* I can. Company No. 2 has a dull colour—a dirty colour. No. 3 has a rather dark colour.

Mr. G. A. D. STUART, I.C.S., Director of Agriculture, Madras.

EXAMINED AT TUTICORIN, MARCH 12TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

2315. (Preamble.)—A reference is solicited to page 33 of the Handbook of Commercial Information, Madras, where a general account is given of Madras cottons and the cotton trade. Messrs. Hilson and Sampson have furnished the committee with detailed information regarding the—

Northerns and Westerns, Salems, Tinnevellys, Cambodia cottons.

2316. *Introduction of Akola cotton into Madras.*—I have very little to add to Mr. Hilson's notes on Northern and Western cottons. I wish however to deal somewhat more fully with the recent introduction of short-stapled "Akola" cotton, *vide* paragraph 2239 of Mr. Hilson's evidence. This cotton is of the *neglectum* type and, judging by the name given to it by the ryots, must be identical with Mr. Clouston's *roseum*. It has been largely introduced from the north in recent years—although a certain amount of cotton of the *neglectum* type has always been grown in this tract. So far this cotton has been confined to the *mungari* (early) crop which is grown on red soils and which only constitutes some ten per cent. of the total crop. The ryots believe that this cotton will not do well on black soils. But it grows well on black soils in the Central Provinces, I understand. The last two years have been exceptionally wet in this tract and this cotton has given very heavy yields of lint, up to 200 lbs. per acre. The average yield for Westerns is nearer 50 lbs. per acre. If this "Akola" cotton should keep up its high yield when grown on black soils in years of normal rainfall, then it is obvious that it would replace the long-stapled local cotton and that we should be powerless to prevent it doing so.

2317. *Eradication of "pulichai"*—In the south, in the Tinnevellys tract, it has been possible to exterminate a similar intruder, *i.e.*, *pulichai*, owing to the fact that—

- (a) the ginneries are controlled by a limited number of buying firms;
- (b) the improved strains of long-stapled cotton, produced by the Agricultural Department give a better return per acre, in money, than *pulichai* does.

(2) These factors do not apply to the northern districts where there are numerous petty ginneries uncontrolled by any buying firms, and where no strain has been evolved from the local cotton which gives anything like so high a yield as has been given by "Akola" cotton in recent years.

(3) This is the present situation, but I must emphasise that we are not certain of one of the factor, *i.e.*, the yield of "Akola" on black soils in normal years. If this is high, there is the danger; if it should be low, there is nothing to fear.

2318. *Cottons of the southern districts of Madras.*—Mr. Sampson has dealt fully with the cottons of the south of the Presidency (Salems, Tinnevellys and Cambodia) and I have nothing to add. Details of the campaign against *pulichai* cotton in Tinnevely are given in the Administration Reports of the Agricultural Department for 1915-16 and 1916-17.

2319. *Necessity for research workers.*—Copies of the last three reports to Government on the expenditure of the special grant for improvement of cotton are enclosed (Annexure I). These give a more detailed account of the work of the Agricultural Department regarding cotton. In this connexion, I should like to urge the necessity for the employment of more research workers on cotton improvement. The continued breeding, selection, and improvement of better strains of cotton in any particular tract is full-time work for an Economic Botanist or Deputy Director. At present there are two Deputy Directors engaged in cotton improvement, Messrs. Hilson and Sampson, but they have each of them general executive charge of all agricultural work in half the Presidency and are also conducting research into crops other than cotton. It is hard enough to keep things going with the present exiguous superior staff. If we are ever to do much work on cotton, an increase of staff is essential.

II.—COMMERCIAL ASPECT.

2320. (30) *Local trade conditions.*—Mr. Hilson has given a full account of the trade customs in the north.

I enclose a copy of a note drawn up by me last year giving a general account of trade conditions with suggestions for improvement (Annexure II).

2321. (31) *Standardization of commercial names.*—Please see paragraph 2315 above. The term "Salems" might well be dropped. It refers mainly to cotton grown in the Coimbatore district. The bulk of this is now Cambodia and is marketed as such. The rest might be called by its vernacular name "*uppam*." The term "Cocanadas" is not very suitable. No cotton is grown near Cocanada, but the bulk of the crop is exported from this port. "Guntur" cotton would be a better term.

III.—STATISTICAL.

2322. (33) *Improvement of cotton forecast.*—My forecast for 1916-17 was 377,379 bales. The actual figures of cotton pressed and loose cotton received at mills totalled 374,145 bales from 1st February 1917 to 5th January 1918. This would seem at first sight to be sufficiently accurate, but I must admit that it is due to overestimation in some tracts cancelling, underestimation in others. However I have been giving attention to the improvement of these forecasts and can say that the figures of area and of normal average yield per acre are as accurate as they can well be. The difficulty is to ascertain the probable yield of the current crop as compared with the normal. This is, however, always a matter of opinion. I get reports from revenue officers, agricultural officers and commercial firms and take them all into consideration.

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(2) Owing to the desire for "uniformity" on the part of the Director of Statistics, all forecast of sowings or outturns from Madras have to go in several months too early, *i.e.*—

First sowing report refers to area sown up to 31st July. Practically no cotton has been sown in Madras. Second sowings report refers to area sown up to 30th September. Sowings in the north will have begun but may not be completed in a late year. No sowings yet in the south.

First outturn report refers to area sown up to 30th November. Sowings in the north will be complete, but much too early to judge the outturn. Sowings in south in progress, not complete except very early years.

Second and final outturn report refers to area sown up to 31st January. The crop is flowering and beginning to boll in north. It is too early for a final forecast of yield. Last year the crop was badly damaged by rain on 31st January, but recovered a month later. In the south the crop has not flowered, some may not be even sown until end of December in a late year. It is impossible to judge outturn.

2323. (34) *Improvement of other statistical information.*—A copy of my local cotton press return is attached (Annexure III). I have been changing the form from time to time to meet the views of the firms. From 1st February I hope to be able to show details under more varieties of cotton and also to show rail exports about a month in arrears. Until now quarterly rail export figures were available only some four to five months in arrears.

2324. (35) *Publication of Liverpool and Bombay prices.*—It is quite unnecessary to publish Liverpool and Bombay prices at up-country markets. The prices are well-known. Local prices of "Tinnies" at Tuticorin follow Liverpool prices closely.

V.—GENERAL.

2325. (46) *Attitude of buyers to improved cottons.*—Buyers have given a premium for our improved strains in Tinny cotton. But we have found it difficult to get any sufficient premium for better picking of Westerns and Coimbatore cotton. Both Messrs. Hilson and Wood made the experiment of separating their cotton into good and bad (stained and dirty) and selling them separately. The prices obtained were, on the average, the same as what would have been obtained from the unseparated cotton. There was therefore no inducement to sell clean cotton separately. It would appear that the ryot or dealer who happens to have a lot of specially clean cotton would be well-advised to mix it with some otherwise unsaleable dirty cotton before selling it. He gets the same price for the mixture as he would get for the clean cotton. This is not as it should be. The difficulty appears to be that the local agents are not authorised to go above the price which is fixed for cotton of average quality although they have full authority to allowance for defect below this quality.

2326. (47) *Effect of water rates.*—This question does not apply to Madras. Cambodia is the only irrigated cotton and this is grown under private wells without extra charge.

ANNEXURE I.

Reports on expenditure of the special grant for improvement of cotton, Madras.

(i)

G. O. No. 1635-REVENUE, DATED 19TH JULY 1915.

Read—the following paper :—

Reference from the Board of Revenue (R.S., Sur., L.Rs. and Agri.), No. 1234, dated 23rd June 1915.

The Hon'ble Mr. LL. E. BUCKLEY,

Commissioner of Revenue Settlement, Survey, Land Records and Agriculture.

Read—the following paper :—

Letter—from D. T. CHADWICK, Esq., M.A., I.C.S., Director of Agriculture, Madras.

To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land Records and Agriculture

Dated—the 19th June 1915.

No.—R.O.C. 1935-G1.

I have the honour to submit a report on the expenditure of the allotment for cotton improvement during the financial year 1914-15 together with proposals for the current financial year.

2. The comparison of receipts and charges with budget allotments necessarily follows the financial year and will be dealt with first. Then will follow as usual a report on the actual working season from which a better idea can be obtained of what is being done. This will deal chiefly with the seed obtained from the seed farms sown in August to October 1913 and sold to the ryots in the next sowing season in 1914.

3. *Finance of the year 1914-15.*—In G.O. No. 2166-Revenue, dated 29th July 1914, an allotment of Rs. 46,350 was provided for the year 1914-15. This was distributed in the three districts in which work was in progress as follows :—

	Allotment.	Total expenditure, 1914-15.	Receipts in 1914-15.
	Rs.	Rs.	Rs.
Tinnevely	28,230	27,986	21,051
Bellary	7,120	6,764	10,127
Kurnool	11,000	11,640	10,79
TOTAL	46,350	46,390	41,967

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The figures are rounded to the nearest rupee. The net expenditure has thus been Rs. 5,133 as compared with Rs. 11,260 in 1913-14. Bellary has this year paid its way so far as the financial year is concerned. So also would Kurnool but for a well-intentioned mistake by a junior officer which will be mentioned later. It is only rarely that the accounts in Tinnevely will balance because, in that district, the work in connexion with the introduction of spread of the seed drill and harrow and the testing of unit strains also enters in these accounts. In that district the cost of raising, purchasing, handling the crop plucked early in 1914 and selling the seed in the fall of the year was Rs. 21,837 and the receipts obtained from the sale of lint and seed were Rs. 20,767. The balance is due to some seed remaining unsold as work was extended to villages in a new circle round Virudupatti where hitherto our men were not known. The rest of the expenditure in Tinnevely was chiefly incurred on spreading the use of the drill and in testing unit strains.

4. Regarding last year's figures, it must be remembered that we purchased *kapas* before the war broke out and had to sell seed after hostilities had commenced and the price everywhere had fallen. Very fortunately, Deputy Directors had sold most of their lint before the price fell, otherwise there had been a heavy loss on the year's working. In the south, an average price of Rs. 171 per *khandi* was obtained for ninety *khandis* of lint and in the northern division Rs. 145 for 97 *khandis*. The prices are now down to about Rs. 140 to Rs. 110 and have been lower still. As was also the case with the ryots, the south was caught more than the north as the season there is later.

5. An account of the work from the point of view of each working season is now given.

Tinnevely.—The lines on which work is in progress were explained in detail last year. They are—

- the general improvement in the purity of the crop by selling seed from bulk selection. (The extent to which definite improvement can be obtained from this method is limited);
- the testing, development and distribution of unit strains. (This takes much longer to do but promises the greater ultimate development);
- the fostering of co-operative sale of pure crops direct to the large firms, and
- the spread of the use of the seed drill and harrow.

6. *The 1914 crop*.—In October–November, 1913, 400.68 acres were sown on seed farm conditions for the Department by 61 contract growers in different villages. This is exclusive of 95 acres sown by ryots with different unit strains on ordinary field conditions in order to provide lint sufficient for proper spinning tests in the mills. The average yield over all this area was 342 lb. of *kapas* an acre which is practically normal but the ginning percentage was 27.3 which is above the normal of 25 per cent. for Tinnevelles. By this means 120,015 lbs. of good seed was obtained. Out of this 103,465 lbs. (sufficient for 12,170 acres) were sold to ryots for seed depôts for sowing purposes for the current crop, as compared with 89,448 lbs. in the previous year and 58,350 lbs. two years ago. Of the remainder, 4,000 lbs. were required for the seed farms for the current year, there was a wastage of less than one per cent. and 11,500 lbs. were left over unsold and had to be used as cattle food. Of this, 5,000 lbs. was seed of unit strains which were grown for spinning tests and which it was never intended to sell. So there was 6,500 lbs. of saleable seed left unsold at the end of the year, sufficient for 810 acres.

We naturally never like to see good seed unsold at the end of the year but these are the reasons for this surplus this year:—

- 4,875 pounds were left over in the Virudupatti circle.

This is a new circle and was the first year in which work had been started there. It always takes a little time for the man to get known and for his seed to become appreciated. But yet he sold 77 cent. of the seed given to him.

- The balance was entirely of a single unit strain (No. 2) all of which could have been sold in villages where it was already known but an attempt was made to spread it into other villages and as Rs. 15 per 250 lbs. was asked for it when the seed was selling at about Rs. 10 and our ordinary *karunganni* at Rs. 12, there was not such a ready market for it in these new villages.

7. The power gins at Koilpatti worked economically and the cost of collecting, cleaning, ginning and disposing of lint and seed was reduced from Rs. 3-2-0 to Rs. 2-12-8 per 250 lbs. of *kapas* handled.

8. *Joint sale by the ryots direct to the gins*.—Last year, it was reported that, in 1913, three villages had tried taking their pure crops themselves direct to the large gins and selling them direct, getting back the seed unmixed and keeping it for the next sowing season. In 1914, all firms possessing gins agreed to take special pains over such consignments brought direct, to gin them at once and to keep them unmixed from the produce of other villages and those firms directly connected with spinning apart from export pay higher rates for produce grown from Department seed, whilst the Sri Chidambara Vinayakar mills at Koilpatti go still further and pay still higher rates for lint grown from unit strains. The trade is thus giving considerable encouragement to the ryot in growing better cotton. In 1914, twenty villages took all or some of their produce direct to the mills under these arrangements and if the resultant seed be valued only at the price of bazar seed at the time of ginning (that is at the lowest figure of the year and, of course, it is worth much more for seed) they made an extra average profit of Rs. 1-2-0 per acre. The seed is the same as the seed we sell at enhanced rates at sowing time, and if it be valued at something below our rates, they cleared an additional Rs. 4 per acre on their crop after paying all carting charges, etc., and as there is now a prospect of better rates for better quality the profits from this method of sale should increase still further. By this means 132,750 lbs. of *kapas* were taken direct to the firms and the villagers retained 97,500 lbs. of pure seed for sowing purposes—sufficient for over 11,500 acres in the following year. It is not unfair to assume that most of this was used solely for seed because we restricted sales in villages which had their own seed; there were practically from 20,000 to 22,000 acres under pure departmental seed. This is only a feeble beginning, but it illustrates the power of this movement, if it can only be firmly established. Properly organised co-operative societies are needed but at present the method of financing them has not been worked out. These societies must have some funds. The members must be able to obtain advances from their society against their standing crop. The middleman now gives them and so gets a hold of the crop, practically fixing the price of the *kapas* when he gives the advance. The result is that, at present, we can only get those who are out of the clutches of the middlemen to take their crops in direct, whereas it is the smaller man who cannot wait to bargain for a good price for his crop after it is plucked who stands to find most benefit from such co-operative sales. It is not easy to run two separate societies—credit and sale—in one village, to find men to manage both and the problem of financing these glimmerings towards joint sale have not yet been solved.

9. The reports of the mills on the spinning tests made on some of the unit strains are given on pages 20 and 21 of the Proceedings of the Agricultural and Trade Conference of December last and are very favour-

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able (also please see page 27 *ibid*). The Department is very much indebted to Messrs. Harvey and Company for their assistance in this matter and it was a matter of general satisfaction that Mr. Steel's name appeared in the last New Year's Honours list. That conference also proved very useful in clearing the position of the Department in relation to spinners and exporters (bottom of page 27 *ibid*) and in determining what would be acceptable as a test of any strain of cotton (pages 26, 27 *ibid*).

10. In the midst of all this work on seed in Tinnevely, there is one dark spot, *viz.*, the spread of a low grade type of Bengal cotton locally known as *pulichai jari* or *mailam* used for adulterating Tinnevelles. Efforts are still being continued to try to bring about joint action (page 31 *ibid*).

11. *Drill cultivation*.—The use of the drill and harrow still continue to spread. The total area under drill cultivation in the last six years has been as follows:—

Crop.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.
	Acres.	Acres.	Acres.	Acres.	Acres.
Cotton	1,549	2,757	2,733	5,809	9,339
Cumbu	70	818	1,144	1,308	1,990
TOTAL	1,619	3,575	3,877	7,117	11,329

In anticipation of an increased demand for these implements, 100 new sets were made to be ready for sale at the sowing season. Thirty-two sets were sold, although I believe that the sales would have been higher but for the natural disinclination of many to incur more capital expenditure at a time when price seemed to be generally falling.

12. All the different lines of work will be continued in this and the following year; especially towards the establishment of unit strains, joint sales, and the spread of the seed drill and harrow. Four hundred and seventy-six acres were sown on seed farm conditions in October, 1914, for the current year. In addition 59 acres are sown with unit strains for the purpose of spinning tests. These seed farms (about 540 acres) are distributed through the whole cotton tract from Virudupatti to near to Tuticorin.

There are now four circles, one managed from the farm at Koilpatti and the other three each in charge of an assistant farm manager. This work forms excellent training for these men.

13. *The Northern Division*.—The work here is somewhat similar but that the seed which is being sold in Bellary is from a unit strain and, in 1914, in Kurnool, seed from a unit strain is taking the place of that from bulk selection known locally as *sircar* cotton. Mr. Hilson is doing a great deal of work on cotton selections (*vide* the Hagari and Nandyal station reports) which promises well for the future, but he is not yet prepared for spinning tests with any. He started much later than Mr. Sampson. Joint sale has not made such progress as the Telugu ryot of the Ceded districts is not so enterprising as his brother in Tinnevely and also because we need to get the details thrashed out first in the latter district. They are, however, beginning to appreciate the importance of keeping the seed with which we have supplied them pure, especially at Nandyal as ryots there have brought their crop to be ginned at the farm gin solely for this object. The seed, which is being put out in Kurnool, is maintaining a ginning percentage of 30 per cent. as against 26 per cent. to 27 per cent. in the local variety (*vide* pages 14, 15 and 16 of the Proceedings of the Agricultural and Trade Conference). The mixtures of different cottons in Kurnool, especially in the ryots' fields, are much worse than is the case in Tinnevely. There is thus not so much to write about the work in the Ceded districts, but it is equally important and is progressing among a much more conservative class of people. We have not nearly so many trained Telugu assistants and both in Bellary and Kurnool the work is more concentrated than in Tinnevely.

14. *Bellary 1914 crop*.—In 1911, the seed farms in this district measured 89 acres; in 1912, 378 acres; and in 1913, 693 acres were sown on seed farm conditions. The cotton yield both in Bellary and Kurnool in 1914 was poor. From Bellary, 85,839 lbs. of *kapas* were obtained yielding 23,142 lbs. of lint and 61,409 lbs. of seed, ginning percentage 27, which is normal for that variety. After the damaged and bad seed was removed 58,253 lbs. remained, of which 1,820 lbs. were used on this year's seed farms and the balance 56,433 lbs. were available for sale. 51,943 lbs. (sufficient for about 5,500 acres) were sold at an average of 15 per cent. above bazar prices for seed. This was a good year's work as compared with last year when 5,842 lbs. of seed were sold although a balance of 4,490 lbs. was left unsold.

15. *1915 crop and 1916*.—674 acres in five villages were sown on seed farm conditions last September for the 1915 crop. The acre yield, however, throughout Bellary is even less than last year. It is hoped to put down in 1915 approximately 1,000 acres of seed farm. The power gin should also then be at work which greatly facilitates handling the crop.

16. *Kurnool 1914 crop*.—The work which was mentioned last year of putting out cotton of one particular strain instead of seed grown from crops on the principle of bulk selection was continued. In all, 651 acres were sown under seed farm conditions. There was not sufficient seed of the one variety (No. 2) for the whole of this area and a portion of the seed farms was for the last year under the old *sircar* cotton. The year was not a good one for cotton and the yields were low but even so the average figures illustrate the differences between the two:—

	Average yield of <i>kapas</i> per acre.	Average ginning percentage.	Average number of lbs. of lint per acre.
No. 2	lbs. 139	30.4	41½
<i>Sircar</i> cotton	134	27.4	36½

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[Continued.]

In a normal year, the yields of *kapas* per acre ought to be double these. The quantity of good seed obtained therefrom was 53,132 lbs. (43,899 lbs. of No. 2 and 9,233 lbs. of *sircar* cotton). Of the No. 2 cotton 9,430 lbs. were used in sowing the seed farms of October 1914 and so 43,702 lbs. were available for sale. Out of this, 30,736 lbs. of seed were sold for sowing purposes at rates 25 per cent. above those prevailing in the bazar. The balance which remained unsold was largely with tahsildars. The Assistant Director who was for the first time in charge of this work with the best of intentions responded too readily to an offer of help from the Revenue Department in the matter of actually selling seed. Tahsildars can help agricultural work in several ways but it is only in the rarest cases that they have time and are fitted to sell seed direct to ryots. One result was a balance of unsold seed and another was that our seed was so widely scattered in different taluks of Kurnool and part of Cuddapah that it was absolutely impossible for the farm manager on this duty to visit the growers and to try to persuade them to gin their crop separately and preserve the seed. The result of it is that most trace of it is gone. However it was the *sircar* seed which was sent furthest away. Mr. Hilson was on leave last year, when all these arrangements were made. This failure to dispose of all the seed coupled with the fact that it was only a half normal crop puts us on the actual working of that crop with a loss of Rs. 1,242 (the figures, of course, run across the accounts of two years). Of course, had not most of the lint been sold at pre-war rates, it would have been much more. The fall in price of lint due to the war affected us like everyone else although we were not caught so badly as some.

17. 1915 crop and 1916.—In October 1914, 1,052 acres have been sown on seed farm conditions, all with No. 2 and approximately 1,000 acres will be sown again this year. It is also hoped to inaugurate joint sale in one village near Nandyal, practically the whole of which is under our seed.

18. *Cambodia cotton*.—Selection work has been started on this at Koilpatti and Coimbatore. General sales are now restricted to the Northern Division where 1,732 lbs. were sold. Of this, 1,013 lbs. were taken by two inspectors of co-operative societies in Anantapur district. As usual, this work was done at a small profit.

19. On the whole, thus, exclusive of that used for seed farms, 186,144 lbs. of seed sufficient for 21,900 acres were sold direct to districts. Another 2,250 acres are sown under seed farm conditions and about another 11,500 acres in Tinnevely have been sown with our seed saved by the villages by joint sale. There are thus to our own knowledge some 35,650 acres under pure types—the largest area yet reached.

20. I now request that funds be sanctioned for continuing this work. Mr. Hilson estimates his requirements at Rs. 26,355 and Mr. Sampson at Rs. 33,740 or a total of Rs. 60,095. Provision has been made in the budget for Rs. 50,000 but from this Rs. 7,500 has been reappropriated for the paddy-breeding station. I have the honour to request that the sum of Rs. 42,500 be now sanctioned for the current year. The future of the cotton market is so uncertain that it is more difficult than usual to forecast requirements. It may be necessary in December to apply for further funds, but it will be seen from previous years that actual requirements usually fall below the estimates by about Rs. 15,000. I therefore request that Rs. 42,500 be sanctioned. It is really impossible to say what receipts will be as they depend on what the price of cotton will be later in the year. They ought to be about the same.

Reference—No. 1234, dated 28th June 1915.

The proposals of the Director of Agriculture for the improvement of cotton cultivation during 1915-16 are submitted to Government.

2. The requirements of the Southern and Northern divisions are estimated at Rs. 26,355 and Rs. 33,740 respectively, or Rs. 60,095 in the aggregate. The budget allotment for the current year for expenditure on cotton is Rs. 50,000. From this, a sum of Rs. 7,500 has been reappropriated in G.O. R. No. 223, Financial, dated 11th June 1915. The Director requests that the balance, viz., Rs. 42,500 may be sanctioned for the present. The Board supports the proposal and requests that Government will be pleased to approve them and sanction the expenditure.

T. RAGHAVIAH,
Secretary.

Order—No. 1685, Revenue, dated 19th July 1915.

The proposals of the Director of Agriculture for the improvement of cotton cultivation during 1915-16 are approved and an expenditure of Rs. 42,500 thereon sanctioned.

Miscellaneous.

(True extract.)

L. DAVIDSON,
Secretary to Government.

(ii)

G.O. No. 1683, REVENUE, DATED 22ND JULY 1916.

READ—the following paper :—

Reference from the Board of Revenue (R.S., Sur., L. Rds. and Agri.), No. 1200, dated 29th June 1916.

The Hon'ble Mr. LL. E. BUCKLEY,

Commissioner of Revenue Settlement, Survey, Land Records and Agriculture.

Read—the following paper :—

Letter—from D. T. CHADWICK, Esq., I.C.S., Director of Agriculture, Madras.

To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land Records and Agriculture.

Dated—the 14th June 1916.

No.—R.O.C. 2213-GI.

I have the honour to submit a report on the expenditure of the allotment for cotton improvement during the financial year 1915-16 together with proposals for the current financial year.

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[Continued.]

2. The statements of receipts and charges for the financial year 1914-15 will be dealt with first. These necessarily cut across two working seasons, so that this portion will be followed by a report on the last complete working season, i.e., in regard to the seed raised from the seed grown on the seed farms in October—November 1914 and sold to the ryots for sowing purposes in the sowing season of 1915.

3. *Finance of the year*.—In G.O. No. 1685, Revenue, dated 19th July 1915, an allotment of Rs. 42,500 was made for this work in 1915-16. This was distributed as follows :—

District.	Allotment.	Total expenditure in 1915-16.	Total receipts in 1915-16 as per Treasury accounts.
Tinnevely	Rs. 27,000	Rs. 23,830	Rs. 14,196
Bellary	7,000	5,867	4,774
Kurnool	8,500	10,002	13,419
TOTAL	42,500	39,699	32,389

The net expenditure in the year was thus Rs. 7,310 due chiefly to the debit balance of Rs. 9,634 in Tinnevely. The reasons for this will be shown later. The gross totals are less than those of last year, not because a smaller quantity of crop was handled but because the price of cotton ruled low. In fact it was a difficult year for sellers. The price rose up till April 1915 and then began to fall away steadily and rapidly. All our cotton had not come in from the seed farms in April and I instructed the Deputy Directors to hold, especially as in August prices began to rise. Then came the notice that cotton was contraband and I told them to sell. Prices, however, went on rising and had I waited another month or six weeks, the adverse balance would have been much less. As a matter of fact, the declaration that cotton was contraband was probably little more than a sop to popular sentiment, the operative factor being the Order in Council of the preceding March. In normal years, I leave the selling to the Deputy Directors but last year was abnormal and I took the responsibility. Even so, much of the expenditure for which it is impossible to show any counter-balancing return is due to the extension of drill cultivation in Tinnevely of which more later; and I trust also to be able to show that the general value of the work being done on cotton is of such worth to the country as to make an adverse balance of Rs. 10,000 or Rs. 15,000 money well expended.

4. An account of the work from the point of view of each working season is now given.

5. *Tinnevely*.—The work continued to follow the four main lines described in last year's report. In October—November 1914, there were 535 acres on seed farm terms as compared with 495 in the previous year. Fifty-eight out of the 535 acres were sown with special selections to obtain sufficient for spinning tests. The following table will show clearly the development of work in this tract. A reference to the files of earlier years will show that even in the south of Tinnevely most of the fields carried mixed crops of *karunganni*, and *uppam*. The first work to which the Department set itself was to restore the position of *karunganni* the true Tinny cotton, meanwhile by plant selection to evolve better and superior strains of *karunganni*. After eight years' continuous effort and care, this latter work had yielded three strains which on ryots' lands were most promising—which we called Company No. 1, No. 2, and No. 3, respectively. Seed farms are not Government farms. They are ryots' land cultivated by the ryots with seed given to them by the Department, on the condition that we can see that the lands are cultivated on the methods we approve and on the condition that we can buy the crop on terms fixed. Incidentally, it may be remarked that I cannot conceive of a more practical form of demonstration. There is at times a feeling abroad that insufficient demonstrations are given on our agricultural stations. Demonstrations are given on those stations, but as agencies of instruction, they are simply not in it beside demonstrations on ryots' own land where we supply the seed, the ryot follows our methods and himself handles the resulting crop. He knows everything that has happened and so do many of the villagers. We could not put our recommendations to a severer test. The seed farm ryots are changed continually. But this is not the reason for which I referred to the seed farms detail. The point is that the figures I am about to give are for our cottons grown on ryots' lands by the ryots with their own cattle and on methods within their own means.

Variety of Cotton.

	Ordinary selected <i>karunganni</i> .	Company No. 1.	Company No. 2.	Company No. 3.	Special unit strains not yet put out.
Acreage of seed farms sown in October 1914	100	39.76	272.88 (a)	63.28	58.75
Acreage from which <i>kapas</i> was bought in 1915	100	39.76	256.75	63.28	58.75
Yield of <i>kapas</i> therefrom in lbs.	18,452	9,603	77,135	19,839	15,495
Yield per acre in lbs. of <i>kapas</i>	184	242	289	313	263
Quantity of lint thereby obtained in lbs.	4,625	2,565	21,707	5,998	4,388
Quantity of seed obtained in lbs.	13,588	6,960	54,506	13,527	10,821
Wastage	239	78	922	314	286
Percentage of lint to <i>kapas</i>	25.07 per cent.	26.71 per cent.	28.14 per cent.	30.23 per cent.	28.35 per cent.

(a) The produce of 6.13 acres was rejected under our contracts as the ryot had plucked *kapas* of other fields and mixed it with his seed farm cotton.

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[Continued.]

In this table the two chief points to which special attention is requested are yield per acre in *kapas* and the percentage of lint to *kapas*—multiplying these out, one gets the lint produced per acre, and it is the lint per acre which pays:—

	Yield of <i>kapas</i> per acre in lbs.	Percentage of lint to <i>kapas</i> .	Yield of lint per acre in lbs.
Ordinary pure <i>karunganni</i>	184	25.07	46.1
Company No. 1	242	26.71	64.5
Do. No. 2	289	28.14	81.3
Do. No. 3	313	30.23	94.8
Other single plant strains	264	28.35	74.8

These are not figures from small plots on an agricultural station but are actual averages from different ryots' lands on extents from 40 to 200 acres scattered in different villages. They are actuals and it would be justifiable to take them as they stand, but I think the comparison as it stands is too favourable to the selections. The season throughout was not a good one for cotton and was worst in the extreme south where perhaps most of the "ordinary selected *karunganni*" seed farms were situated. Thus the yield of *kapas* per acre is, I think, too low in the table given above if the comparison of yields of lint are pressed. To prevent any risk of exaggeration, I would prefer for purposes of comparison to place the average yield of the *kapas* per acre of "ordinary selected *karunganni*" at the highest of any of the selections from all, the seed farm cottons, viz., 313 lbs. per acre. This is undoubtedly the basis of comparison most unfavourable to the single plant selections. The first line would then read—

	Yield of <i>kapas</i> per acre.	Percentage of lint to <i>kapas</i> .	Yield of lint per acre.
Ordinary pure <i>karunganni</i>	313	25.07	80

and the comparison of yield per acre of lint would be 80, 64.5, 81.3, 94.8, 74.8 lbs. respectively.

6. I submit that these figures of yield of lint certainly in regard to Nos. 2 and 3 justify the expenditure of money and labour spent on this work of cotton improvement, but this is only one side of the fascinating story of cotton. The price which the ryot actually gets depends not only on the quantity he has for sale but on the price he gets for it. The system of joint direct sale by ryots which was started three years ago has enabled the ryots not only to preserve their stocks of good seed for next season's sowing, but to get an extra premium for the quality of the lint for all these selections. Nos. 1, 2 and 3 have been proved by actual bulk spinning tests to be superior to ordinary *karunganni* in purity, length and strength of staple. We are greatly indebted to Messrs. Harvey and Company, who were the first firm to recognise the possibilities of these selections and to offer a premium to those ryots who brought in their crop to them pure. In 1913, the amount of such lint obtainable was very small and the premium offered was Rs. 3 a *khandi* of 500 lbs. over the market rate. Thanks to the system of direct sale and preservation of seed, the extent under these selections has been steadily increasing. In 1914, the premium was again Rs. 3 a *khandi*, in 1915—the year now under report—it opened at Rs. 5 a *khandi* and closed at Rs. 6. In the current year, it is worth mentioning that the quantity was becoming sufficient to interest exporting houses and competition increased. This year opened with a premium of Rs. 10 a *khandi* on this cotton and has already advanced Rs. 13 a *khandi* and beyond and has touched Rs. 16 a *khandi*. These are actual transactions from which there is no escaping. The price this year for fully good fair Tinnies has been between Rs. 180 and Rs. 195 per *khandi* of 500 lbs. If the price be taken at Rs. 180 and the premium be only put at Rs. 10 and the figures of yield of *kapas* per acre be put the same as the normal figure of one pothi and a half (or 375 lbs.) the difference to the ryot between company No. 3 and ordinary pure *karunganni* can very readily be shown. From what has been written above it will be seen that these figures taken are moderate and no exaggeration.

Company No. 3.		Ordinary pure <i>karunganni</i> .	
Item.	Particulars.	Item.	Particulars.
Average yield of an acre in <i>kapas</i>	1½ pothis or 375 lbs.	Average yield of an acre in <i>kapas</i>	1½ pothis or 375 lbs.
Lint percentage	30.23	Lint percentage	25.07
Therefore quantity of lint obtained per acre	113 lbs.	Therefore quantity of lint obtained per acre	94 lbs.
And quantity of seed obtained per acre	262 lbs.	And quantity of seed obtained per acre	281 lb.
Value of 113 lbs. of lint at Rs. 180 the <i>khandi</i> of		Value of 94 lbs. of lint at Rs. 180 the <i>khandi</i> of	
	Rs. A. P.		Rs. A. P.
504 lb.	40 5 0	504 lbs.	33 9 0
Premium on 113 lbs. of lint at Rs. 10 the <i>khandi</i> of 504 lbs.	2 4 0	No premium	Nil
Value of 263 lbs. of seed at Rs. 12 per pothi of 247 lbs.	12 12 0	Value of 281 lbs. of seed at Rs. 9 per pothi of 247 lbs.	10 4 0
Total money return from an acre	55 5 0	Total money return from an acre	43 13 0

Balance in favour of company No. 3, Rs. 11½ per acre.

Little wonder that this seed is at a premium and that watchfulness over this seed supply is the most urgent and pressing work there. These selections are two of Mr. Sampson's and he deserves the greatest

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credit for them. With organisation, constant care and effort there is a prospect of raising the whole general standard of Tinnevely cotton within an appreciable time. But this work is becoming so important and widespread that with green manuring in Madura, these three districts of Madura, Ramnad and Tinnevely form a sufficient charge for a Deputy Director. Mr. Thomas has thrown himself into the work with characteristic keenness and determination.

7. After this rather long expatiation on the merits of these cottons, I return to the usual statements of the returns of sales of seed in the sowing season of 1915. As explained above, the yields of the crop of 1915 ran low throughout. We withdrew from distribution the whole of the seed of Company No. 1, as although it was an excellent cotton it was none or very little better than Company Nos. 2 and 3 and yielded appreciably less. With the surplus stock of farm seed available 87,096 lbs. of these selected seeds were sold at a premium in village depôts sufficient for 8,700 acres. This however, is only a partial statement of the case. Very much larger quantities of this seed were used for sowing as a result of the system of direct sale and co-operative ginning—vide below. In 1915, they thereby obtained 274,560 lbs. of good selected seed. The ryots undoubtedly kept this seed for sowing—for such purposes it commanded a premium of thirty per cent. to fifty per cent. at sowing time. It was, of course, impossible to trace all this seed and I prefer to make the conservative estimate that only two-thirds of it was really sown, which brings the total of selected seed sown in 1915 up to 271,136 lbs. sufficient for some 27,000 acres—hence it is that the cotton is becoming of interest to exporting houses. No account is taken here of seed which has been out with the ryots for more than two years.

8. Joint direct sale by ryots to ginning firms.—This is a most potent method of increasing the stock of good seed in the country and of getting into the hands of the ryots the full value for the quality of the cotton they grow and for penalising them directly and immediately for any adulteration. It is, however, uphill work due to village factions and personal tastes and requires careful watching. In few villages has it been possible so far to get a sufficient number together to form a registered society. Special attention is being given to this; but at present the practice is largely confined to those who are sufficiently well off not to need advances from the broker. The following statement, however, shows its development since it was started in 1913-14:—

Year.	Number of villages concerned.	Number of ryots who brought their selected cotton direct to ginneries.	Average number of ryots per village.	Amount of <i>kapas</i> so brought.	Amount of good seed so obtained.	Amount of good seed sold by Government from Government seed farms, etc.
				LB.	LB.	LB.
1913-14	3	6	2	..	..	89,448
1914-15	20	63	3.1	132,750	97,500	103,465
1915-16	29	89	3.1	..	274,560	87,096

The tendency is in the right direction. The last column has been added to show how important this direct sale is from the point of view of seed supply. Even if it be assumed that only two-thirds of the seed so obtained is actually sown, yet this source supplied last year 183,040 lbs. of selected seed, or more than double that from the seed farms. The latter will always be necessary to maintain purity of type and to put out better cotton still.

9. The future.—Except in the extreme south, ordinary selected *karunganni* is not now being grown on the seed farm conditions. It is all Company Nos. 2 and 3. Special efforts are being made to test these in the Virudupatti circle (vide below). In view of the competition, which has risen this year for this class of cotton, I have instructed Mr. Thomas to consider whether he could not manage 1,000 to 1,500 acres of seed farm in 1916-17.

10. Pulichai.—The above is one aspect of the efforts made towards the improvement of purity of Tinnevely cotton. Another very important step has been taken in another direction which is vital to all efforts towards purity and quality. Reference has been made in previous reports to the existence to a low grade cotton locally known as *pulichai* or *jari* which was introduced somehow some six or seven years ago either from the Central Provinces or Northern India. It is short stapled, very white, harsh with a fairly clean and somewhat large greenish-brown coloured seed. It belongs to an entirely different class of cottons from "Tinnevelles." It does not yield on the average in total weight of *kapas* more than Tinnevelles do; but the lint outturn is thirty per cent. against ordinary Tinnies 25 per cent. In actual value pure it is only about two-thirds that of Tinnevely but it is obvious that if by mixing with Tinnevelles, practically Tinnevely prices can be obtained for it, it pays to grow it on account of its greater lint outturn. It is also perfectly obvious that if it became widespread, the particular standing which Tinnies hold in the world's cotton market would be lost, possibly never be regained. For the last few years, the cultivation of this low grade cotton has been extending because Tinnevely prices were practically obtainable for it. The danger had become serious and imminent. Its presence in Tinnevely lint had been detected at least once in a consignment sent abroad. Practically every firm interested in Tinnevely cotton wrote to me last year independently asking that its cultivation should be stopped or at least checked—no easy matter in the circumstances. After some negotiations, all buying firms interested in Tinny cotton agreed not to purchase any *pulichai* pure or mixed in the 1917 season. Leaflets were printed in the vernacular and widely distributed before the sowing season in 1916 giving notice of this resolve. Men were sent specially to the villages to dissuade sowings. The Revenue authorities helped. Sowings of *pulichai* instead of increasing were reduced to one-third of the previous years and many plants sown by chance were uprooted. It was not, however, eradicated. Especially around Virudupatti and chiefly through the agency of some dealers, who gambled on the agreement breaking down, a considerable area was sown chiefly mixed. The result was that the early offerings of cotton at Virudupatti

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—the chief cotton market—all contained some admixture of *pulichai*. Firms refused to admit any cotton within their yards, and the whole market was at a standstill with no money circulating for a fortnight. By that time the very name of *pulichai* was rapidly becoming anathema to the brokers. This, however, could not hold forever, and the firms agreed to take such cotton on the sole understanding that the *pulichai* mixed with it should not be paid for. The pendulum began to swing and it soon became apparent that more stringent methods were needed. All firms then entered into a formal legal agreement permitting inspection of their yards and books by a selected officer of the Agricultural Department and the imposition of penalties where *pulichai* had been paid for. I wish to record my great appreciation of the spirit and help with which firms have worked with us towards this object of stopping adulteration often at much inconvenience, trouble and loss. I am most indebted to them. There were some who thought we were following a vain hope in endeavouring to stop adulteration but by the progress and experience gained I am sure it can be done. It is, however, absolutely essential to continue effort in its stricter form for another year and to give intimation thereof widely before the next sowing season. It is a straight issue for purity and quality on which both the cotton firms and the Agricultural Department are staking their reputations with the ryots and neither of us can afford to lose them. Meanwhile our selected cottons are coming on more valuable than *pulichai* and it is largely for this reason that larger seed farms are necessary this year. Meanwhile the Collector of Ramnad, Mr. Loftus-Tottenham—who by the bye is rapidly becoming an expert in the vegetative characteristic of cotton—is continuing the fight against it in the villages. If it can thus be practically stamped out by this joint action, it will be as potent a factor in maintaining the quality of Tinnevely cotton as anything that can be done on the Agricultural station by way of selection. Personally, I hope then to be able to make out a case for legislation against its reappearance.

11. *Drill cultivation*.—Inter-cultivation and efficient tillage are as important in the raising of good crops as is good seed and the sowing of seed in lines with bullock hoeing later between them makes for good cultivation. The spread of this system is shown in the following table of area drilled in the last six years. Figures represent acres—

Crop.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Cotton	1,549	2,757	2,733	5,809	9,339	12,715
Cumbu	70	818	1,144	1,308	1,990	4,345
TOTAL	1,619	3,575	3,877	7,117	11,329	17,060

It should be remembered that when left to spread by its own virtue, the use of the drill and horse hoe with planting of turnips took 100 years to establish itself throughout Gloucestershire. The sowing season during which the drill can be used is very short and the stationary character of the figures of 1911-12 and 1912-13 seemed to indicate that we were reaching the limits of the capacities of the regular staff for demonstration. In 1913-14, the system was tried of trying a few labourers in the use of these implements in different villages and employing them for from two to four months to teach others in their own and adjoining villages. The implement may at first be lent but the ryot uses his own cattle and his own labour and that of another cooly. The proportional cost of departmental assistance so given is therefore small. This system of agricultural instruction and demonstration—for such it only but emphatically is—worked so well that, in 1915-16, 196 coolies were so employed. Demonstrations were given in 194 villages of which 48 had never previously been touched. In eight villages, where the system was well established, all assistance was withdrawn. The Deputy Director has to watch this work to see that assistance in a particular village is not unduly protracted. The fact remains that since the employment of these village instructors, the area drilled has risen from 3,877 acres to 17,060 (or more than fourfold), the area done by the ryots themselves without any assistance in any form was 8,400 acres or more than twice the total area drilled in 1912-13, 83 sets of implements each capable of cultivating 50 acres of land were sold in 1915-16 as against 32 in 1914-15 and 35 in 1913-14 and 12 in 1912-13. It is also reported that more and more are being made locally. It is on the cost of these trained local coolies that the chief debit of the work in Tinnevely arises: but I submit that the method is justifying itself by its results. It is a class of work, in which demonstration and instruction must be given; and no cheaper or more effective agency could be found than by training men in the villages and making them into local instructors: it is a class of work in which if results are to be obtained it is necessary to go wide, which could never be done if one relied solely on the superior staff trained at the college. I also submit that it effectively disposes of the suspicion which arises now and again in certain quarters, that demonstration in the villages is not attempted. Our men in every district taken up are always at it. Also I trust that the manysidedness and scale of this work in Tinnevely, the variety of agencies brought in to help when considered with that, for instance, now in progress against palm disease in Godavari, will show that the Agricultural Department is not afraid to go wide wherever it sees an opening and where it can guarantee supervision and control. I am very glad to be able to commend the work of the staff in Tinnevely. In regard to implements it may be mentioned that a two-furrow disc plough costing Rs. 284 has been hired out to one agricultural society.

12. *The Northern Division*.—The cotton industry itself is not so well organized as in the south, the Department is not nearly so well staffed (it is only now that Telugu students are passing through college); drill cultivation is the rule everywhere, and, therefore, for these reasons it is impossible at present to tackle the question of adulteration and the work is not so manysided as in Tinnevely and Ramnad.

13. *Bellary*.—872 acres were sown on seed farm conditions in 1914 with *sircar* cotton No. 1. The yields especially were low. The contract with one ryot was denounced as he had mixed his seed. In all, 49,796 lbs. of *kapas* were bought (an average yield of only 78 lbs. an acre) which gave a lint percentage of 29.1, well above that of the country crop: 7,900 lbs. of seed was used on the seed farms of 1915 and the balance of all the good seed as well as 2,259 lbs. preserved from the 1913-14 crop and 2,952 lbs. purchased from Hagari Agricultural Station (in all 29,032 lbs.) were sold to ryots at eleven per cent. above bazaar rates. It is very satisfactory that all was sold though stocks were much less than last year. A much larger area,

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namely 934 acres in eight villages, has been sown on seed farm terms in 1915 and there should be still further development this year.

14. *Kurnool*.—Here the seed farms in 1914 (*viz.*, 1,052 acres) were sown with *sircar* cotton No. 2 which is a single plant selection giving a higher lint outturn and a whiter and better cotton. Here also the contract with one ryot had to be denounced because he had stored his cotton in a leaky hut and spoiled it, so really the produce only of 975 acres was brought, *viz.*, 134,742 lbs. of *kapas*—a yield of 138 lb. an acre, the same as in the previous year. It will be noticed that, at both Bellary and Kurnool, they are working now solely with the progeny of single plant selections. After picking over the *kapas*, 71,609 lbs. of good seed was obtained, of which 7,908 lbs. were used on seed farms, 51,850 lbs. sold to ryots at twenty per cent. above bazaar rates and 1,497 lbs. were left unsold. In 1915, 980 acres were sown on seed farm condition.

15. The total sales of seed in the three centres may be shown as follows:—

	1914-15.			1915-16.		
	By ryots from direct sale of lint.	From seed farms.	TOTAL.	By ryots from direct sale of lint.	From seed farms.	TOTAL.
Tinnevely and Ramnad	97,500	103,465	200,965	183,040	87,096	270,136
Bellary	..	51,943	51,943	..	29,032	29,032
Kurnool	..	30,736	30,736	..	61,850	61,850
TOTAL	97,500	186,144	283,644	183,040	177,978	361,018

16. *Proposals for financial year 1916-17*.—It is easier this year than it was last to estimate financial needs. The difficulty is apparent when it is remembered that the price of Tinnevely cotton last year fell to Rs. 125 a *khandi* and has this year been Rs. 195. Yet the budget for 1916-17 had to be prepared in August 1915 when prices of cotton were exceedingly low. Now the position has changed completely—prices have been high. The Deputy Directors of Agriculture estimate their requirements as follows for the current year:—

Northern Division.

	Rs.
Bellary	25,270
Kurnool	13,270
TOTAL	38,540

with receipts Rs. 35,655 and the Southern Division estimates expenditure at Rs. 39,190 with receipts Rs. 32,092. The total estimates therefore are—expenditure Rs. 77,730 receipts Rs. 67,747. The budget allotment is Rs. 51,500. I have the honour to request that this sum may be sanctioned and if possible another Rs. 25,000 from the reserve with Government or, in all, Rs. 76,500.

Reference—No. 1200, dated 29th June 1916.

The proposals of the Director of Agriculture for the improvement of cotton cultivation during 1916-17 are submitted to Government.

2. The requirements of the Northern and Southern Divisions are estimated at Rupees 38,540 and Rs. 39,190 respectively, or Rs. 77,730 in the aggregate. Towards this, there is an allotment of Rs. 51,500 only in the budget for the current year. The Director requests that sanction may be accorded to the expenditure of this allotment and that, if possible, a further sum of Rs. 25,000 may be allotted towards the deficit. The Board approves of the Director's proposals and specially urges that the increased allotment may be sanctioned.

3. The Director's report is one of the greatest interest and shows how much the cotton cultivator has been helped by the Agricultural Department.

Copies may be distributed to the Press.

S. KRISHNAMA ACHARI,
for Secretary.

Order—No. 1683, Revenue, dated 22nd July 1916.

The Government sanction an expenditure of Rs. 51,500 on the improvement of cotton cultivation during 1916-17. If notwithstanding the use of the strictest economy, the Board of Revenue finds it impossible to confine the expenditure to this amount and if provision cannot be made to meet the excess by reappropriation, an application may be made later for an additional allotment.

Miscellaneous.

(True Extract.)

J. P. BEDFORD,
Acting Secretary to Government.

Madras.]

Mr. G. A. D. STUART, I.C.S.

[Continued.]

(iii)

G.O. No. 2533, REVENUE, DATED 16TH AUGUST 1917.

READ—the following paper :—

Letter—from G. A. D. STUART, Esq., I.C.S., Director of Agriculture,
To—the Secretary to Government, Revenue Department.
Dated—Madras, the 26th June 1917.
No.—R.O.C. 1573-2686-GI.

I have the honour to submit a report on the expenditure of the allotment for cotton improvement during the financial year 1916-17 together with proposals for the current financial year.

2. The statement of receipts and charges for the financial year 1916-17 will be dealt with first. These cut across two working seasons so that this will be followed by a report on the last complete working season, i.e., in regard to the seed raised from the seed grown on seed farms in October-November, 1915, and sold to the ryots for sowing purposes in the sowing season of 1916.

3. *Finance of the year.*—In G.O. No. 1683, Revenue, dated 22nd July 1916, an allotment of Rs. 51,500 was made for this work in 1916-17. An additional allotment of Rs. 25,000 was sanctioned in G.O. R. No. 251, Financial, dated 8th November 1916. This was finally distributed as follows :—

	Allotment.	Expenditure in 1916-17.	Total receipts in 1916-17 as per treasury accounts.
	Rs.	Rs.	Rs.
I Circle, Bellary and Kurnool	31,800	24,350	31,142
VI Circle, Tinnevely, Ramnad and Madura	44,700	43,647	30,058
	76,500	67,997	61,200

The net expenditure in the year is, therefore, Rs. 6,797, made up of a profit of Rs. 6,792 in the I Circle and a loss of Rs. 13,589 in the VI Circle. These figures of profit and loss do not represent the real facts however because they refer to the financial year and not to any complete working season. The profit in the I Circle is largely due to the fact that the 1917 season there was very late owing to the receipt of heavy rains at the beginning of February which threw back the crop. The resulting crop was also poor owing to the very wet season. Consequently only Rs. 1,983 were spent on the purchase of cotton in the three months, January to March 1917, as against an estimate of Rs. 13,000 and an actual expenditure in the corresponding months of 1916 of Rs. 6,812. This also explains the failure of the Deputy Director of Agriculture, I Circle, to spend his full allotment. As soon as the nature of the season became evident, Rs. 4,000 were transferred from the allotment of the I Circle to the VI Circle and Rs. 3,000 of this extra sum were usefully spent. Similarly, the loss in the VI Circle is mainly due to the large expansion of the work there as explained in paragraphs 8 and 9 below. Rupees 17,536 were spent in the three months, January to March 1917, mainly in connexion with the 1917 crop, as against Rs. 9,370 spent in the corresponding months of 1916. The receipts corresponding to this expenditure of Rs. 17,537 will come into the current financial year 1917-18.

4. An account of the work from the point of view of each working season is now given.

5. *VI Circle.—Tinnevely, Ramnad and Madura.*—The work continued on the same lines as in previous years. In October-November 1915, there were 552.5 acres on seed farm terms as compared with 535 in the previous year. The strains of cotton grown and the results obtained are shown below :—

Type name of selection.	Area under seed farm in acres.	Total yield of <i>kapas</i> in lbs.	Yield of <i>kapas</i> in lbs. per acre.	Lint outturn per cent.	Average yield of lint in lbs. per acre.
C. Company ¹	371.91	122,015	328.1	29.38	96.5
C. S.S.F.C. ¹	21.34	6,092	285.5	30.89	88.2
C. S. S. F. C. ²	20.23	5,805	286.9	29.23	83.9
A. Company ³	100.94	42,905	425.1	32.72	139.1
A. S. S. F. A. ¹	20.04	9,273	462.7	31.62	146.3
A. S. S. F. A. ²	18.04	7,276	403.3	31.66	127.7
TOTAL	552.50	193,366	..	..	..

The two strains, Company No. 2 and Company No. 3 were grown for distribution to ryots. The others are special selections which were grown to provide material for spinning tests. Attention is invited to the figures of yield of lint per acre. In viewing these, it must be remembered that they represent only the result of the "season" picking, i.e., the harvest up to April, 1916. We do not buy the cotton harvested at the "summer" picking in July-August from these crops as this is usually of inferior quality. Moreover it is the district practice to pay in kind the coolies who pick the cotton and we accordingly lose sight of some ten per cent. of the crop from this cause. For the purpose of crop statistics, the district average yield for a normal crop is taken as ninety pounds of lint per acre, including both season and summer pickings. This is possibly too low. It will, however, be making a very liberal estimate if we adopt ninety pounds per acre for the normal

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[Continued.]

yield of ordinary Tinnevely cotton from the season picking alone. On this basis the profit to the ryot in growing Company No. 3 in place of ordinary Tinnevely works out as follows :—

	Company No. 3 (actuals from 100.94 acres in 1916).	Ordinary Tinnevely (estimated).
	Per acre.	Per acre.
Yield of <i>kapas</i>	425 lbs.	360 lbs.
Lint per cent.	32.72 per cent.	25 per cent.
Lint obtained	139 lbs.	90 lbs.
Seed obtained	286 lbs.	270 lbs.
	Rs. A. P.	Rs. A. P.
Value of lint at Rs. 200 per <i>khandi</i> of 504 lb.	55 3 0	35 11 0
Premium on lint at Rs. 16 per <i>khandi</i> of 504 lbs.	4 7 0	No premium.
Value of 286 lb. of seed at Rs. 12 per <i>pothi</i> of 247 lbs.	13 14 0	Value of 270 lbs. of seed at Rs. 9 per <i>pothi</i> of 247 lbs. Rs. 9 13 0
TOTAL	73 8 0	45 8 0

Balance in favour of Company No. 3 = Rs. 28 per acre.

These figures explain the popularity of Company No. 3 cotton. A premium of Rs. 16 per *khandi* was readily given by the firms on account of its good qualities. In some cases as much as Rs. 20 was given. The new selection S.S.F.A. promises even better results in yield per acre and has been very well reported on by the spinning mills. This is therefore now being put out on as large a scale as possible under the name Company No. 3-A.

6. From the 552 acres of seed farms sown in 1915 supplemented by the surplus stock of farm seed, 135,028 lbs. of seed were obtained in the 1916 season. Of this 87,086 lbs. were sold to ryots at a premium for sowing in October-November 1916 and 26,840 lbs. issued to seed farms, the balance, i.e., 21,102, being classed as inferior and sold as cattle food. From last year's report it will be seen that we sold 87,096 lbs. of seed in the 1915 season, sufficient to sow some 8,700 acres. About 40 per cent. of the resulting crop from this seed was sold by ryots on co-operative lines as explained below. We know that these obtained 703,002 lb. of good seed for sowing in the 1916 sowing season. Assuming, as in last year, that only two-thirds of these were actually sown, which is a very conservative estimate, seeing that the seed sells at a premium, we may safely say that 87,086 + $\frac{2}{3}$ of 703,002 = 555,754 lbs. of our seed was sown in October-November 1916, which would be sufficient for some 56,000 acres. Reckoning an extra profit of Rs. 28 per acre as worked out in paragraph 5 above this means that we have put over fifteen lakhs of rupees into the pockets of the ryots in the current year. This is taking no account of the remaining sixty per cent. of the crop raised from the seed issued last year or of any seed which has been out with the ryots for more than two years.

7. *Joint direct sale by ryots to ginning firms.*—This is becoming of increasing importance and in this system we can now foresee the solution of the problem of how to supply annually seed sufficient for the 600,000 acres comprising the Tinnevely cotton tract. This means six million lbs. of seed, or the produce of 30,000 acres of seed farms. We could not run this area departmentally, but we could run 1,500 acres which is all that is necessary to supply seed to co-operative seed unions farming 30,000 acres. These unions would be carefully located throughout the tract so that the supply of improved seed would be brought within reach of every ryot. This is what we are now aiming at. Progress was slow in the earlier years, but is now becoming rapid as will be seen from the figures given below :—

Year.	Number of villages concerned.	Number of ryots who pooled their <i>kapas</i> and sold their lint co-operatively to the mills.	Average number of ryots per village.	Amount of <i>kapas</i> brought for co-operative ginning.	Amount of good seed obtained.	Ample to sow about
				LBS.	LBS.	ACS.
1913	3	6	2	30,000	22,500	1,500
1914	20	63	3.1	132,750	97,500	6,500
1915	29	89	3.1	226,000	169,560	11,300
1916	71	362	5.0	1,004,299	703,002	46,900

These seed unions are not registered under the Co-operative Societies Act but the members are usually also members of the local village co-operative society and so are able to finance their transactions. The members of the union bind themselves to grow our cotton and to sell the resulting *kapas* jointly to a firm who will make special arrangements to return them their seed pure after ginning. This seed is kept for sale as sowing seed. We assist them in making the necessary arrangements with the firms and certify their cotton so as to ensure their obtaining a premium for it.

8. *The future.*—The figures of yield of lint per acre given in paragraph 5 above show clearly that cottons of the Company No. 3 type are much better yielders than Company No. 2. The latter will therefore be dropped except in certain particular tracts where it has special advantages and Company No. 3 and its special strains distributed instead. In paragraph 7 of his report for last year, Mr. Chadwick foreshadowed the

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[Continued.]

necessity for greatly increasing the area of our seed farms. It soon became evident that if we were to compete successfully with *pulichai* we required as large an amount of the Company No. 3 seed as we could raise. As from G.O. No. 1683, Revenue, dated 22nd September 1916, it appeared doubtful whether the allotment for seed farms in 1916 would be increased, I took counsel with Mr. Thomas as to whether it would not be possible to finance a larger area of seed farms with the allotment by modifying our system. Prior to 1916 we bought the entire crop in the form of *kapas* from the seed farms and this involved a considerable gross expenditure although most of it was recovered subsequently by selling the lint. The new system which has been tried in 1916 consists in buying the seed only, the ryot selling the lint direct to a firm. After all, we do not want the lint to pass through our hands, and the only disadvantage of the new system is that the *kapas* are ginned at the firm's ginnery and not under our control at the farm gin. But, in any case, the increased area covered by our operations makes it out of the question to send all *kapas* to be ginned at the farms, and further the firms take great care that these special seed farm cottons are not mixed. We still retain the old system to some extent round Koilpatti but the new system will be adopted generally in the future. By it we can finance a much larger area from the same gross expenditure and, as a matter of fact, some 2,000 acres of seed farm were sown in October-November 1916 mainly in the *pulichai* tract round Sattur. This falls to be dealt with in next year's report however.

9. *Pulichai*.—A reference is solicited to paragraph 10 of last year's report for a description of the situation with regard to this intruder into the "Tinnevely" tract. The intruder is being fought on two lines,

- by a combination of the buying firms to refuse to buy it,
- by distribution of seed of Company No. 3 which yields the ryot a better return per acre than *pulichai* does.

Either method alone would have failed. There can be little doubt that *pulichai* gives a better return per acre than ordinary Tinnevely even when properly valued on its merits as a short-stapled cotton and not mixed surreptitiously with good Tinnevely. Had we not had in Company No. 3 a cotton which can beat *pulichai* at its own game, i.e., high yield per acre, nothing could have prevented its spread, and the agreement of the firms not to buy it must inevitably have broken down eventually. We may legitimately object to a ryot palming off *pulichai* as "Tinnevely" and so obtaining a price to which he is not entitled and incidentally ruining the reputation of Tinnevely cotton. But we have no more right to object to a ryot growing a crop of pure *pulichai* and selling it as such, if it pays him to do so, than we have to object to his deciding to grow ground-nut instead of cotton for the same reason. Luckily for the spinners and exporters interested in long staple cotton, it pays the ryot better to grow our Company No. 3 cotton than to grow *pulichai*. The one great danger in the situation was that we had not a large stock of the seed of Company No. 3 ready last year. As explained in the preceding paragraph, steps were taken at once to increase the supply and we may look forward to the future with confidence. The period of danger has been bridged by the action of the firms seconded by strenuous work on the part of the staff of the Agricultural and Revenue Departments. At a meeting held at Tuticorin in September 1916, the firms decided to renew their legal agreement and to make it even more stringent in that no cotton containing more than three per cent. of *pulichai* was to be ginned or bought by them. Cotton containing less than three per cent. can be bought only after a deduction has been made for the quantity of *pulichai* contained. Luckily this quantity can be readily detected by a count of a sample of the seed obtained from the gins. Each of the seven firms has deposited Rs. 5,000 as a guarantee in the name of the Director of Agriculture as trustee under the agreement and Mr. Thomas inspects the yards and books of the firms to see that the conditions are fulfilled. I am glad to say that the agreement has been loyally adhered to by the firms, such few breaches of it as have been detected having been due to accident or the unauthorized action of subordinates. The attitude of the firms had a great moral effect and assisted greatly the action of the officers of the Agricultural and Revenue Departments whose activities took the form of persuading the ryots to pull up every *pulichai* plant in their fields. This was successfully accomplished throughout the Ramnad and Madura districts and my very sincere thanks are due to the two Collectors, Messrs. Paddison and Loftus-Tottenham, for the whole-hearted aid which they gave me. The efforts of the Deputy Director of Agriculture, Mr. Thomas, in the Tinnevely district were not quite so successful but much useful work was done. In this tract we found some ninety acres of almost pure *pulichai*, the owner of which naturally declined to uproot it. We decided to buy the crop, if possible, in order to control the seed and Mr. Thomas eventually succeeded in persuading the owners to sell it at 25 per cent. below Tinnevely price, which represented its market value on its merits. For the sake of the moral effect, the seed from this cotton was subsequently publicly burnt at the Koilpatti farm before a large gathering of ryots.

Pulichai has thus been largely stamped out, but it still exists as an impurity in the general crop over a wide area. It will be a matter of years to root it out completely, not because it will be grown deliberately but because many ryots are careless about their seed. There would seem to be a case for legislation against *pulichai* in the interests of the purity of the Tinnevely crop, and I am going into the matter separately.

10. *Drill cultivation*.—As explained in previous years' reports, this line of work takes the form of demonstrating on ryots' lands the use of the practice, universally followed in the Ceded Districts, of sowing crops in rows with the seed drill and intercultivating them with the bullock hoe instead of by hand. The table below shows the progress of the work since 1913 :—

Year.	Total area drilled.	Area drilled with departmental assistance.	Area drilled by ryots themselves.	Sets of implements sold by the Dept.	Implements made by the ryots.
	ACS.	ACS.	ACS.		
1913	7,117	4,399	2,718*	35	..
1914	11,329	6,924	4,405*	32	..
1915	17,060	8,660	8,400*	83	..
1916	15,351	8,304	6,882†	111	15

* These areas are estimated and not actuals.

† This area is actual.

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[Continued.]

Although there was an increase in the number of sets of implements in use in 1916 yet there was a falling off in the area of cumbu drilled and only a slight increase in the area of drilled cotton. This falling off is partly real and due to the fact that the staff were compelled to devote their energies to the campaign against *pulichai* and is partly due to the more stringent checking of the areas reported as drilled, it having been found that one subordinate at least had attempted to obtain departmental credit by exaggerating the areas drilled in past years. Moreover the rules were made more stringent in order to prevent the system of demonstration degenerating into a system of cultivating ryots' fields for nothing—a system which could, of course, be expanded indefinitely. After the preliminary free demonstration we now insist on the ryot either hiring or buying a set of implements. Progress is slow, but there is much prejudice to overcome and many unexpected difficulties to smooth over. For instance, the village carpenters, who have been keeping a certain number of implements in order, in return for their yearly fees, naturally object to being expected to deal with a much larger number of new-fangled implements unless their remuneration is increased.

An attempt was made to plough some 500 acres of *hariali* infected land with a five-furrow disc plough drawn by the motor tractor taken over from the Department of Industries. This failed owing to the breakdown of the tractor. The two-furrow disc plough which was hired to the Avalnattam Agricultural Association last was bought outright by them, and the similar implement belonging to the Koilpatti farm was let on hire whenever it could be spared. Were it not for war-prices, many of those ploughs could be sold.

11. *I Circle—Bellary and Kurnool districts*.—The following statement shows the areas of seed farms sown in 1915 to provide seed for the 1916 season and the results obtained :—

	Area of seed farms.	Total yield of <i>kapas</i> .	Yield of <i>kapas</i> per acre.	Lint outturn per cent.	Yield of lint per acre.
	ACS.	LBs.	LBs.	PER CENT.	LBs.
Bellary Sircar Cotton No. 1	934	138,088	148	28	41.6
Kurnool Sircar Cotton No. 2	980	113,986	116	32	37.2
TOTAL	1,914	252,074	..	..	..

The point to be noticed here is the poor yield of lint per acre. The season was poor and the crop suffered from late sowing and untimely rain. The average normal outturn of both northern and western cotton is taken as fifty lbs. per acre for purposes of crop statistics, the percentage of lint to *kapas* being 25 per cent. The figures given above show that, in spite of better lint outturn, we cannot assert with any certainty that our selected strains give a better return per acre than the ordinary crop of the tract when grown on a large scale, although when tested on the Nandyal farm our selections give a slightly better yield as shown below. Our strains have been selected for good staple, colour and strength, but not specially for total yield, although attention has been paid to lint outturn.

It seems to be the case that it is impossible to combine good yield with good staple in these "Northern" and "Western" cottons, our experience being that staple and lint outturn vary inversely with each other. For instance the testing of the selections at Nandyal gives the following results :—

	Local cotton.	Selection No. 2.	Selection No. 14.	Selection No. 50.
Length of staple	$\frac{1}{2}$ to $\frac{3}{4}$	$\frac{3}{4}$ to 1	$\frac{3}{4}$ to 1	$\frac{1}{2}$ to $\frac{3}{4}$
Yield of <i>kapas</i> per acre	320 lbs.	320 lbs.	380 lbs.	400 lbs.
Per cent. of lint to <i>kapas</i>	26	30	25	30
Yield of lint per acre	83 lbs.	96 lbs.	95 lbs.	120 lbs.

This is regrettable from the point of view of those interested in long staple, because the tract is at the mercy of anyone introducing a short staple cotton giving a high yield, such as *pulichai*. This or a similar cotton has actually made its appearance in the 1917 season on a small scale and has given remarkably high yields. The season was however exceptional, the rainfall having been three times the average. It remains to be seen how it will do in a normal year. But it is becoming increasingly evident that we must shortly review our policy in this tract and decide whether to go for staple or yield in the future. In the Central Provinces, where a similar problem arose, the decision was to go for yield and as the result *roseum* cotton (which is very similar to, if not identical with, *pulichai*) has now largely replaced the indigenous varieties (vide article on the improvement of cotton cultivation in the Central Provinces by Mr. Clouston in the Agricultural Journal of India—Special Indian Science Congress Number, 1917).

12. From the seed farms in Bellary and Kurnool, 176,568 lbs. of seed was obtained in 1916 and of this, 20,133 lbs. was issued for the 1916 seed farms and 108,456 lbs. sold to ryots at a premium for sowing. Of the balance, some 14,000 lbs. was considered unfit for use as seed and so sold as cattle food and the rest remained in stock at the end of 1916.

13. In Kurnool, an experiment was made to see if it would be profitable for a ryot to clean his *kapas* before selling. The *kapas* was carefully picked over and all stained and damaged *kapas* separated. We could obtain no more than the current market rate, i.e., 172 rupees per *khandi* for the cleaned *kapas* while the pickings sold for only Rs. 157 a *khandi*. The cost of picking came to Rs. 3 per *khandi* and the total loss on the operation came to Rs. 323 assuming, as is undoubtedly true, that we could have sold the whole lot uncleaned at Rs. 172 a *khandi*. At Bellary we sold uncleaned cotton at Rs. 174-11-0 per

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[Continued.]

khandi. Unless buying firms will give a premium for clean cotton it is obviously a waste of money to clean it. The ryots' practice of selling the good and bad together just as it comes from the field is obviously the correct one.

14. The total quantity of seed issued in the three centres may be shown as follows, including issues to seed farms and a small quantity of Cambodia seed sold in the I Circle :—

	1915-16.			1916-17.		
	By ryots from direct sale of lint.	From seed farms.	Total.	By ryots from direct sale of lint.	From seed farms.	Total.
	LBS.	LBS.	LBS.	LBS.	LBS.	LBS.
Tinnevelly, Madura and Ramnad.	*169,560	*87,443	257,003	703,002	113,926	816,928
Bellary	..	37,442	37,442	..	56,719	56,719
Kurnool	..	70,348	70,348	..	73,058	73,058
TOTAL	169,560	195,233	364,793	703,002	243,703	946,705

* Revised figures.

15. *Proposals for financial year 1917-18.*—As explained in paragraph 8 above, the system which was introduced in the VI Circle last year of buying only the seed from the seed farms enables us to finance the operations with a much smaller allotment per acre of seed farm than has been required in the past. The same system is being introduced in the I Circle in the current year. Further, the 1917 crop is a very poor one in the I Circle, so that the expenditure that will be incurred in the financial year 1917-18 in purchasing this crop is much lower than was anticipated. I could not foresee these matters when framing my budget for 1917-18 last year. I went by the experience of last year and the steadily rising price of cotton and budgetted for a gross expenditure of Rs. 78,400 made up as follows :—

Budget Estimate.

	Expenditure.	Receipts.	Net expenditure.
I Circle	38,200	38,500	+300
VI Circle	40,200	32,000	—8,200
TOTAL	78,400	70,500	—7,900

and this sum was allotted by Government.

For the reason given above the gross expenditure and receipts will both be lower and are now estimated as follows :—

	Expenditure.	Receipts.	Net expenditure.
I Circle	15,576	16,000	+424
VI Circle	28,000	20,500	—7,500
TOTAL	43,576	36,500	—7,076

I shall therefore be able to surrender some Rs. 34,000 out of the Rs. 78,400 allotted. I request that the expenditure of Rs. 44,000 may be sanctioned now and that I may be allowed to report as to the amount that can be surrendered in December next. As has been explained in previous reports, it is always very difficult to estimate owing to the impossibility of foreseeing the nature of the season and the price of cotton a year ahead. The latter factor has been partially eliminated by our change of system but still affects the receipt and expenses to some extent.

G.O. No. 2533, Revenue, dated 16th August 1917.

Recorded.

Miscellaneous.

2. The Government sanction an expenditure of Rs. 44,000 on the improvement of cotton cultivation during 1917-18.

3. The re-appropriation of a sum of Rs. 5,750 out of the budget provision of Rs. 78,400 for cotton cultivation has been sanctioned in G.O. No. 2389, Revenue, dated 6th August 1917, for expenditure in connexion with the sheep farm at Bellary. The balance of Rs. 28,650 will be resumed at once. The Director of Agriculture may apply later on to Government for an additional allotment if it is found necessary.

(True extract.)

A. R. KNAPP,
Acting Secretary to Government.

ANNEXURE II

Note on Marketing of Cotton in Madras.

Although the system by which cotton passes from the hands of the growers to the exporting or spinning firms is generally similar throughout the Madras Presidency, yet the details of the process differ considerably

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[Continued.]

in different areas and no general account can be of much use. Moreover, I am not satisfied with the information I have so far been able to obtain as to these details. There are obvious gaps in the reports which have been sent in, which could only be filled in by a detailed examination of a series of particular transactions. I will, however, do the best I can on the material available and will give first a general account and then particulars of the practice in certain areas.

General account of marketing.

Firms.—Cotton is bought and finally paid for, by a limited number of firms, for

- export by sea or rail,
- spinning in local mills.

Firms owning spinning mills may export also.

Local agencies.—Such firms have local agencies at the important cotton centres in charge of an agent, who may be a paid servant, or may be really a broker paid by commission on transactions. Such agent or broker is responsible for the quality of the cotton bought. Each local agency will possess godowns for storing cotton and a baling press, unless the cotton is to be moved over comparatively short distances for spinning or baling elsewhere when it is sometimes not pressed.

Lint, kapas, and seed.—Usually only lint is bought. The *kapas* may be ginned in outside ginneries and the lint only carted to the firms, or the *kapas* may be brought in and ginned by the firms, the seed returned, and the cost of ginning deducted from the price paid for the lint. In a few cases, *kapas* is bought outright and the seed sold by the firm. Payment is made on weight of lint, either—

- before it is pressed (loose bale system).
- after it is cleared and pressed (pressed bale system).

Middlemen.—The chain of middlemen between the firm and the grower may be represented as follows :—

```

Firm (sub-agent).
|
Broker.
|
Dealers.
|
Sub-dealers
|
Ryots.

```

But this chain may be short-circuited. Rich ryots may sell direct to firms and may themselves be dealers or sub-dealers. The broker may be dispensed with or may function as the local sub-agent.

The broker or dealer makes forward contracts with the firms to supply a stated quantity of cotton of a standard quality by a fixed date or dates. Usually he also contracts to supply this at a fixed price but sometimes the price is left to be fixed by the current market rate at time of delivery. He may be financed by the firms or may finance himself if a capitalist or by borrowing from *sahukars*. He makes sub-contracts with sub-dealers and village middlemen, who are usually cotton growers themselves. He may finance them by giving advances. These brokers and dealers fulfil their contracts by—

- bringing in cotton which they have bought outright, or
- bringing in ryots with cotton for sale. In this case they get a commission from the ryot for effecting the sale and for watching weightment, etc., on his behalf.

The brokers and dealers (and even the sub-agent surreptitiously) may also gamble on the market by buying when prices are low in order to deliver against their contracts when prices rise.

Ryots.—The actual growers of cotton may be divided roughly into three classes—

- Rich ryots who are in a position to hold up their crop according to the market, and who may sell direct to firms or brokers and may themselves act as sub-dealers.
- Solvent ryots who have to sell their crop fairly soon, but can take their time and bargain with dealers.
- Poor ryots who take advances for seed, etc., from dealers and contract in advance to sell their crop at a low rate.

These classes of course merge into one another and the proportions vary in different tracts.

Mixing.—Mixing of varieties and the grading of poor lots with good cotton is commonly practised by the middlemen. The seed becomes mixed during ginning.

Allowancing.—In theory the firm imposes "allowance," i.e., deductions from the price for poor quality cotton, the presence of seed, leaves, and dirt in lint, etc. In practice, however, the severity of this allowancing is apt to vary inversely with the market demand. Cotton which has been altogether refused when the demand is poor is passed without allowance later on in the season if the demand has become brisk. It is very seldom that any premium is given for superior quality.

Fraud.—Dealers and brokers are reported to cheat the ryots over weightment. The same is alleged of the sub-agents of firms in some places. "Commission agents" are reported to collude with sub-agents to defraud ryots over weighing and allowances.

Details of the several markets.

1. "Tinnevelly," i.e., Madura, Ramnad and Tinnevelly districts.—*Kapas* brought into firms who gin return seed, and pay for lint. Small independent ginneries have sprung up into recent years, but these are mostly leased to firms who run them as out-agencies; firms buy the lint ginned at the rest. Policy of firms is to keep ginning in their own hands both on account of the profit and to be able to prevent adulteration and damage by too rapid ginning. Contracts with dealers usually for small quantities at a time new contracts being made as soon as old one fulfilled.

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[Continued.]

2. "Salem," Coimbatore and Trichinopoly districts.—No detailed investigation has yet been made. Much the same as "Tinnevelly."

3. "Northern and Westerns," Bellary.—Kapas ginned in independent ginneries, only the lint taken to firms and bought on "loose bale" system. Dealers (commission agents) not financed by firms. Make forward contracts, and charge As. 8 per 312 lb. of lint as commission for effecting sale and watching interests of vendor in weighment. Sub-dealers (middlemen) or the ryot himself get the kapas ginned, paying ginning charges. Deliberate mixing up of inferior and damaged cotton is practised by certain middlemen who are merchants in Bellary town.

Adoni.—Much the same as Bellary, but many ryots cart their kapas to Adoni and sell it to firms either direct or through commission agents. Usually only lint paid for but some firms buy kapas. A particular street is used as a cotton market. The cotton is bought therein and then taken to the compound of the firms for weighment. Middlemen fewer than in Bellary and are not so powerful.

Prodatur.—Only one middleman between firms and ryots. No broker or commission agent. These middlemen make forward contracts for quantity to be delivered. Collect kapas for ryots and see to ginning. Firms buy lint. Ryots sell kapas to middlemen with whom they contract but price is settled according to the market rate at time of delivery. The system of advances with prices settled in advance formerly prevailed but died out some six or seven years ago as the ryots became more solvent owing to the spread of groundnut.

Nandyal.—Firms buy lint on "pressed bales" system, i.e., make final weighment and payment after bales have been pressed. May give an advance on receipt of the lint. Make forward contracts for quantity and price with dealers. Ginning done by independent ginneries.

"Cocanadas," Guntur district.—No work has yet been done by the Agricultural Department and there is no information on record.

General remarks.

Disadvantages of present system from point of view of the growers and possibilities of improvement—

(a) In order that the grower should get the full value for his produce, it is desirable that he should be brought into closer contact with the actual final purchaser. This eliminates the middlemen's profits and also gives the grower a chance of getting a premium on good quality. The difficulty is that the middlemen or commission agent does serve some useful purposes, as follows:—

- He guarantees a minimum standard of quality, to some extent.
- He finances the system to some extent.
- He sees to ginning in some tracts.
- He collects and bulks the produce.
- He represents the interests of the seller in matters of weighing and allowancing.

On the other hand—

- He is largely responsible for fraudulent mixing.
- By such mixing the seed of improved varieties becomes lost.
- He is reported to cheat ryots over weighments.
- His terms for advances are oppressive.
- In the Northern and Western areas, he appears to keep alive a mistrust of the fairness of firms' weighment and allowancing in order to justify his commission.

The solution of the problem is some form of co-operation by which the growers would bring their produce in bulk to the firms. Headway on these lines has been made in the Tinnevelly tract, where the problem was tackled mainly from the necessity for preserving the seed of improved strains. Ryots are forming voluntary unions who bring their kapas direct to a firm. Practically no financing is necessary as ginning charges are deducted from the price paid for lint, and the ryots do their own carting. Previous arrangements are made so that ginning can take place at once and the seed returned to the ryots. The ryots of Tinnevelly and Ramnad are mostly solvent and the financing of this system gives no trouble. The seed unions run parallel with village co-operative credit societies, but are not yet formed into regular registered societies, nor does it seem necessary to aim at this for the present. These voluntary unions for joint sale also function as 'seed unions' who agree to take seed of our improved strains, multiply it, and sell the resulting seed to ryots for sowing. The members are bound to cultivate the whole of their lands with one strain. On these conditions being observed, a certificate is given by the Department which is accepted by the firms as guaranteeing the uniform quality of the cotton and a substantial premium is being paid on this cotton. Progress on similar lines in the Northern and Western circles is more difficult. The position of the middlemen is stronger. The system of independent ginning and the deferred payment involved in the "pressed bale system" at Nandyal make financing necessary. Ryots are poorer, and it would appear that the development of ordinary co-operative credit must precede any reform in the system of cotton marketing.

It may be asked whether reforms could not begin from the other end, i.e., whether the firms could not change their system of buying. It is always very difficult to alter trade customs in the face of competition and of the varying interests of exporters, spinners, balers and ginners—not to mention the sub-agents, commission agents and dealers. The ideal would be an open market, with plenty of space and godown accommodation, where ryots would bring in their kapas and expose it for sale; weighing to be done in the market under Government supervision and payment to be made in the market as soon as the kapas was weighed or at least as soon as the kapas was ginned in firms' own ginneries.

Such a system could only be introduced with the aid of legislation, making it penal to deal in cotton elsewhere than in the market and enforcing the observance of market rules. The cost could be recovered by fees which should come cheaper to the ryot than the present expenditure on commissioner's and middlemen's profits. The ryots would also gain by the competition that would arise for good lots, on which at present he gets no premium. But as the interests of the broker and middlemen would either be adversely, or not at all, affected by any such change of system, I do not think that any such drastic change is possible. I have been in correspondence with the cotton firms about possible improvements in the Nandyal system and have received promises of co-operation to some extent, especially in regard to giving of premium for good produce. By the gradual spread of co-operative credit and the general idea of co-operation and by the joint action of the more important firms who are alive to the fact that their permanent interests are the same as growers I hope that it will be possible to effect improvements, even if slowly.

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[Continued.]

ANNEXURE III.

Copy of press return submitted by the Department of Agriculture, Madras.

DEPARTMENT OF AGRICULTURE, MADRAS.

Return showing the inland consumption and exports of raw cotton in the Madras Presidency for the week ending 12th January 1918.

(NOTE.—All figures are in bales of 400 lbs. each.)

Variety of cotton.	FOR CORRESPONDING WEEK OF PREVIOUS YEAR.		FOR THE CURRENT WEEK.		Total from 1st February to corresponding week of previous year.	FOR THE CURRENT YEAR FROM 3RD FEBRUARY TO DATE.			Exports by rail from the Madras Presidency from 1st January to 30th September 1917.	Imports by rail into the Madras Presidency from 1st January to 30th September 1917.	Total of columns 10 and 11 minus column 12.	Government crop estimate for the year 1916-17.
	Received at mills.	Exported by sea.	Received at mills.	Exported by sea.		Received at mills.	Exported by sea.	TOTAL.				
Tinnevelly and Salmes	124	338	375	..	375	197,941	71,998	127,590	199,588	..	..	267,227
Northern and Westerns and Cocanadas.	687	..	857	..	857	90,587	54,877	12,984	67,861	..	..	110,112
TOTAL	811	338	1,232	..	1,232	288,528	126,875	140,574	267,449	130,636	29,425	368,660

(a) Returns have been supplied in the corresponding week of previous year by ten mills.

(b) Do. do. current week by nine mills.

(c) Exports by sea in current week are—Madras nil; Tuticorin nil; Cocanada nil; Calicut nil.

NOTE.—Government crop estimate for 1917-18, preliminary—

Tinnevelly and Salmes	286,932
Northern, Westerns and Cocanadas	208,757
TOTAL	495,689

Quantity of cotton pressed in the Pressing Factories and of unpressed cotton received at Spinning Mills in the Madras Presidency during the week ending 12th January 1918.

Variety of cotton.	IN PREVIOUS YEAR.				IN CURRENT YEAR.			
	Number pressed in week ending 13th January 1917.	Number pressed from 1st February till 13th January 1917.	Unpressed cotton received at mills from 1st February till 13th January 1917.	Total cotton accounted for from 1st February till 13th January 1917.	Number pressed in the current week.	Number pressed from 3rd February to date.	Unpressed cotton received at mills from 3rd February to date.	Total cotton accounted for from 3rd February to date.
Tinnevelly and Salmes	..	(a) 162,224	Revised figures not worked out.	..	267	218,901	10,439	238,340
Northern and Westerns	288	(a) 99,178			634	97,356	5	97,361
Cocanadas	..	54,856			..	39,720	..	39,720
TOTAL	288	(a) 316,258			901	355,977	10,444	375,421

(a) Revised figures.

OFFICE OF THE DIRECTOR OF
AGRICULTURE, MADRAS,
22nd January 1918.

G. A. D. STUART,
Director of Agriculture.

Mr. G. A. D. STUART, I.C.S., called and examined.

2327. (President.) The aim of the Agricultural Department in the Northern and Western tracts has been to obtain by selection a variety of the local cotton with a high ginning percentage, keeping an eye very closely on *roseum* cotton, the point in favour of which is its high outturn. It is only grown on red soils in the Northern tract. That is not the case with Dharwar American which has been grown this year on black soils on a fairly large scale round Tadpatri. The problem of keeping out short staple in the Northern and Western tract is rather a difficult one as the Department has not been able to discover a strain of the local cotton with a sufficiently high yield and ginning percentage. We cannot make any commercial arrangements there as we have been able to do in the Tinnevelly tract. The firms do not control the ginneries there as they do in Tinnevelly. The problem of keeping out short staple cotton in the Northern and Western

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[Continued.]

tract is going to be a difficult one. The Department is discouraging the cultivation of such cotton, but it cannot prevent the ryots bringing in any seed they like from outside as they have apparently been doing.

2328. Nothing has so far been done on Coconadas. As soon as Deputy Directors are available, we intend starting a farm at Guntur and to work on Coconadas there on the same lines as we have been working on Northern.

2329. We have got to take up Cambodia first, as that is more important. The opinion of the experts differs in regard to the deterioration of Cambodia, but I think that it has undoubtedly deteriorated owing to its cultivation as a dry crop and also as a perennial crop—conditions under which one would naturally expect deterioration. As far as I can make out, when it is grown as a garden crop on red soils with proper irrigation and manuring, it is as good as ever. As soon as Madras has its own Pest Act, the Department will have power to deal with Cambodia left on the ground for more than one season. We shall have to show that leaving it on the ground for more than one season tends to the spread of insect diseases as there is no doubt that it does. Saigon is the source of origin of Cambodia cotton and, in view of the importance of Cambodia in the Madras Presidency, I think that it would be a good thing to depute one of our Deputy Directors to Saigon to make a special study of conditions there.

2330. As to the question of increase of staff, I think Deputy Directors with botanical training are the best type of men, as so many of the problems to be dealt with are agricultural, i.e., problems of cultivation. I would press for an increase of Deputy Directors. I should like to have a man specially for cotton work in the different tracts with no executive charge. Cotton would keep him busy for a good part of the year. He might have time to work on cereals as well and would also be engaged in reading up the literature on the subject. I would advocate the appointment of crop specialists. We could do with three Deputy Directors doing nothing but work on cotton on much the same lines as Mr. Parnell has been specialising in regard to paddy. They would simply be Deputy Directors. In the same way that Mr. Parnell is specialising on paddy at Coimbatore, there would be a similar man specialising on cotton at Koilpatti. He would have to consult the man in general charge before putting out new varieties. Results would be obtained quicker that way. I think the appointment of Imperial Cotton Specialist might be made more useful than at present. I do not require further mycological or entomological assistance in regard to cotton.

2331. I should very much like to have some sort of organization by which spinning tests could be conducted under standard conditions. At present firms do spinning tests of small samples for us as a matter of favour. Two samples of the same cotton often get entirely different reports from two different firms. In one case, we got a different report on two samples of the same cotton owing to the gummies of the boras in which the cotton was sent being marked differently. It was, therefore, thought that they were two different lots of cotton.

2332. As regards the question of forecasts, I hope they are steadily improving. The difficulty here is that the dates prescribed for their submission are not suitable. I think our figures of area are accurate except in the case of certain *zamindari* areas. I am getting all possible information from the firms. It is extremely difficult to make estimates of outturns on the dates fixed. Tinnevely cotton is very often not sown when we have to prepare our final estimates. It would suit Madras much better if the final forecasts were published at the end of April and not in the middle of February as at present. The simplest way would be to postpone the forecasts by two months, i.e., to submit them in October, December, February and the end of April. The returns from presses are improving and are a great help to us in preparing the forecast. We are gradually getting them more complete, but it would be a great advantage if they were made compulsory.

2333. The experiments last year in inducing ryots to pick cotton clean at Hagari and Bellary led to no results. Unless you get a premium for quality, you will not get the ryot to improve the picking of his cotton. It is no good their bringing in clean cotton if they get nothing extra for it. Mr. Wood tried round Coimbatore with mills and exporting firms. The firms told him that the cotton was excellent but they would not pay a higher price for it because it was a small quantity. That is the difficulty, I do not see how it can be got round.

2334. (Mr. Roberts.) In the Westerns tract, it is true that the *mungari* problem has not been touched yet. *Mungari* is quite a small crop, less than seven per cent. of the total area. So far as we can see, *roseum* is not coming in on black soil. Dharwar American, is doing so, further south round Tadpatri. *Mungari* is a mixed crop. There is a fair amount of *neglectum* in it. So far as *roseum* is concerned, it is all a question of yield on black soils as a dry crop. I do not want to start experimenting with it as it would be dangerous to give a lead. I do not think that it is desirable to do anything at present. The figures of the yield of *roseum* are based on reports from our demonstrators.

2335. With regard to our work on Northern and Westerns, in the Westerns tract we have been putting out a variety called Sircar No. 1. We do not propose to go on with it; it has not done very well. I am not satisfied with it and would like to get something better. It does not seem to be superior to the ordinary local cotton; it is not a particularly high yielder. For the present we have not got anything to push there, i.e., nothing outstanding. In the Northern tract, the cotton known as Nandyal No. 14 is an excellent cotton. We are going to push that. It is a better yielder than we first thought. One of the mills said that it was one of the best cottons. The ginning percentage is low but it is a better yielder than the ordinary mixed crop. It is difficult to say much about it until we get it on a larger scale. We have thirty acres under it this year. The difficulty is that the ginning percentage is low: it is only 25. That of the average local crop would be about 26. It is not higher. The ginning percentage of Sircar No. 2 was about thirty one year. Half the local crop of cotton is now composed of Sircar No. 2 so that the ginning percentage must have gone up to 27. So there is a percentage of two per cent. to fight against. Mr. Hilson has worked out the premium which would make No. 14 pay. He suggests about Rs. 10 premium per *khandi* of lint as suitable.

2336. I do not think that one of the reasons why there is so much ratooned Cambodia cotton is that the ryots cannot get seed. They can get the seed from their first pickings and sow the same area with that. There may, however, be some difficulty in getting seed of Cambodia for new tracts. I would apply the Pest Act to Coimbatore first where there is much stem weevil. There is no difficulty about getting seed there.

2337. In regard to co-operative sales, I think that they are going to become a big thing here. There may be a lot of opposition from the petty dealers. The question is which is the stronger. The ryots ought to be in a strong position after years of high prices and should be able to hold their own. The intelligent ones realise their advantages. I am quite hopeful about it.

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[Continued.]

2338. In regard to markets in the Northern and Western tracts, I should like to see open markets established something on the lines of those in Berar. I consider forward selling an evil. I have no remedy to suggest except to form open markets and to get the ryots to bring their cotton in direct to the market and to get them into closer touch with the ultimate buyers. Under the local Municipal Act, you cannot establish a cotton market. A market can only be established for grain and edibles. I do not consider that auction sales in the Northern and Western tracts would secure higher prices. It should be possible to make arrangements with firms as in the Tinnevely tract.

2339. The opinion of the Department is obtained before new types are pushed. The opinion of the trade on the cottons is first obtained before we put them out. There are no formal meetings of the Department to discuss policy but we have a general meeting twice a year at which all sorts of questions are discussed. One is to be held on the 18th after the Committee leaves Coimbatore.

2340. (Mr. Hodgkinson.) I find great difficulty in getting a sufficient premium for carefully picked cotton. The difficulty is to find anybody to take up small quantities. We are trying to get the firms here to pay a premium for cleanly picked cotton. It would be very difficult to arrange with one firm to buy these small lots, as we should be accused of giving that firm a monopoly. We should, however, be glad to arrange with one firm to take over small lots. We will make further experiments.

2341. The trouble in regard to getting clean cotton is more particularly in the Northern and Western tracts. The difficulty in regard to Company 3 and 3-A is that they are liable to be wiped out by a bad season. The crop is a delicate one.

2342. The formation of co-operative unions to sell cotton co-operatively and the establishment of open markets are the best way of getting rid of middlemen. It would be a great advantage if, in the Northern and Western tracts, the firms would adopt the system of having their own ginneries in connection with their presses as they have in Tinnevely. They would then actually see the *kapas* which they don't do now. They would then deal direct with the ryots and so do away with fraudulent mixing and the trouble about weighments.

2343. (Mr. Wadia.) As regards the statement in the final general memorandum on the cotton crop for 1917-18 that the yield per acre of "Salems" including Cambodia increased from 56 lbs. per acre in 1916-17 to 145 lbs. per acre in 1917-18, I think there is something wrong. Fifty pounds is the average yield we take of Salems, but now-a-days Salems are practically all Cambodia. 145 must include Cambodia and the 56 last year must have excluded Cambodia. As regards the increase in the yield of Tinnevellys from 83 lbs. to 94 lbs. per acre, last year was a bad season, this year is a good one.

2344. As to the improvement of agriculture by modern methods of cultivation, I do not think there is much room for steam ploughing. The use of heavy ploughs for clearing land of *hariai* grass might be desirable, but I do not think that you can teach the Bellary ryot much about the improvement of the cultivation of cotton. He knows all about dry farming which the Americans have only recently discovered. Down here in the South, we are going on with the improvement of sowing in lines but the climatic conditions are different from the Northern tract and there are difficulties. As regards the statement in the forecast that the Westerns crop has suffered from the effects of the heavy rains of the last two years which have made the black soil very foul with weeds, when the black soil is wet the ryot cannot get on to it with any kind of plough whether steam or hand. He has to wait till it dries. During the last two years there has been so much rain that the ryot has had very little opportunity to till the land and has had to let the weeds grow. If the Bellary ryot gets a chance, he won't allow weeds to grow. In Tinnevely, ryots agreed to have some 500 acres of cotton soil infested with *hariai* grass ploughed with a motor tractor at Rs. 5 per acre. But one tractor broke down after a few acres had been ploughed. I have had requests for steam ploughing from ryots in western Bellary who have heard of the Bombay experiments in the Dharwar Districts. I intend to experiment further with power ploughing after the war as soon as we can get the machinery. I have put my Agricultural Engineer to work on the problem. He is investigating the literature on the subject. I do not think that the keeping clean of the ground would tend to increase the yield per acre, as the ryot keeps the ground very clean already. It is possible that the use of power ploughs would slightly cheapen his operations.

2345. I do not see how the Agricultural Department could control the distribution of seed right through. Our policy should be to send out perpetually a stream of good seed from our farms to the seed unions. That is our policy at present. I should like to see the whole of the Tinnevely tract covered with a net work of seed unions. Each year fresh seed would be given to the seed unions; in the second year, the whole of the seed union land would be grown with that strain and in the third year the whole of the tract would be covered with it. That is the ideal to be aimed at. Three years should be enough to cover the whole tract. The seed farms must perpetually renew the nucleus. There is no difficulty in getting seed taken up. The farmers prefer buying our seed; they pay more for it and are anxious to get it. As the whole tract gets covered with the cotton, it would become more and more difficult to put out improved seed but our work should be more or less done by that time.

2346. As regards the opening of more demonstration farms, our policy is to do the demonstration on the ryots' own land rather than on Government farms. Our men go to a village, talk to the ryots and get one or two of them to try a particular improvement—such as growing a new strain or sowing the crop in lines. If the improvement is any good, the whole of that village will very soon adopt it. The cultivator thinks that if on a Government farm you grow a particularly good crop, it is because cultivation is carried out regardless of expense. He cannot afford to do that. If he sees his neighbour raising a good crop, he thinks that there must be something in it. I therefore prefer demonstration on the ryot's land rather than on Government demonstration plots.

2347. We want more experimental stations started. The chief line in regard to an increase in the yield of cotton per acre is the improvement of the strain, i.e., selecting a single strain and improving on it. There is more room for improvement in the Westerns tract, where the yield is only 50 lbs. per acre than elsewhere. The rainfall is the limiting factor in that tract, at any rate in Bellary. Cotton from Adoni is considered better than that from Bellary. The reason is that the rainfall there is heavier than in Bellary. The rainfall at Adoni is 25 inches, whereas in Bellary it is only 19. Nothing can be done to increase the yield by irrigation. In the cotton tract in the Bellary district, the subsoil is gneiss and the water is very salt. It is very difficult to get drinking water, much less water for irrigation.

2348. Seed of short-staple cotton is liked by the cultivator and brought from other parts because it gives a higher yield and a higher ginning percentage and therefore a better return per acre. *Pulichai* is being grown at Koilpatti farm in order to solve the question of yield finally. The ryots said that they got

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[Continued.]

a high yield from *pulichai* and they certainly got a high ginning percentage. I am not satisfied as to the correctness of Mr. Chadwick's statement that *pulichai* "does not yield on the average in total weight of *kapas* more than Tinnevellys do." The matter has not been tested. That statement is not based on experiments. I agree with Mr. Chadwick that if *pulichai* were marketed pure and not allowed to be mixed with Tinnevellys, it would only get two-thirds the price of Tinnies. That was pricing it as Bengals, which is the price it ought to get. The present price of Bengals is Rs. 170 per Bombay *khandi* less than Tinnevellys. This should not make it profitable to grow *pulichai* as compared with Tinnevellys, but we have no definite figures of the yield of pure *pulichai* per acre. As there is some doubt about it, I would not put out a low quality of cotton like that. The Agricultural Department has not put it out. As I have said, in the Northern and Western tracts it is a matter for the future, but I have no intention of putting *roseum* out.

2349. In order to prevent mixing, I would not go so far as entirely to prohibit the transfer of *kapas* from one district to another by rail. I think it might be possible to control transport by rail, but I would not prohibit it altogether. We are trying to push Cambodia in Madras. If Cambodia were grown in North and South Arcot, for example, the *kapas* would have to be transported to other districts as there are no gins and no presses there at present. We might get gins there fairly soon, but it would be many years before we got presses. The *kapas* would have to be railed to Madras. A special license in such cases might meet the difficulty, but I am not in favour of a sweeping prohibition of railing ginned cotton. I should like to stop Coconadas being brought to Nandyal to mix with Northern. The control of ginneries would be very difficult to work in practice. Licensing might be useful in controlling the mechanical efficiency of the gins, but I do not see how you can control mixing in that way. If a man wants to mix, he will do so. If as a condition of granting a license it was stipulated that all pressed bales should be marked with the name of the pressing and ginning factory so as to enable the mixture to be traced back if any, I do not think that that would have any effect. There might be a mixture in the ginnery and the man who pressed might not know where the cotton was ginned. How is he to mark the bale with the name of the ginning factory? He would have to take the name from the agent and it might not be correct. A man can buy cotton from ten or twelve ginneries and mark it as he likes. You can mark bales with the name of the press but that is as far as you can go. That is why I should like to see firms doing ginning themselves in the Northern and Western tract as they do in the Tinnevely tract. I think you could control the mechanical side of the ginneries to ensure that ginneries were kept in order. If you insisted on small ginneries adhering to a decent standard, a good many of them would close down, which would be a good thing. I do not know whether it is necessary to license pressing factories. Mixing certainly goes on in the presses but you cannot trace the mixture back to the press. In one case a firm was unable to give me separate figures for Cambodia and Tinnies because they were always pressed mixed.

2350. Sircar cotton No. 1 in Bellary district is one of our single plant selections. It is a *herbaceum*. Sircar No. 1 and Hagari No. 1 are the same thing.

2351. In my report for 1915-16, the ginning percentage of Company No. 3 is shown as 32, whereas in the previous year it was 30.23. These are the figures obtained from the seed farms in that particular year. The difference is probably due to the small areas on which the figures are based. If the ginning percentage for the whole area were taken, the figures for the two years might be much closer together.

2352. Seed unions were introduced as we could not take over the seed distribution over the whole cotton area. As to the desirability of an increase in the area of the seed farms, we want to work through the seed unions. Mr. Chadwick foreshadowed the necessity of a general increase in the area of our seed farms. We specially increased the area of the seed farms in 1915-16 in order to fight against *pulichai* and to be able to put out Company No. 3 round Virudupatti.

2353. I have already stated to Mr. Hodgkinson that it does not pay to pick the cotton clean. A little more had to be paid to the pickers. The average price obtained did not cover the cost of clean picking. The firms would not offer more than the market rate for the clean cotton and a good deal less than the market rate for the stained cotton so that the average was considerably less than the market rate, and the result was a loss to the ryot. We will however try again, though we have already made two experiments.

2354. Forward selling may be partly due to ryots wanting to get the benefit of high prices. I do not assume that it is a fault, but it is a practice which certainly tends to deteriorate the quality of cotton, especially in a year when prices rise. I think it would be better if we could do without it. You cannot blame the ryot for selling forward or the dealer for buying forward.

2355. As to whether it would be feasible to levy a cess on cotton for purposes of cotton improvement, I think the simplest way would be a cess on every bale pressed if Government wanted to raise money for the improvement of cotton or anything else. I can see no special objection to such a cess. I personally think that it would be fairer to levy it on the whole crop. As to whether it should not be levied on exports only as in the case of jute and indigo, I would point out that India has a monopoly of jute and that the greater proportion of the indigo crop is exported. I think it would be quite easy to levy the cess at the presses especially if the submission of returns of bales pressed were made compulsory. It would merely mean that the baling charge instead of being, say, Rs. 5 would be Rs. 5 plus the cess. You could get returns of unpressed cotton. In the case of half pressed bales, there would be no difficulty as they have to go through the press. The cess would be in proportion to the weight of the bale. It would be small and it would not be worth while to make a distinction in regard to the price of the cotton.

2356. (Mr. Ashton.) It is easy to get *takavi* (Government loans) for the construction of wells. In theory, it is, but in practice there is the *taluk* office to get through. Special rules were issued under which the Agricultural Department was authorized to give loans for putting up oil engines and pumps. These were not a success and are now being revised. The conditions were rather too stringent, and people did not like them. There is no great rush for *takavi*. The ryot has to pay too much before seeing the money.

2357. Cambodia is the only cotton that is irrigated. There is very little cotton irrigated under canals except in Kurnool. I think there is a large field for extending Cambodia in the central districts of Madras, i.e., Salem, North Arcot and Chittoor. I am trying to push it there, but I have not got enough men. I am doubtful about the Northern Circars, owing to the heavy north-east monsoon rains which come at the flowering season. It has been tried on the farms there, but it has very frequently been a failure. There are parts of Kurnool in which there are possibilities in regard to Cambodia, especially round Sirvel on the Kurnool Cuddapah canal.

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2358. (Mr. Hodgkinson.) The Department has a farm there. Our general policy is not to grow short-staple cotton where long staple can be grown. If there was a tract where the growing of short staple cotton would give the cultivator double the profit of long staple, I would advise him to grow the short staple. On an equal basis I would certainly advise long staple.

Mr. T. V. RAMAKRISHNA AIYAR, Acting Government Entomologist, Madras.

EXAMINED AT COIMBATORE, MARCH 15, 1918.

Written statement.

2359. *Experience.*—I do not know much of the different aspects of cotton cultivation in Southern India, except as much as is required of an economic entomologist. As an entomologist, I have some familiarity with two of the cotton tracts in South India, Coimbatore and Tinnevely, and it is only in connexion with the insect-pest aspect of cotton cultivation that I beg to offer the following remarks.

2360. *Insect pests of Cambodia.*—In the Coimbatore tract, where I am permanently stationed, the area under Cambodia cotton has, during the last five or six years, considerably increased and there is a likelihood of its extending more and more around this tract. In my opinion, for a successful extension of this exotic variety, the insect pest aspect of this question deserves some attention, for, in my experience, I find that the exotics such as Caravonica, Cambodia, etc., appear more susceptible to attacks of insect-pests as compared to the local varieties, which withstand pests to a greater degree, and since it is very difficult to check the further extension of the crop, the next best thing is to try our best to push it on safe lines.

2361. *The cotton stem weevil.*—In the following remarks, I have attempted to show how one particular pest is beginning to play the rôle of a rather serious drawback to the extension of Cambodia cotton, and I have also attempted to offer some suggestions in this direction for the Committee to consider, if it considers them worth anything. This exotic plant, which is a luxuriant grower and a very good yielder, though liable to the attacks of the common pests of cotton found all over India, is in the Coimbatore tract particularly found subject to more damage by one particular insect—the cotton stem weevil—more than any other pest of cotton. It is very curious that this insect has not been found on cotton outside this tract in Southern India. In this tract the local (*deshi*) varieties are also attacked by this insect but the damage done is very little compared to that on the Cambodia variety. I have not as yet found the insect on Cambodia cotton in the Tinnevely tract where also this variety is beginning to be cultivated, but I am afraid that the pest might sooner or later closely follow the Cambodia variety wherever introduced. And it is not unlikely that from this exotic variety the pest might, in course of time, extend its serious depredations on to the local varieties in the tracts where Cambodia happens to be introduced. This little insect more or less appears to be a real menace to the successful extension of Cambodia cotton in the tract.

2362. *Nature of the damage done by the cotton stem weevil.*—The nature of the damage done by this creature is as below. The adult insect is a very small pale brown beetle of about an eighth of an inch in length and is never conspicuously seen on the plant; and it is not directly responsible for the damage done to the plant as it is the young one or grub of this creature that does the real mischief. The grub is a short thick-set fleshy creature of about half an inch in length; this creature tunnels into the stem of the growing plant and due to this irritation, abnormal swellings are formed on the stem and the vigorous growing of the plant is seriously affected. The presence of these swellings is an indication to show that the plants are attacked by the weevil and the cotton cultivator cannot easily make out the presence of this pest until this abnormal nodular growth of the stem shows itself. As these nodules or swellings appear, that portion of the plant stem becomes very feeble and when a strong wind blows, the stem snaps and the plant lodges. In some cases, the plant lingers on, while in others it might dry up. From about a month after the seedlings come up, the attack of the insect begins and it continues right till the very end of the cotton season. The developmental stage of one generation lasts two months and in this way four broods can appear during the usual cotton season of October to June. In bad cases very few of the plants in any plot escape damage and though many of them do not entirely die, the crop as a whole suffers a good deal and the outturn becomes very poor.

2363. *Method of control.*—From a knowledge of the life-history and habits of the insect in Southern India, the only feasible method of control with regard to this pest has been found to be one of prevention. Direct mechanical methods or insecticidal applications, which are practicable in many other cases of insect attacks, are unfortunately not possible in the case of this creature, which is an internal feeder. The preventive method consists in the systematic pulling out and destruction of first-attacked plants. For a season or two, this work will appear very alarming and disappointing, since a good percentage of the plants may have to be sacrificed; but in course of time, this will be found to do a great deal of good. Even in this method there are certain factors which might operate in a way not very advantageous to the persevering cotton-grower. These are: (i) Imperfect methods of carrying out the measure. The pulling out and disposal of infected plants should be done in such a way that there will be no fear of infection from these pulled-out plants. Very often they are pulled out and left in the field or heaped somewhere quite exposed. As the insect is able to continue alive in these pulled out stems and emerge for further infection even after some fairly long period of time, these diseased stems, containing the grubs, pupæ, etc., of the insect, should, if possible, be burnt at once; or if the cultivator cannot afford to do so, he can collect them in good gunny or cloth bags and keep them immersed in water for a couple of days, so that all trace of living things in the stems may be killed out by drowning. After this operation, the stems can be dried and used for fuel as is usually done. If the pulled out stems are not thus carefully disposed of, there is no good of pulling out the plants at all. (ii) Want of co-operation among adjacent cultivators. This is one drawback in many cases of insect control. If one man carries out the measure carefully and systematically and if his neighbour neglects it, all the work of the first man is wasted and in such cases he is helpless.

2364. *Necessity for a "close season" for Cambodia cotton.*—Over and above these points, there is one important factor which hampers the proper control of this pest to a considerable extent, and it is with regard to this aspect of the whole question that I beg to invite the attention of the Committee. It is this. In this tract as in the Tinnevely and Ceded Districts, the local varieties are annuals and grown on dry lands; the Cambodia, on the other hand, is grown chiefly as an irrigated crop in garden lands. Whereas the local annuals are pulled out after the season, which is not generally later than July, I have found plots of

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Cambodia being kept on all through the year; it is not grown strictly as an annual. This continuous existence of the cotton plant all through the year necessarily allows all the cotton pests and particularly the weevil, which is very injurious to the Cambodia variety, to breed and multiply enormously. From the pest point of view, the disadvantages of growing in the same tract one variety as an annual and another as an almost perennial one are many, and if Cambodia is allowed to grow as a quasi-perennial crop the practice will certainly help to perpetuate cotton pests in general and the stem weevil in particular as it appears rather partial to this exotic variety.

(2) In order to mitigate this evil of allowing the pests to have a sort of bridging-over period from one cotton season to another, I would suggest that the State should come forward and establish a sort of "close season" during which no live cotton plants should be allowed to remain on the ground. This will be a wholesome rule not only for checking the weevil alone but will appreciably act on the other common pests of cotton many of which at times cause considerable damage. In the absence of the plant, the pests will necessarily have to starve and a considerable percentage of them will be destroyed in this way. For the cotton stem weevil there should be an interval of at least two months which is the period of one life cycle of the insect, and as to its alternate host plants excepting *gogu* (*Hibiscus cannabinus*) on which it breeds to a very small extent, it has not been found to breed on any other plant. I could suggest that the period may be from July 1st to October 1st. The power to see that this regulation is obeyed may be vested in the hands of the revenue authorities assisted by the itinerant agricultural officers of each tract. I believe there is some such rule in East Africa where all cotton plants are, according to state legislation, to be off the ground by a certain date every year.

2365. *Conclusion.*—I would therefore urge that before the cultivation of an exotic variety like Cambodia cotton is allowed to spread as it is likely to do, and as it appears impossible to check the growing attraction to this variety, proper precautions are taken to guard against the inroads of till now unknown pests which might not only act detrimentally on the introduced exotic variety, itself, but which, on conditions becoming favourable, might, in course of time, seriously menace the local varieties, which are so far free from the depredations of such pests.

Mr. T. V. RAMAKRISHNA AIYAR called and examined.

2366. (*President.*) The distribution of the cotton stem weevil is very restricted in South India so far as I know. We have found it only in the Coimbatore District so far. It is serious wherever Cambodia is grown. It is found to a small extent in *deshi* cottons, but it has not affected them seriously. The presence of the stem weevil was first discovered in South India in 1907, and it has been on the increase since then. We have been trying some experiments on the farm here to combat it, mostly preventive experiments. Generally the affected plants are uprooted and destroyed. As an entomologist, I would say that as far as Cambodia is concerned, the stem weevil is becoming a pretty serious matter. The only measures I can recommend are of a preventive nature. The reason is that it is only when a plant is badly attacked that one can detect the attack. We have no special man told off for this work. The habit of leaving the crop on the ground from year to year is a very bad one from the entomological point of view. The entomological difficulties would probably disappear to some extent if the affected plants were rooted up and destroyed at the end of the first year.

2367. The strength of the Entomological Department here consists of one Government Entomologist with three Assistants under him together with a subordinate staff consisting of three sub-assistants. We have no special fieldman for cotton work.

2368. (*Mr. Roberts.*) The weevil kills the plant in certain cases when the plant attacked is a young one. Older plants do not die but suffer a good deal in vigour. I have not discovered whether any plants are immune. Comparatively speaking, the local cottons do not suffer so much as Cambodia. The only remedy so far known is to pull and destroy the attacked plant. I do not know whether thick sowings would be of any help. I have suggested in my written evidence that the period, July to October, might be considered as the off season for Cambodia. I do not know if the new crop is sown in September. In my opinion, the close season which I have suggested could be established by legislation. I cannot say whether there is a law to this effect in East Africa. I have heard of it. I am not sure of it.

2369. (*Mr. Hodgkinson.*) When the plant is rooted up, it has to be taken away from the field immediately, otherwise there is not much use in pulling it up. It should be burnt up or dried up or drowned in water for sometime so as to kill the creatures inside. The adult creature flies about from one plant to another. That is how new plants get infected. The reason why I have suggested a close season is that such a period will starve out the pest and prevent multiplication.

2370. (*Mr. Wadia.*) We saw the pest here for the first time in 1907. We have been trying our best on the farm to check it. The difficulty is that the surrounding cultivators will not take to our methods, which will succeed only when there is co-operation among all the cultivators of one tract. Our methods therefore often fail for want of co-operation. We still get the pest on the farm as it comes from the surrounding fields.

Mr. F. R. PARNELL, B.A., Economic Botanist, Madras.

EXAMINED AT COIMBATORE, MARCH 15TH, 1918.

Written statement.

2371. *Botanical work on Cambodia cotton in Madras.*—My experience of cotton is limited to that acquired from conducting plant-breeding work, on a small scale, with Cambodia at Coimbatore since 1913. For this reason, I shall confine my remarks to section I (c), dealing with exotic cotton.

(2) Single plant selections of Cambodia were started and, in addition, crosses were made between this and Bourbon, a *hirsutum* type, now growing around Erode, which was presumably introduced generations ago during the early attempts to grow exotics in this district.

(3) The Cambodia selection work was given up owing to lack of time, but some after the progeny of the Cambodia-Bourbon cross are still being carried forward. The original idea was to introduce into Cambodia

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something of the sturdy habit; resistance to stem-borer and fine quality of lint characteristic of Bourbon. It soon became evident that considerable time would be necessary for carrying out this object with any degree of success. An examination of the second generation showed great variation but nearly all types possessed one undesirable feature, viz, a smaller boll than Cambodia. A large proportion of the plants grew and yield well, without irrigation, on the mixed soil of the Botanical Garden. Many selections were made and, whilst not giving great hope of replacing Cambodia as an irrigated crop, some of these are extremely promising for growing as a dry-crop. The lint varies considerably, but is generally up to Cambodia standard and often better.

(4) I have little doubt that if this material could be worked up it would give high-yielding types, with lint at least as good as Cambodia, suitable for cultivation without irrigation in localities too dry for Cambodia. This work, however, cannot be carried out as it would demand considerably more time than I can give to it. I would like to emphasize, in this connexion, the fact that good results from any such work can only be expected where the officer in charge is able to devote to it considerable time and personal attention. The importance of this fact is now beginning to be realized and it is hoped that, as a result, agricultural officers will be enabled to concentrate on definite lines of work. I, personally, am fortunate in that practically my whole time is given to plant-breeding work on rice.

2372. *Possibilities of extension of area under American cotton.*—With regard to the extension of the area under exotic cotton, I enclose a copy of a report which was sent to the Director of Agriculture, Madras by Dr. Barber in 1911—"A study of the rainfall in Madras as affecting the growth of American cottons."

ANNEXURE.

A study of the rainfall in Madras as affecting the growth of American cottons, by Dr. C. A. Barber, late Economic Botanist, Madras.

1. In considering whether any particular tract in South India is likely to be suited for the introduction or extension of superior cottons of the *hirsutum* type, a number of factors have independent influence. Of these by far the most important are the amount of water available and the retentivity of the soil for it. The following appear to be the main factors to be considered:—

- (a) The character of the soil, whether black cotton which is so retentive of moisture, mixed which is especially suited to American cottons, or red and other light soils which can only be utilised with abundance of water.
- (b) The total rainfall during the period of growth: the character of the rainfall, whether sudden heavy storms and floods or lighter, more frequent rains: the number of rainy days in each month of the growing period: the length of the rainy period.
- (c) The character of the wind: the effect of heavy wind in drying up the plants as in Coimbatore and Udumalpet: the presence of sea breeze or "crop winds" as in Guntur and parts of Tinnevely and the presence of mists during the dry season, these again being in close relation with a soil which has the power of absorbing moisture.
- (d) The presence of subsoil water whereby irrigation from wells is possible: the availability of water from tanks, including such cases as have only sufficient water for an occasional irrigation.
- (e) The local conditions of the people and of other crops: for instance, the incidence of the grasshopper plague on cereals in the western taluks of Bellary and the disinclination of the people of South Arcot to go on growing groundnuts.
- (f) The average temperature during the growing period.

2. It will not be possible to deal with these factors in the present paper, but, before deciding on the suitability or otherwise of any district, they must all be carefully studied *in situ*. In the present paper, I propose to confine myself chiefly to the actual monthly rainfall in certain selected places and have added a note on the number of rainy days in each month. The Bellary District, as is natural, will receive the most careful attention.

3. Fletcher, in his note on cotton cultivation, gives the following statistics regarding rainfall conditions in the Broach, Carnatic and Deccan regions of the Bombay Presidency. Broach is a district of south-west monsoon and the rains are satisfying because of the retentive character of the black cotton soil: the Deccan again is a tract of south-west monsoon, but the rains are far more meagre and the soil is inferior: the Carnatic on the other hand (and this is the tract most interesting to us because of its nearness to Madras) has some rain from both monsoons although the total amount is comparatively small.

Broach.—38 inches: June 8, July 15, August 8, September 5, October—May 2.

Deccan.—20 inches: June 4-14, July 8-19, August 5-4, September 6-23, October—May 2-5.

Carnatic.—25-8 inches: May 1-4, June 3-6, July 3-6, August 2-5, September 3-9, October 2-6, November—April 3-5.

The rainfall distribution in the Carnatic is seen to be better than in either of the other tracts: the period of growth is longer so that even on light soils it is possible to grow cottons: the cotton in some parts is equal to any in India and it is the only place where the *hirsutum* variety has established itself as an annual crop without irrigation.

4. Let us now apply this method to the Bellary District. In the Hadagalli and Harpanahalli taluks, the rainfall is small, 21—24 inches, but the distribution is good as there are rains more or less from April to October. There is good to fair rain in May, rising in quantity to September, a further variable but sometimes good supply in October and practically none for the rest of the year. The following appears to be the usual course of the seasonal rains:—

April under 1 inch: usually light showers, but sometimes none: extremes 0 to 2-40.

May 2—5 inches: rains usual: extremes 0-42 to 8-56.

June 3—5 inches: rains usual: extremes 0-68 to 6-67.

July 3—4 inches: rains usual: extremes 1-26 to 4-61.

August 2—5 inches: rains usual: extremes 0-69 to 8-09.

September 3—6 inches: rains usual: extremes 0-68 to 7-54.

October 2—6 inches: variable: extremes 0-19 to 7.

November 0-5 inches: rains very light.

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Hadagalli has uniformly less rain than Harpanahalli excepting in May when it is slightly heavier. This may be accounted for by the more hilly nature of the latter taluk. The falls in the district are small and frequent (averaging under half an inch) rather than few and heavy. Every month has an occasional almost total failure while the next month has a heavy fall to make up for it: the lowest falls noted above do not therefore mean famine years but merely variations in the distribution. Such light falls as are usual in the tract will probably be more effective than in hotter districts at lower elevation. I have been unable to accept the returns from other places in the taluks, because they are in one-fourths and halves of an inch. I have noted that whenever this method is adopted the rainfall is invariably much less!

5. The rainfall in Bellary taluk is interfered with by the Sandur range of hills which cut off much of the south-west monsoon rains. It is throughout similar to that in the western taluks, but from May to August there is a total of 7.56 inches in place of 10.37. This with its drier air, brings Bellary into the class of places where the introduction of *hirsutum* is hardly likely to be successful. The rainfall in Adoni and Alur is better than in the western taluks. There is less in May, but for the rest of the year there is more and it therefore becomes an interesting question whether, with the undoubtedly better soil, Bombay cotton might not be profitably tried in these taluks. The air is, however, a good deal drier and the temperature probably a good deal higher and no certainty can be arrived at without experiment.

6. In the succeeding studies, I have taken the actual monthly falls for the last ten years, 1900-1909:—

Nandyal.—Rainfall 27.8 inches.

January 0.2; usually none; occasionally meagre.
February 0.05; usually none; occasionally meagre.
March 0.1; usually none; occasionally meagre.
April 0.6; usually none or meagre.
May 0.8; usually showers but very meagre.
June 3.7; usually moderate to good rains.
July 5.5; usually good to heavy rains.
August 7.7; usually moderate to good rains; occasionally heavy.
September 7.7; usually good to very heavy rains.
October 2.3; usually rain; meagre to moderate or good.
November 0.6; meagre or none; occasionally moderate.
December 0.4; usually none; occasionally meagre.

The neighbourhood has black and red soils. In the red soil (and this applies to the whole of the Sirval taluk) the land might be prepared in April-May and the cotton sown in June as the October rains are not heavy. In the black soils, experiments might be tried in sowing the seed in June-July or in October.

7. *Cuddapah*.—Rainfall 28.70 inches.

January 0.8; usually none; occasionally meagre.
February 0.2; usually none; very occasionally meagre.
March 0.05; usually none; very occasionally meagre.
April 0.5; usually none; occasionally meagre.
May 1.2; usually some rain, but rarely even moderate.
June 2.8; usually moderate; occasionally good or meagre.
July 3.6; usually moderate to fair rains; very occasionally heavy or meagre.
August 5.7; variable; good or very heavy to meagre.
September 6.7; good to very heavy; occasionally meagre.
October 3.8; moderate to good; occasionally heavy or meagre.
November 2.5; variable; usually meagre but sometimes good or heavy.
December 0.9; none or meagre to moderate.

Some rain falls in May and the land may be got ready. In June, moderate showers increasing in July to moderate or fair rains; the rains from August to October are good and a further fall occurs sometimes in November. Sowing may take place, especially in mixed soils, in June-July and harvesting in October-November onwards.

8. *Anakapalli*.—Rainfall 35.15 inches.

January 0.5; }
February 0.5; } Over half the years no rain at all; others (one-third), occasional rain storms.
March 0.4; }
April 1.4; rain each year, but very little; in one-third of the years, occasional storms.
May 1.95; rain each year, but meagre in over half.
June 4.9; rains usually more than 4 inches, but in three years less than 3 inches.
July 4.7; good rains every year, 2.52 to 10.10.
August 5.1; more even, 2.63 to 7.92.
September 7.6; usually good rains; occasionally heavy, 1.14 to 14.38.
October 5.0; usually good rains between 3 and 9 inches; two years less than 2 inches.
November 2.1; varies much; four years moderate to heavy; two years greater than one inch, and four years none at all.
December 1.0; usually less than one inch and occasionally none.

There is an absence of black soil here, but a good deal of subsoil water. Rains commence in April-May and good rains fall during June to October and sometimes November. It becomes difficult to suggest the proper month for sowing since heavy rains at both flowering and crop time are injurious. There is quite a good period for growth and probably some time about August will prove to be suitable for sowing.

9. *Cuddalore*.—Rainfall 49.82 inches.

January 1.7; usually some rain; sometimes none.
February 1.3; usually little or no rain; very occasionally a heavy rain.
March 0.1; usually little or no rain.
April 0.6; usually no or meagre rain.
May 1.3; usually some rain; sometimes none.
June 1.0; usually little to meagre rain.
July 3.3; usually moderate to good rains; sometimes meagre.
August 4.1; rains usual; moderate to good.

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September 6.2; moderate to heavy and occasionally very heavy rains.
October 11.2; variable between moderate and extremely heavy.
November 11.9; heavy to extremely heavy rains; occasionally meagre.
December 7.1; usually good to very heavy; occasionally meagre or none.

There is plenty of rain in this tract. Probably Cuddalore is not a good selection as the rains of the north-east monsoon are heavier than further from the sea. The rains in December well necessitate a later planting than in Anakapali and perhaps September may prove to be the right month, but this will have to be guided by the season. The plants must be fairly high when the heavy north-east rains begin.

10. *Coimbatore*.—Rainfall 24.76 inches.

January 1.7; variable; usually some rain; occasionally good but usually meagre.
February 0.1; practically no rain.
March 0.4; practically no rain, but occasionally showers.
April 1.7; usual meagre or none; but sometimes good rains.
May 3.1; rains usually; generally moderate to good; sometimes meagre.
June 1.5; rains usually meagre; occasionally fair.
July 1.7; rains usually meagre; very occasionally good.
August 1.2; rains usually meagre; sometimes moderate and very occasionally good.
September 1.8; rains usually meagre; occasionally good.
October 7.6; rains good to heavy; very occasionally moderate.
November 2.7; rains usually moderate; occasionally meagre and very occasionally good.
December 1.3; usually meagre; sometimes none.

A region of practically one monsoon, the north-east, and the rains concentrated into October-November. The land can usually be prepared in April and the seed sown in May or June. But from June to September the rains are meagre and the winds strong. In black cotton soil, it will probably be best to plant after the heavy monsoon rains have ceased (November) and it is doubtful if red soils can be used without irrigation. There is little likelihood at present of American cotton replacing the local kind unless it can be planted in early September.

11. *Erode*.—Rainfall 30.11 inches.

January 0.6; usually little or no rain; one year nearly 6 inches.
February 0.1; little or no rain.
March 1.0; usually little or no rain; one year nearly 6 inches; two years 1—2 inches.
April 1.6; usually little or no rain; sometimes fair rains.
May 4.0; usually moderate to good rains; occasionally heavy.
June 1.1; usually meagre or poor rains; sometimes none.
July 1.8; usually some rains, usually 1—2 inches; occasionally good.
August 4.2; usually good to heavy rains, but variable and sometimes meagre.
September 4.8; usually good to heavy rains; occasionally meagre.
October 6.3; good rains; occasionally heavy.
November 2.9; variable—either meagre or moderate to good.
December 1.7; usually little or no rain; sometimes good rain.

The rainfall is better than in Coimbatore, but there is no black cotton soil. If suitable soil (e.g., mixed) could be found, planting might be done in July-August and reaping in December.

12. *Udamalpet*.—Rainfall 23.63 inches.

January 0.7; usually little or none, but occasionally meagre rains.
February 0.2; usually little or none.
March 0.5; usually little or none, but occasionally meagre rains.
April 1.3; rains meagre; very occasionally good or none.
May 2.9; rains moderate to good; occasionally meagre.
June 1.1; rains little or none; sometimes meagre to fair.
July 0.7; rains little or none; occasionally meagre.
August 1.2; usually little or none; one case of nearly 8 inches.
September 1.0; usually meagre rains; very occasionally good.
October 7.3; moderate to heavy; occasionally very heavy.
November 4.7; usually good to heavy; occasionally meagre or failing.
December 2.0; usually little or none, but occasionally fair and in one year very heavy.

As in Coimbatore, the rains from June to September are very meagre, while the wind is stronger. There is little likelihood of American cotton being grown. With the exception of May, when the rains are moderate, there are only two rainy months in the year, October and November. The only chance would be to plant after the falls in November and it is doubtful if the American cotton could ever compete with the local.

13. *Madura*.—Rainfall 36.10 inches.

January 1.0; usually some rains, very small, but occasionally storms up to 4.0.
February 0.3; half years 0.0; remaining years small; heaviest 1.25.
March 0.7; more than half the years 0.0; very small, but occasional storms up to 3.31.
April 2.3; varying; always some rain from .50 to heavy rains up to 6.78.
May 3.4; rains usual, usually good; once under 1.0, up to 6.06.
June 1.6; rains variable, usually very meagre; five under 1 inch, lowest 0.13; two years fair to good.
July 1.4; rains variable, usually meagre; five years under 1 inch; lowest 0.01, 0.110, 0.023, 0.37, two years fair (3.28 and 3.78).
August 4.6; rains usually good; sometimes moderate and once failed (0.44); 2 years heavy 9.99 and 7.02; 4 years good.
September 6.2; rains heavy in five years; fair to good in five years; always more than 3; three years very heavy, 12.31, 10.62, 9.54.
October 8.2; rains excessive to heavy to good; lowest 3.34; heaviest 14.15, 13.15 and 11.129.
November 4.5; rains good to fair; two years failed 0.36, 0.97; five years between 5 and 8.
December 1.8; variable, usually meagre; seven years less than 2 inches; total failure in two years 0.0 and 0.8; two years 3.78 and 7.28, and occasional storms.

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[Continued.]

There is plenty of rain if the falls are not too heavy. There are rains from April to December, with a weak month in July. Planting might be done in August-September to get the plants up before the heavy monsoon rains of October, but care should be taken that there are facilities for drainage.

14. *Satyamangalam*.—Rainfall 27.48 inches.

January 1.5; usually little or none.
February 0.3; usually none and occasionally meagre.
March 0.5; usually none and very occasionally meagre or moderate.
April 1.6; usually rain, meagre to moderate.
May 4.5; usually good rains; very occasionally meagre.
June 0.8; usually little or none, and occasionally moderate.
July 1.1; usually meagre; occasionally moderate or none.
August 2.2; usually meagre; occasionally moderate or good.
September 3.7; usually meagre to moderate; occasionally heavy.
October 7.1; usually good; occasionally very heavy.
November 3.1; meagre or good, varying.
December 1.0; meagre or none; occasionally moderate.

The early rains are rendered of little use unless there are wells because of the dry spell from June to August. Planting might be tried in September or in good years in August, but the growing period is not long enough on any soils but black, where the planting might be successful at the usual time after the rains.

15. *Sattur*.—Rainfall 30.28 inches.

January 1.2; rain usually meagre to moderate; occasionally none.
February 0.2; rain usually none or very meagre.
March 0.7; rain usually none or meagre; very occasionally moderate.
April 2.2; usually meagre to moderate; occasionally none.
May 3.3; usually moderate to good; occasionally none.
June 0.3; usually none or extremely meagre.
July 0.6; usually none or very meagre.
August 1.4; usually very meagre; occasionally moderate.
September 2.9; rain is variable, meagre to good.
October 7.8; good to heavy.
November 5.3; usually moderate to good; occasionally very meagre.
December 2.3; variable, very meagre or none to moderate; very occasionally good.

The rainfall is similar to that of *Satyamangalam*, but the growing period later and longer. Black cotton sowing might be successful, but there could be no sowings earlier than September and probably, in black soils, the usual period would be better.

16. *Palamcottah*.—Rainfall 26.95.

January 1.8; generally some rain; usually meagre; occasionally heavy storms.
February 0.7; usually less than 1 inch, one year 3.23, but practically no rain for agricultural purposes.
March 1.2; variable; good to moderate rain in three years; usually less than 1 inch and of little value except for preparation of land.
April 2.6; usually rains, fair to moderate most years, with occasional failure.
May 1.8; usually rains, moderate for eight years and two failures.
June 0.5; rains very meagre and usually of no practical value.
July 0.08; practically no rain.
August 0.7; practically no rain; with occasional storms.
September 1.3; usually some rain; one year fair, the rest meagre or very small.
October 6.9; rains good to heavy; one year failed.
November 6.0; rains good to heavy; one year meagre and one year very small.
December 3.4; rains moderate to good six years; meagre four years.

In the absence of black cotton soil, there would be little likelihood of success, and even if it were present in quantity, it is doubtful if American cotton would grow.

17. *Tenkasi*.—Rainfall 44 inches.

January 2.9; rains moderate to fair; occasional storms and failures.
February 1.4; variable, four years moderate, the rest practically useless.
March 2.5; variable, four years fair to good, meagre to moderate four years; failed two years.
April 3.8; rains usually good; occasionally heavy; sometimes meagre.
May 2.0; rains usually meagre; occasionally good and occasional failures.
June 4.9; rains usually good; once very heavy and thrice meagre.
July 3.8; variable, three years good to heavy, three years moderate to good, four years meagre.
August 1.6; variable, usually meagre but occasionally good.
September 1.0; meagre with one fair year.
October 8.7; rains usually good; sometimes very heavy; one year meagre.
November 6.0; rains usually good; sometimes very heavy; two years meagre.
December 5.3; variable rains either heavy or meagre.

There are two periods of rain, June-July, south-east monsoon and October-January, north-east monsoon with a failure between the August to September thunder-showers. There is, however, a further smaller period in rains from March to May. It is very difficult to suggest the proper time for sowing. One might be tempted to suggest the quite unusual period March-April for sowing with harvesting in August-September, but local studies would be necessary as to the effect of winds and temperature on the growth of the plants.

18. A note is added on the results of a study of the returns of the monthly averages and number of rainy days for the 35 years ending 1904. I have considered that a month with four or more rainy days on the average may be called rainy and as such suitable for cotton growth; with less than three it is a dry month and, with three, between the two. Marking the rainy months with a cross, the dry months with an O and the ones between with a dot we can get a graphic idea of the length of the rainy period in any place, such as will be suitable for cotton-growing. It is interesting to note that three main regions become separated out, the northern with rains beginning in May, the southern with rains beginning in April and the coastal with rains

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beginning in June. Two places situated in gaps of the western *ghats* are exceptional in the length of their rainy period and form a fourth class.

Northern Tract.—Rainy period commences in May.

	Rainfall.	Rainy periods.	Rainy days.	Length of rainy period.
Bellary	19.50	0000.XXXXX.00	35	6 months.
Adony	26.14	0000.XXXXXX00	46	6 "
Nandyal	32.56	0000.XXXXXX00	47	6 "
Anakapalle	36.39	0000.XXXXXX0	43	7 "
Hadagalli	20.89	0000.XXXXXXX00	42	6 "
Harpanahalli	24.06	0000.XXXXXXX00	46	6 "
Cuddapah	31.50	0000.XXXXXXX0	44	7 "

Coastal Tract.—Rainy period commences in June.

Cuddalore	52.87	00000.XXXXXXX	57	7 months.
Panruti	46.93	00000XXXXXXX	52	7 "

Southern Tract.—Rainy season commences in April.

Udumalpet	22.27	000.X.000XX.	35	3 plus 3
Palamcottah	27.28	000.X.000XX.	42	3 " 3
Sattur	25.83	000.X00.XXX.	38	2 " 5
Coimbatore	21.87	000.XXX.XXX.	45	9 months.
Erode	28.24	000.X.XXXXX0	45	8 "
Madura	34.71	000.X.XXXXXX	51	9 "

Gaps in Western Ghats.

Pollachi	30.39	000XXXXXXX	57	8 months.
Tenkasi	39.49	00.X.XXX.XXX	63	10 "

Taking these figures into consideration and ignoring other factors such as the presence of black cotton oil and subsoil water, temperature, wind, etc., we may add the following deductions to those made in the preceding paragraphs:—

- (1) Suitable for the introduction of American cotton—rainy period of at least six consecutive months. Hadagalli, Harpanahalli, Cuddapah, Cuddalore, Panruti, Pollachi (I am indebted to Mr. Sampson for drawing my attention to the latter place.)
- (2) Probably suitable—at least five consecutive months. Adoni, Nandyal, Anakapalle, Madura (Tenkasi).
- (3) Possibly suitable—a long rainy period, but rainfall small and in some months meagre, Coimbatore, Erode.
- (4) Unlikely to prove suitable—Bellary, Udumalpet, Palamcottah, Sattur.

Mr. F. R. PARNELL called and examined.

2373. (*President*.) My principal work is on rice. I first started with the intention of carrying on work on rice and cotton, the work on cotton being definitely subsidiary to that on rice. As work on *deshi* cottons was being done by Deputy Directors I intended to spend my time on Cambodia. In the first place, I started selection work on Cambodia and also started crossing it with Bourbon on the strength of some preliminary results obtained by Dr. Barber when he was Government Botanist. I carried on selection on Cambodia for only two years. Mr. Wood then took it up and I dropped it because I had very little time for work on cotton. The crosses which had been started were carried on, as they were there, to see what they might produce and there are still some remains of them going on now. As a matter of fact, they have produced no definitely good strain although there was good material that might have produced something if time could have been given to it.

2374. I certainly think that the cotton crop in this Presidency is of sufficient importance to warrant the appointment of a botanist to devote as much attention to it as I am devoting to rice. I think a lot could also be done by crossing. Selection work could be done by Deputy Directors. In fact, it could be done by any scientific officer who could give time to it. I think that crossing could be done to most advantage by a botanist with a knowledge of plant breeding. There is undoubtedly a great deal of room for concentrated work on cotton. I am inclined to suggest a special botanist for work on cotton. Apart altogether from the good work that could be done by the Deputy Directors, it would be a help to have somebody to do the scientific work.

2375. I shall not give up direct control of my improved strains of rice until I am certain that they are some good. I test this myself by making comparisons on small plots. The work at Manganallur may be taken as an example of my selection work on rice. I have been selecting rice at Manganallur for three seasons. This year a certain number of strains appeared to be definitely better than the farm strains but further confirmation is wanted before they are put out. I shall carry on further comparisons next year and meanwhile I have a certain amount of seed of each of these good strains enough to sow several acres at any rate. This has been handed over to Mr. Sampson for growing on a fairly large area on the Farm with a view to multiplying it so that next year, when I find out which strains are really the best, we shall have a fairly large amount of seed to start with. When it reaches that stage, I think I can let it out of my hands, but I shall take an interest in it even afterwards. If Mr. Sampson has any suggestions to make as regards improvements in such matters as strength of straw, etc., I shall try to bring them about. I have no desire to look after seed farms. I should want to make comparisons between my strains and local strains on a large enough area to

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enable definite results to be obtained but would not tie myself down to a definite area. I would grow it on comparative plots. It would be grown on long narrow strips repeated many times and the total area would come to much less than that ordinarily required where large rectangular plots are employed.

2376. (Mr. Wadia.) I can satisfy myself by field trials on not more than one quarter of acre area for each strain. I should not take it any further than that. It would be grown on a farm scale by the Deputy Directors. Paddy is entirely different from cotton.

2377. If I were working on cotton, I should not be satisfied to hand it over unless I was sure of the commercial value of the lint, so that a fairly large area would be required. I am in favour of my own position, i.e., that of practically a crop specialist. That is the only possible way to get on with rapidity. An extension of that position would mean a body of workers on cotton in different provinces who could meet and would be very useful to each other.

2378. (Mr. Roberts.) I think Mr. Gammie's classification of cotton is as good as any body else's, but I do not think it is very scientific because of the large amount of crossing that goes on. From Mr. Gammie's results, I imagine that cottons cannot cross as much at Poona as they do here. Personally, I think that very good local work could be done on cotton without any knowledge of a classification whatever. I think it is a very good thing to have classification for purposes of convenience in order that it may be possible to know without a sample what people are talking about. So far as I have seen that is about all classification of cotton is good for.

2379. The most serious defect in the habit of Cambodia cotton, in my opinion, is the dropping of the lower branches right down to the ground with the result that the *kapas* gets very badly stained and it is impossible to irrigate the cotton without spoiling a very large number of the lower bolls. The wood is not very strong but it is very largely due to the shape of the branches in addition. It requires very stiff branches to keep up the large number of heavy bolls Cambodia produces. The dropping of the branches is not entirely due to the sympodial branches keeping down and the monopodial branches keeping up as very long monopodial branches go down almost as badly as some of the sympodial. I have made a scientific examination of the habits of recently introduced Cambodia. Comparison is difficult as it is such a mixed crop and there is much more variation in habit in the recently introduced Cambodia than in the acclimatized Cambodia. Bourbon cotton has a deeper root system with more pronounced tap roots than Cambodia. The study of the root system of any crop is a thing which should be done. I doubt if Cambodia would do any better on garden land if it had a deeper root system. It might do better on black soils if it had a deeper root system. You must have two distinctive types for the two classes of cultivation. It is impossible to get one type which would suit all conditions. It was with the idea of evolving different types that I crossed Bourbon with Cambodia. Bourbon is much stiffer and more erect and has large monopodial branches coming from below which are much stiffer than the Cambodia branches. It has a deeper root system and does not succumb to stem borer so easily.

2380. I find it extremely difficult to get a proper valuation of cotton except as a commodity with a definite 'trade' name. In other words if one asks the value of cotton, the first enquiry is made "what is it?" I think that information is not forthcoming, no price is given. I think the establishment of a Central Bureau which should be able to carry out spinning tests is essential and would be the only possible means of correlating prices. I would undoubtedly lay great stress on that as the only way in which standard valuations can be obtained.

2381. It is true that Cambodia varies a good deal in staple and in ginning percentage even under irrigation. I think that if a strain of cotton is better than the ordinary, it should be put out even though it has not reached finality.

2382. (Mr. Hodgkinson.) Any strain with a better habit is undoubtedly the best to push, other things being equal. It has not yet been determined whether the Cambodia strain with better habit on the Farm at Coimbatore is a better yielder.

2383. Company No. 3 was grown on the farm here but gave poor results as compared with other localities. The reason is that the conditions of soil and atmosphere are so different here from those in Tinnevely that it would be very extraordinary if it gave the same results in both districts. I would not advise giving out Company No. 3 here until it has been proved that it is better than the local strains.

Mr. R. CECIL WOOD, Principal, Agricultural College, Coimbatore.

EXAMINED AT COIMBATORE, MARCH 15TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

2384. (1 and 2) Experience and varieties.—I am acquainted with nearly all of the agricultural cottons (i.e., excluding the small quantity of tree cotton grown in gardens, etc.) of the Presidency. I have been engaged in selection work in Bellary (Westerns) and Nandyal (Northerns), and have of course, grown the crop in Coimbatore. Most of this is *G. herbaceum*: Nandyal gerrapatti is *G. indicum*.

2385. Cultivation of cotton.—The crop is confined or nearly confined to black soils though I am finding out here that you can apparently get a very good crop off red soils. Cereals also do well on the red soils here, and it is probably the reason why in a mixed soil tract, cotton is usually seen on black soils. Cultivation is usually, in the parts I have mentioned, of a low order. Often the lands nearer the village (which can be watched) grow the food crops, the cotton being confined, sometimes without rotation, to the more distant fields. I suppose Rs. 5 an acre would more than cover the acre expenditure (calculated on the basis of paying for everything) on eighty per cent. of the land in the Northern and Western areas. The yields vary from 120 to 400 lbs. of *kapas*, with about 21–23 per cent of that lint. The Northern area is at the upper scale of these figures, the Westerns on the lower. The systems of cultivation will be found briefly described in the appendices of the annual reports of the Hagari and Nandyal Agricultural stations. Holdings are large: larger when the land is poor. The area devoted to cotton depends partly on the season, partly on the rotation which is itself largely a question of season i.e., of rainfall, and partly on the price. An increase in the latter

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would increase the area of cotton and simultaneously the price of food grains, since transport facilities are usually poor in these tracts, and the reduction in the area under grains would have to be met by importation. Better cultivation will mean better crops and that and seed selection are the best directions in which to work, as witness the purchase of the disc plough near Koilpatti. Any large increase from the use of manures is not to be looked for, as in such dry tracts, manuring is rather a ticklish question. This *herbaceum* or *indicum* cotton does not compete with any other cotton except possibly in the western taluks of Bellary where it may compete with Dharwar or Upland American cotton. I have no experience of this as a field crop except for some experimental plots at Hagari. It stands no chance as a field crop in that area.

(c) Exotic cotton.

2386. (21) Varieties.—This is the Cambodia cotton which has spread so rapidly through South India. I saw a crop of this cotton at Koilpatti in 1906, the second year of its introduction into India (see Koilpatti report for 1906-07).

2387. Cultivation of Cambodia cotton.—It is grown under entirely different conditions from the dry cottons, as it needs irrigation. This means that it competes with many other crops, on the basis of rupees per acre. In this tract it has largely ousted wheat, and competes strongly with tobacco. It is much more intensively cultivated than the dry cottons and is capable of wide extension (a) by more intensive cultivation, especially in the way of manuring, (b) an increase in the irrigable area. The profits from the cultivation of this cotton have already led to a large increase in the business of well sinking, and the present second year of high prices, assuming that it only takes the grower one year to get out of the hands of the *sahul*, will probably lead to a further large increase in this direction.

2388. (23) Comparative returns.—That the profits are large is obvious, and hardly needs proof. I have grown it here for some years and reckon on getting an average of 700–800 lbs. an acre with at least a 33 percentage. I have grown over 1,750 lb. of *kapas*, but latterly the damage done by the stem weevil [*Pemphres affinis*] has largely reduced the yields. I hope that two fields this year will give me over 1,500 lb. At present prices this means over Rs. 400 an acre. One possible result of the increase of this cotton has been the rapid rise in the price of fodder, which shows that it is now competing with cereals.

2389. Deterioration of Cambodia cotton.—It is said that this cotton is deteriorating. I shall be able to show the Committee two fields of newly imported Cambodia on which they can form their own judgment. I think myself that the stem weevil has much to do with the report, because the lint from the dragging branches gets so dirty and stained, and I shall show fields from which this pest is absent, which I think as good as any I have grown. There is no doubt however that selection will improve this cotton, as it has with others, and considering what a success a casually introduced cotton has been. I see no reason why careful breeding should not produce a cotton infinitely superior. Much of the Cambodia that comes on to the market is grown on dry land, for which it is quite unsuited, and worse still, much is ratooned, an utterly indefensible practice, which should be penalised by law. This has brought about the rapid loss of the good name this cotton formerly enjoyed, and the premium which it carried. Messrs. Stanos & Co. have always expressed themselves as quite satisfied with my lint, which was not handled in any unusual way, but which was simply from a pure crop, picked with a little more care than usual.

II.—COMMERCIAL ASPECT.

2390. Commercial aspect.—I confess that the cotton trade is a mystery to me. I cannot see that cotton is bought on any basis of quality or uniformity except the most casual inspection for dirty or stained cotton. I carried out an experiment last year, in grading Cambodia lint with the result that in some cases I got no higher price for the better stuff and at best, a price which did not pay the cost of picking and the loss on the second quality stuff. I have talked the matter over with the firms here, but they either say that the selected cotton was altogether outside their trade samples, or else that the Bombay buyers here corrupt the trade and by a regular system of bribery get all cotton ultimately through the mill. It is difficult to believe in such circumstances, that uniformity or indeed quality of any sort is of the high importance which is claimed for it. The separation of Cambodia and *upam* should not prove an insurmountable difficulty, if the trade really want them separated, since the seeds are very distinct, both in appearance and size.

2391. Desirability of standardizing processes of determining qualities of cotton.—There is a point to which I have not seen much attention given, which I might perhaps mention here. I have experienced some difficulty, when selecting cottons in making exact determinations of length of staple, fineness of staple and percentage of lint to seed. Such processes, it seems to me, might be standardized with some advantage, and before this can be done, some preliminary work would be needed. If there are to be sectional meetings of the Board of Agriculture, why not a meeting of cotton selectors, one from each Province, to demonstrate the methods they adopt, and by testing each other's methods evolve a standard procedure. It is by no means certain that A's idea of half an inch staple, is at all the same as B's in another Province.

Mr. R. CECIL WOOD called and examined.

2392. (President.) I am carrying on work on Cambodia cotton on the Agricultural College Farm. I was asked to make a beginning with selection work on Cambodia with a view to having some material ready for the Cambodia farm when started. There is a proposal to start a farm specially for Cambodia. I began in 1914-15. The cotton was sown cut in lines in 1915-16. Last year I had four plots, each from a single plant. Out of these four, I did my best to select for yield, habit, quality, etc. and in this selection I was helped by Mr. Steel. No. 11 was selected, the other three were mixed and sown in another field. The yields last year were:—

	lbs. of <i>kapas</i> per acre.
No. 4	900
No. 5	1,000
No. 6	1,100
No. 11	1,300

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The ginning percentages were 34, 37, 37, and 37½. No. 11 was satisfactory in habit and was the best in yield and ginning percentage. The area on which Selection No. 11 has been grown this year is about three acres. I shall hand the selections over to the Deputy Director when the Cambodia farm is started. I have had experience of selection work in Nandyal, Hagari and Ballary. Sircar No. 2 was one of my original selections.

2393. Cambodia is grown on ten to fifteen acres on the College farm every year. There is no particular selection about it. I have in the past got very heavy yields from ordinary unselected stuff; the heaviest yield I ever obtained being 1,750 lbs. of *kapas* per acre. The cotton was carefully rogued, and *upmam* plants were picked out, but there was no particular selection for quality. The cotton was sown in lines, and was carefully intercultivated. A fair amount of manure was given. Our cultivation was a bit above the average. I do not think I have now got anything that will give as good a yield as that.

2394. The stem weevil undoubtedly is a very serious factor. It eats into the stalks and the plants fall over very badly, as they get weak and unable to resist high winds. We try to clear the whole place, and burn the affected stuff as early as possible though we may lose some of the later pickings. It is rather less this year than in previous years, which is possibly due to getting the stalks out of the ground as early as possible. The new importations of Cambodia are absolutely riddled with it.

2395. The introduction of Cambodia is certainly having a considerable effect in sending up prices. I suppose the College farm is typical of this district, as it contains both garden and dry land. My yield of cotton is twice as much as it was five or six years ago. It is about the same all over the district. There is not a hundred per cent increase in *area*, because Cambodia is a higher yielding crop. You get a much bigger yield per acre.

2396. I think if *upmam* is carefully treated and cultivated on dry soils, it gives as much as Cambodia. I had a field last year which gave a yield of 800 lbs. an acre which is higher than I had ever heard of. It was on red soil, on which the cultivators generally prefer other crops to cotton. 800 lbs. is rather more than twice what I got when it was grown on black soils.

2397. From the agricultural point of view there is a good deal to be done in the way of rotations. A very large increase in fodder crops is noticeable recently, owing to the substitution of cotton for cereals. Normally, the area under cereals produces sufficient straw. Now there is so much land under Cambodia, that land has to be devoted to growing fodder only. That is also reflected on the farm.

2398. (Mr. Roberts.) I do not know what proportion of the area under Cambodia is dry land. I am working on irrigated Cambodia only. I have never grown any Cambodia on dry land. It is very poor stuff round here when grown on dry land. This year, Messrs. Stanes and Company offered me only Rs. 5 a *khandi* less for my crop of *upmam* than for good Cambodia. They want *upmam* in their mills.

2399. Fresh seed has been imported this year to compare with the present selected strains and afford material for fresh selections. There were two importations this year, one from Cambodia and the other from Saigon. The Saigon importation came rather late, and is still very small. The Cochin China importation was so badly riddled with borer that I do not know what I shall get out of it.

2400. Selection No. 11 has a ginning percentage of 37½ as against 33 for the ordinary variety. I find it very difficult to get any definite idea how to estimate staple accurately. The average for selections Nos. 4, 5 and 6 respectively is .89, .89 and .85. Selection No. 11, I put down as .79, in staple, and it is the shortest staple. I have no definite standard in view as regards length. .79 was the lowest and .93 the highest for a dozen plants I had originally. Mr. Steel was perfectly satisfied with Nos. 4, 5 and 6. Selection No. 11 was added on the ground that it was of a particularly good habit and a heavy yielder. I am aiming to beat the local cotton in yield and ginning percentage. I would go for cotton with a higher ginning percentage in preference to length of staple in cases of differences in length of staple up to ½ of an inch. If I could get cotton of a much longer staple, I would not mind the ginning percentage.

2401. I get my cotton valued by the local mills and buyers. Last year, I had a lot of Cambodia cotton picked over by hand and separated into two grades before ginning. The figures are rather interesting. The actual proportion of the cotton in the two grades was first grade 63.5 and second grade 36.5. When the samples were ginned separately, the first sample gave 33 per cent. of lint, and the second a little over 29. The unselected gave slightly over thirty. I then sent samples to five different firms and asked them for an opinion as to how much these two samples were worth above or below the unselected Cambodia, which had not been picked over. One firm valued the first grade at Rs. 10 above the unselected and the second grade at Rs. 60 under. On the basis of a price of Rs. 250 a *khandi*, and the proportions mentioned above, this worked out at Rs. 32 a *khandi* less for the selected than for the unselected. The second firm valued the first grade at Rs. 10 to 13 above the unselected, and the second grade at Rs. 7 less working out at Rs. 4 a *khandi* more for the selected than for the unselected. The figures for the third firm were plus 17 and exactly the same, working out at plus 17. For the fourth firm, they were plus 5 and minus 10, working out at minus 6; for the fifth firm they were plus 10 and minus 5, working out at plus 4. This was the net result after allowing for the cost of sorting.* The first firm was actually engaged in using the lint. It will be seen that all the firms gave a slightly higher valuation for selected than for unselected lint but the result rather gave me the impression that quantity and ginning percentage were the things to go for, and it was not worth while to go for quality. It was evident that taking a little extra trouble with cotton did not pay. The samples were only two or three pounds. The actual areas of the plots on which Cambodia was grown was 9 to 21 cents.

2402. I have already stated that I have no standard in my kind as regards the length of the staple. As far as I can understand the problem, there would be no great objection to introducing .6 inch staple cotton on irrigated land provided it were a good yielder. There would be no difficulty in selling .6 inch staple Cambodia. If it were a good yielder, the grower would make money over it. My difficulty now is that nothing is paid for length of the staple. I should say that cotton according to length of staple is worth so much but that we don't get that value. It might be possible to arrange matters so as to get a proper price for staple, but my experience up to the present is that the proper price is not paid for staple. Cotton business men may not have the time to pay attention to it. They have no time for practical tests. I am certainly not going to grade my cotton any more. I have had not much experience of selecting for staple. The first point which was taken up on Mr. Gammie's advice at Nandyal was an increase in percentage of lint, of course, anything irregular or hopelessly bad to be picked out. According to him the primary thing was yield and ginning percentage. Professor Todd held exactly the opposite view. He was horrified at the spread of *roseum*.

2403. Messrs. Stanes said that last year's lint had badly deteriorated in comparison with the previous year's. I imagine it is a question of season. The same seed was sown on the same class of land.

* A note on this will be found in the Department's Year Book.

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[Continued.]

2404. I do not get cottons valued in Bombay. It might be a help to get them valued in a more open market. I am going into the point. Some kind of Central Bureau or organisation of that kind which would help to get buyers in touch with growers would be very useful. I would go so far as to say that some organization of that kind is essential and would help the various workers in all provinces.

2405. We sow cotton in lines and keep hoes working up and down between the lines. It is undoubtedly an improvement.

2406. (Mr. Hodgkinson.) My first interest is the cultivator rather than the trade. It is essential for the cultivator to grow the most valuable crop. With regard to premium for clean cotton, all I can say is that up to the present my experience is that taking a little extra trouble with my cotton does not pay me. It does not seem worth while taking any very great trouble over it.

2407. As to the supply of long staple cotton from India to Lancashire. I should say that it would not take very long to meet an increased demand for long-stapled cotton. The figures of Cambodia for the last six years show that if there is a demand for long staple cotton, it can be grown on a large area in a short time. Five years would be sufficient to spread it with an adequate staff. It is not a lengthy matter to substitute one cotton for another. I think that Cambodia could be increased in staple by one-sixth to one-eighth of an inch by selection. I think it is within the bounds of possibility to get Cambodia 1½ inch in staple with a ginning percentage of 37½ and an outturn of 1,300 lbs. to an acre. Seeing the improvement brought out by careful selection with other cottons I think it is quite possible to get equally good results with Cambodia. My selection is rough and ready and I do not claim to have done very careful work on it. I may not have picked out plants with particularly good lint. We have not touched crossing at all in this Presidency. With selection and crossing where necessary we can produce cotton with a much longer staple than at present. I think there is plenty of scope for the Agricultural Department to improve Cambodia cotton seeing the success they have had with *karunganni*.

2408. There is a field of *karunganni* (Company No. 3) on the farm. I was very disappointed in it. A sample of the lint was sent to Mr. Winter who reported that the colour was far too yellow, the staple only short to medium and only suitable for 16s. The firm strongly deprecated the spread of such cotton in this district as it might perhaps be used for mixing. The ginning percentage was high 33 per cent. against 24.8 for *upmam*. The yield on the average of rather a careful test was 516 lbs. an acre against 316 lbs. per acre in the case of *upmam*. When I got these figures, I thought there might be just as big a boom in the cotton here as in Tinnevely but apparently the staple was perfectly useless. Messrs. Stanes seemed to be very much afraid of any suggestion of pushing the cotton because its extension in this district might lead to the deterioration of other qualities. As the ginning percentage is high, the ryots might grow it to adulterate it with other cottons.

2409. (Mr. Wadia.) I have been sending only about two to three pound samples of cotton for valuation by the mills. They have never given me to understand that the samples were too small for purposes of valuation. I will send bigger samples now that I have more cotton. The five samples which I sent to five different firms shewed different results. I cannot say to what reason this was due but the personal element no doubt comes in considerably. It is easier for the mill-owners to value *kapas* than lint. I sent samples of lint for valuation. If you gave me the lint of pure *karunganni* and of *upmam* and *karunganni* mixed, I do not think I should be able to tell the difference.

2410. Wherever there is cotton with a high-ginning percentage, whether it is short or long staple, I would encourage the cultivator to grow it if it pays him best. I would not go so far as to say that staple is immaterial. It is a question of the relative importance of the two factors. I consider the yield and the ginning percentage are more important although I cannot give figures to show by how much. Generally speaking, my selection work would proceed along the line of first selecting for ginning percentage and then for staple. That is the plan I adopt for rough selection work. I have not had much time to go into the selection of cottons in the way in which Mr. Parnell does for paddy. I have to do it along with other work. In definite tracts, short staple cotton with a higher ginning percentage pays the cultivator better than long staple cotton. My impression is that that short staple cotton was marketed separately and was sold as such. It was not mixed with long staple cotton and passed off as long staple cotton. So far as the Central Provinces are concerned, I imagine that the short staple cotton is sold on its merits, as there is so much short staple grown there that there is nothing to mix it with. In Tinnevely, short stapled cotton was grown for mixing with Tinnevelles. I think that *roseum* cotton in the Central Provinces is still selling well as compared with long staple cotton. I do not know whether the difference between Navsari and Surat and Khamgaon cotton is widening.

2411. The tracts suitable for *karunganni* and Cambodia cotton overlap. There are areas in the *karunganni* tract in which Cambodia can be grown. Cambodia and *karunganni* do not compete unless Cambodia is grown on dry lands. I think *karunganni* is confined to black soils in the Tinnevely district. I would recommend *upmam* for dry lands in the Coimbatore district. Our experience of selected *karunganni* is that its staple has proved very weak in this district, although it yields well and gives high ginning percentage. My view is that, for this tract, careful selection of a better type of Cambodia should be made. Wherever Cambodia is grown, there certainly ought to be separate selection for the separate tracts. In the case of *karunganni* and *upmam* also there should be separate selection for each tract.

2412. Before I took over charge of the Coimbatore College, I was Deputy Director of the Northern Division. I am now confined entirely to the College. I have lately dropped experimental work on the College farm because I had no time to carry it out thoroughly. There is, of course, a demonstration farm for the students. We have about eighty or ninety students in the College. It is impossible for me to do the work of a Deputy Director of Agriculture in addition to my work as Principal of the College even if assistance were given to me. I think the two positions should be entirely distinct. I have got fifteen acres of Cambodia and between forty and fifty acres of dry cotton on our College farm. The total cultivated area is about 250 acres under different crops exclusive of paddy land. We have two classes for students—those taking the short course only and those taking the full course. There is a short course which extends to two years. The full course takes another year and half. We have no vernacular classes. I do not advocate starting them. I do not think at present that that is the best way of getting at the ryots. I think actual demonstration is the best way. Demonstration combines both teaching and learning as, in the course of demonstration, the staff increase their knowledge of the farmer and his difficulties.

2413. I think it possible that Indians can be trained to fill the post of Deputy Director. We have not got any special class in the College in which they could be trained but it is more or less a question of experience. I think the 3½ years' course is sufficient, combined with personal work under a senior Deputy Director. The facilities in the College are quite sufficient for turning out men fit for eventual appointment as Deputy

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Director. The weak point is the class of men coming up for training. We want a better class of men. We hold a simple examination of our own for admission. All that we want is that the students should have a sufficient knowledge of English to be able to follow lectures in English and a certain amount of common sense. At present I am opposed to the affiliation of this College to the Madras University.

Dr. C. A. BARBER, Sugarcane Expert, Coimbatore.

EXAMINED AT COIMBATORE, MARCH 15TH, 1918.

No written evidence was submitted by the witness.

2414. (President.) I think that if really good work is to be done, each cotton tract wants a separate botanist in the first instance. It will take a number of years for him to obtain successful results. I do not think any one man could tackle the botanical aspect of cotton in the whole of the Madras Presidency. There are five tracts and five distinct varieties of cotton. The botanical work becomes extremely complicated after a short while. One man would very soon get muddled and would not be able to carry out the spade work that is necessary. I quite agree that excellent work has been done and is being done by the Deputy Directors in regard to selection, but they have no time for crossing work on Mendelian lines. One botanist on cotton for the whole Presidency would not be sufficient. I think that Cambodia itself, i.e., the *hirsutum* type, would keep a man fully employed. Cotton has its own complexities. Various points in regard to lint such as strength, evenness, feel and length of staple have to be considered. One has to work out whether there is any correlation between these, whether they are self-destructive, whether they are mendelian characters, and so on. The selection policy is an excellent one and should be followed until further details have been worked out by the botanists.

2415. I am afraid I do not know much about Bourbon cotton. My memory of it is that it was a very good long staple cotton but gave a very poor yield. The fact that it has been able to maintain itself in the country all these years, shows that its underground growth, at any rate, is all right. *Nadam* is, of course, also perennial. It might be a suitable cotton for crossing, as Mr. Parnell points out that it has got good characters.

2416. (Mr. Wadia.) In my note which Mr. Parnell has submitted with his evidence, I have made suggestions as to the tracts which are suitable for the introduction of American cotton, and although written a long time ago, I still think that the suggestions hold good subject, in the first instance, to the rainfall factor. Other factors also have to be considered, for instance the character of the soil, temperature, prevailing winds, subsoil water, etc.

2417. I should like to see a trial of Cambodia in such a neighbourhood as Anakapalle, a region where both the monsoons are available to a certain extent. My note was written in connexion with an attempt to introduce Cambodia into the Hadagalli and Harpanahalli taluks of the Bellary District. The shortness in the staple of the ordinary Indian cotton is due to the long period without rain. The Coimbatore district gets rain in eight months but it is not properly distributed. 22 inches is distributed over the eight months. The question of distribution of rain counts for a good deal in regard to the extension of long staple cotton. The fault in Tinnevely is a short rainy season and that is a tract in which American cotton would die out. My idea is that for the successful growth of American cotton there must be a connected series of rainy months.

2418. (Mr. Roberts.) My own impression in regard to the deterioration of Cambodia cotton is that it is due to the growing of the cotton on unsuitable and inferior dry land and to keeping it on the ground from one year to another.

2419. Supposing I were a botanist in charge of a cotton tract, I would rely both on selection and crossing. I would adopt exactly the same policy as I have done in regard to sugarcane. I would start with selection, being the easy work and would also start the much more difficult and much longer crossing work, no results in regard to which could be obtained for several years. I do not think that a central organization to correlate the work of the various provinces in cotton is necessary. My own impression is that there are far too many different tracts in Madras alone. One man could not do the whole work for Madras and it would be still a more hopeless task for any one man to try to tackle the problem for the whole of India.

Mr. H. C. SAMPSON, B.Sc., Deputy Director of Agriculture, Madras.

EXAMINED AT COIMBATORE, MARCH 15TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

2420. (1) Experience.—I have been stationed at Trichinopoly for the last 10½ years as Deputy Director of Agriculture and as such I have been frequently in touch with the cotton cultivators of all the districts south of Madras.

2421. (2) Varieties.—The varieties of short staple cotton, of which I have experience, are (1) *Pulichai* (a mixture of two varieties of *Gossypium neglectum*) grown in the Tinnevely area. It is of recent introduction and was first seen in 1908, but its cultivation is now practically exterminated. (2) *Nadam*, a perennial *deshi* cotton, is grown on light soils in Coimbatore and Trichinopoly districts. As it is not a black cotton soil cotton, and as its area of cultivation is limited to very precarious soils, it is of little importance as cotton. It is of negative importance in that it harbours insect pests.

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(b) "Deshi" long staple cotton.

N.B.—Unless otherwise stated, the replies below deal with the "Tinnevely area"—Tinnevely, Ramnad and South Madura districts—as other areas of "deshi" cotton are of minor importance.

2422. (1) Varieties.—*Karunganni* and *uppam* are the varieties of long staple cotton grown in this circle.—The former is a cultivated variety, possibly originally an *indicum*. It is generally supposed to be the original Tinnevely cotton of commerce. It is now grown in Tinnevely, Ramnad and Madura districts either pure or mixed with *uppam* (*G. herbaceum*). Formerly, up to 1907, its cultivation as a pure crop was confined to a few villages in the extreme south. Two improved strains of *karunganni* cotton have been introduced by the Department and it is estimated that more than half the tract is now sown with these. A similar cotton to *karunganni* is found in the black soils of Trichinopoly where it is grown as a mixture with *uppam*. In the Coimbatore district, *uppam* is the only *deshi* cotton grown on black cotton soils.

2423. (2) Size of holdings.—I cannot say what is the size of an average holding. Many ryots do not own any cattle at all, others own from one up to three or four pairs. One pair are kept for about thirty acres of black cotton soil. From half to two-thirds of the holding is annually under cotton, i.e., on well farmed lands. Petty ryots, especially those who lease land, and ryots, who are in financial difficulties, will grow cotton every year as this is the money crop of the tract.

2424. (3) Yields and profits and comparative returns.—The average yield of cotton (*kapas*) is about 400 lbs. under ordinary conditions of farming for both *uppam* and *karunganni*. The average price of *kapas* for the last ten years excluding the present abnormal prices, is about Rs. 27 per *pothi* of 250 lbs., i.e., the average gross income is about Rs. 43 per acre. The average cost of cultivation, i.e., the actual cultivation of the cotton crop, will be about Rs. 16 per acre, which leaves a net profit of Rs. 27 per acre.

(2) The cost of cultivation is reckoned on the following basis:—one pair of cattle will work thirty acres. This area produces twenty acres of cotton, i.e., a gross money yield of Rs. 860. The other ten acres provide food for the house, fodder for the cattle and the cotton stalks provide fuel. Sundry domestic purchases can be set against the income derived from the profits of a cow or buffalo which will usually be kept. The farmer's expenses will be:—

	Rs. A. P.
Land assessment at Rs. 1-4-0 to Rs. 1-8-0 per acre	45 0 0
Maintenance, i.e., house, cart and implements, interest on capital expenditure, such as purchase of cattle (depreciation of cattle has been omitted as ryots seldom keep cattle which depreciate in value. They buy them young and sell after two or three years' work).	100 0 0
Cotton seed for his cattle at six lbs. per day = 2,190 lbs. at Rs. 9 per 250 lbs.	79 0 0
Casual labour for weeding at Rs. 2 per acre	60 0 0
Picking charges of cotton one-twelfth to one-sixteenth of the crop picked (allowing that his own women pick half the crop, this can be taken at one-twenty-fourth)	36 0 0
TOTAL	320 0 0

This leaves a net income on the holding of Rs. 530, i.e., Rs. 17-6-6 per acre on the 30 acres or on the cotton area alone (i.e., 20 acres) Rs. 26-5-0.

(3) The Agricultural Department have introduced two strains of improved cotton which, it is estimated, now represent more than half the area of cotton in this tract. These are (1) *Company No. 2*. This gins a 29–30 per cent. against 25 per cent. for the ordinary crop. This increase in the ginning outturn increases the value of the *kapas* approximately by Re. 1 for each 250 lbs. of *kapas*, while for quality the increased value which can be realized by the ryot is approximately Rs. 2 for 250 lbs. Thus, apart from any increased acre yield, this gives an increased profit per acre of Rs. 9-6-0. This increases the net income from the cultivation of cotton to Rs. 36-1-0 per acre. (2) *Company No. 3*. This gins at 33 per cent and the lint is valued slightly higher than the above, but, taking it at the same figure, the increased profit per acre amounts to Rs. 16. This increases the net income from the cultivation of cotton to Rs. 42-5 per acre. There is no doubt that both these strains give an increased acre yield, but, what this is, can only be calculated after several years' statistics have been taken into account.

(4) "*Pulichai*" (see paragraph 2421 above) was more profitable to grow than the ordinary Tinnevely cotton: firstly, because it was used to adulterate Tinnevely cotton and therefore sold at the Tinnevely cotton prices; and secondly, it ginned at 33 per cent. instead of 25 per cent. Under these circumstances, it was worth to the cultivator Rs. 8 per 250 lbs. more than Tinnevely. Now that the ryots have a cotton which gives the same ginning outturn and for which buyers pay an appreciable premium this no longer holds good. As to the acre yield of *pulichai*, there is no doubt that, in certain soils and certain seasons, it gave higher yields than the local cotton, but it is equally true that in certain soils and seasons the local cotton gave higher yields than the *pulichai*. On the average I do not consider that *pulichai* gave any higher yields of *kapas* than the local cotton.

(5) Cotton is practically the only money crop of the black cotton soil. Coriander, which is usually grown mixed with cotton in varying proportions according to the anticipated price, is also grown for sale, but the prices fluctuate so much that it is difficult to compare the profits with those of cotton. It is a useful crop, however, as it is harvested in February and the farmer is thus able to get ready cash before his cotton comes in and this may often save him from mortgaging his cotton crop to a dealer. All other crops are grown for food and fodder and domestic requirements and not for sale. Occasionally Bengal gram and horse-gram are grown for sale, but this is only done if the sowing season for cotton has been missed.

(6) No comparison can be made because Cambodia cotton, the only exotic of any importance in Madras, is not a black cotton soil crop. If it is grown on black cotton soil, it is merely a gamble on the season.

2425. (14) Rotations and manures.—On the Tinnevely black cotton soils, cotton usually follows a cereal. In the south of the tract this cereal is invariably *kumbu* (*Pennisetum typhoides*). In the north it is replaced to some extent by *varagu* (*Paspalum scrobiculatum*). A sufficient area of fodder *sorghum* is also grown to meet the farmers' fodder requirements, but the area of this crop is restricted to actual requirements, as cotton following this never does as well as after other cereal food crops. Many of the better class farmers reserve certain lands on which they grow their cereal year after year; others again may grow this cereal for a few years on the same land to work up its fertility; as, usually, the grain crop is the only one which directly receives manure. In many villages, the rotation is definite; all the cereal will, by co-operation, be on one side

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of the village lands in one year, and in the next this will rotate with cotton. In the extreme south the cereal is more prominent because the season is short and the cereal is a short duration crop. Hence there is less risk than in growing cotton; again, in the east of the tract the soils are rich and deep, and cotton takes longer to mature and is frequently caught by the hot weather before it has commenced to ripen. Here the cereal also holds a larger place in the rotation because it is a more certain crop. Fodder *sorghum* is the only crop which is grown pure. The grain cereal is mixed with various pulses such as green-gram, black-gram, cow-gram, cluster beans, etc., while in the north of the tract, where the season is earlier, red-gram is mixed. These are all sown in rows through the crop; cotton in the same way is mixed with cow-gram, horse-gram, Bengal-gram in rows. Coriander is usually mixed with cotton, the proportion varying with the price of this commodity. Various other crops also are found in the small quantities in the cotton fields, for supplying domestic needs, such as castor, safflower, *pulichai* (*Hibiscus cannabinus*) and *onum*. Apart from supplying domestic needs, the objects of the cultivation of these mixtures is to provide ready cash during the cultivation season before the cotton crop comes in.

(2) Cattle manure, composted with tank silt, vegetable refuse, house ashes, etc., is the main manure. This is invariably applied to the cereals. It cannot with safety be applied to the cotton owing to the lateness of the season in this tract. If so applied, the vegetative growth is too luxuriant, the ripening of the cotton is delayed till the hot weather sets in and the result is that the plant cannot sustain its vigour and drops its bolls, etc., in consequence; the only manure which cotton may get directly is light sheep folding at 1,000 to 2,000 sheep per acre for one night. Soil mixing and carting tank silt or red soil is also largely resorted to. In Coimbatore black cotton soils, the question of rotation is not so carefully attended to and cotton is usually grown year after year without manure. In the Trichinopoly district, the cultivation is poor and the cotton only forms a mixture with pulses, cereals, etc., which are broad-casted together.

2426. (15) Conditions affecting increase in area.—The area capable of growing cotton is limited by the area of black cotton soil and cannot be extended except temporarily, as at present, when the high prices ruling have caused more cotton to be grown than is economically sound. Thus last year, in the Tinnevely tract, there was a serious shortage of fodder *sorghum* which meant that inferior fodder had to be purchased from the rice tracts. Dry food grains are at present exceptionally high in price and will probably be higher still this next year, as the cereal crop this year is very poor. The agricultural population here are very dependent on their own crops for food, as they are not rice eating people, and they are isolated from any areas from which dry food grains could be imported at reasonable rates.

2427. (16) Suitability of existing varieties.—The reply to this applies exclusively to the "Tinnevely" tract as no attempts have been made to improve the *deshi* cotton of Coimbatore and of other minor cotton tracts. As I may lay claim to the production of the types of cotton now being pushed in this tract my opinion may be considered as biased. The main objects kept in view in improving the Tinnevely cotton were: (1) increased ginning outturn, (2) increased quality, (3) increased acre yield. The first of these is most important as one per cent. increase in ginning outturn is equal to about four per cent. increase in the price of *kapas*. It is, however, of the little use if the cotton produced is unsuited to the market and the Tinnevely tract is peculiarly situated, in that it is isolated from other tracts and has its own particular markets. It is ten years since I obtained a strain which ginned at 34.50 per cent., but it took me six years of work before I got a selection from this, which gave a cotton decidedly superior to the Tinnevely cotton, and another two years before seed could be produced in sufficient quantity for this cotton to attract the attention of the export and home buyers. As regards acre yield, it is very difficult to say how far any increase has been attained, and here again this tract is peculiarly situated, in that the season is much later than elsewhere in India and the crop often does not mature until the hot weather. Our two selections now put out are quite different in habit; one is an uneven ripening cotton and the other is an even ripening cotton. If the sowing season is late or the growth of the crop has been checked by too much rain, then an uneven ripening cotton gives the highest yield. If the season is early and growth has not been checked, then an even ripening cotton gives the highest yield and it can mature its crop before the hot weather, while, if the season is late and the hot weather catches the crop when still in flower and young bolls, there is very profuse shedding and a great reduction in yield. My own opinion is that we should do better by not adhering to one strain, but that we should distribute a mixture of two or more strains so that a proportion of the crop will suit the particular season. This is provided that the lint of these strains is of the same quality. This is on the same principle that the farmer sows a mixture of crops to ensure some yield from one or the other. Our two strains now generally grown give a lint very similar in all respects: one gins at 29 to 31 per cent. and the other at 32 to 34 per cent. In one season, the ryots will rush for one because it did well the previous season. In the next, the demand may be for the other.

(2) I am unable to say whether the cotton now being pushed is the best. It is possible that by further selection we can improve on them and it is possible that cotton from other parts of India might when acclimatized prove even superior to what is now being grown. Our seasons, however, are so distinct from those of other cotton tracts that it would be a very labourious task testing and acclimatizing other cottons, and, moreover, there is always the risk of unsatisfactory cottons being introduced by stealth from such trials as well as the difficulty of isolating such varieties and preventing them crossing among themselves and with indigenous cottons.

2428. (17) Prevention of mixing of different varieties.—The only remedy, which, as far as I can see, is likely to have any effect in preventing mixing is to have a buyers' association which would frame rules, which all firms would agree under penalty to adhere to. All cotton bought on the market as lint would have to be allowed. All cotton brought on the market as *kapas* would be subject to allowance on the analyses of the seed and the rates at which such allowances are based would be according to the tabular rates and samples kept by the association. This would mean that in time the buyers would have the ginning under control and the dealers would pay the ryot a better price for unmixed *kapas*. It may be said that this would deal hardly with the private gin owner. The legitimate income of such a factory, however, is derived from the charge for ginning and the illegitimate income is derived (either by gin owners or by dealers and ryots who bring in *kapas* for gining) by mixing. This mixing is either with the direct intention of making the cotton, which is to be disposed of, appear better than what it really is, or else it is due to indifference, and no care is taken either by the gin owner, the dealer or the grower, to see that the crop is grown pure. Hence, if the factory is a controlled factory by the buyers' association, its legitimate income is not interfered with. The eradication of *pulichai* cotton from Tinnevely has been effected in much this way, but here conditions are specially favourable as the ginning factories are almost entirely owned and controlled by the buyers.

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(2) As for mixing the lint itself by the members of the buyers' association, this is a matter between them and foreign cotton markets. As, however, such firms always sell on sample, any deviation from the standard can easily be detected and such associations as the World's Federation of Cotton Weavers and Spinners should be able in their own interests to deal with this side of the question. There is also, I consider, propaganda work for the Indian Trades Commissioner in placing samples and information as to quantities of the different grades of Indian cotton in the hands of foreign cotton markets, and not only this but he should get expert opinion as to what work that particular grade is suited for, so that it can be tested at mills which are suitably equipped for dealing with it. A cotton broker is not the man who can give this information, and I understand that, as far as Liverpool is concerned, it is very difficult to get anyone to really value Indian cotton at its manufacturing value. Colour, freedom from leaf, and *nep* are given chief prominence.

2429. (18) Uses of seed and seed selection.—The seed is used for cattle food, and much of it is supplied to the other non-cotton growing districts of the south for this purpose. A certain amount at normal times is exported, but Tinnevely cotton seed has a reputation and the prices are as a rule too high for much export trade from here.

(2) There is a certain amount of seed selection done. A ryot who buys seed always chews it and tell by the colour whether the seed is fresh or undamaged by heating. Formerly most of the seed sown was hand ginned. There was a belief that machine-ginned seed had poor germination, but the ryot and dealer now realize that this is due to the *kapas* not being dried properly and the seed not being stored properly after ginning. Even now, however, some ryots reserve some of their season picking *kapas* and hand gin it before the sowing season for seed.

Dealers profess to and very often do select good samples of season *kapas* for seed. There is no doubt that the ryot does try to get good seed, and this is evidenced by the fact that the petty ryot's crop, especially if he is a *pariah*, is usually the worst and most mixed field in the village. Of recent years, many ryots bring samples of dealer's seed to the Koilpatti Agricultural Station for opinion as to whether it is what it is reputed to be.

(c) Exotic cotton.

2430. (21) Varieties.—The varieties of exotic cotton grown in my Circle are Cambodia throughout the southern districts; Bourbon in the east of Coimbatore district.

2431. (22) Size of holdings.—I cannot say which is the average size of the holdings in which exotic cotton is grown. The proportion of cotton in a holding is usually up to its economic limit. With the present high prices it is considerably above this.

2432. (23) Comparative returns.—The conditions under which Cambodia cotton is grown are so variable that it is impossible to give any information as to the average yields and profits, nor can any general comparison be made between the profits of this and *deshi* cotton as the latter is a dry black cotton soil crop and this is not.

2433. (24) Rotations and manures.—The application of manures varies with the district, the soil and the conditions of farming; where grown under wells, the crop is usually well manured with tank silt and with cattle manure and sheep penning.

2434. (25) Conditions affecting the increase in area.—The conditions affecting an increase in the area under Cambodia are:—

- (a) Manure and rotations.
- (b) Competition with food and fodder crops.
- (c) The price of cotton.
- (d) Insect pests.
- (e) Development of ginning and buying agencies in districts where cotton is not a customary crop.

(2) (a) *Manure and rotation*.—Cambodia cotton, if it thrives, is an exhaustive crop, much more so than *deshi* cotton because its root system is a surface one and the existing knowledge of manures and manuring cannot cope with this decrease in fertility. When the price of cotton is high, as it is now, the ryot can temporarily forego this consideration, but it follows that this leads to big fluctuations in the area under this crop as he can only recoup the fertility of his land by attending carefully to rotations.

(3) (b) *Competition with food and fodder crops*.—This is intimately connected with the previous reason. High prices of Cambodia cotton always means a shortage of fodder, and this is a serious matter when Cambodia is grown as an irrigated crop under wells, as the farmer is dependent on his cattle for lifting water as well as for his manure supply. A shortage of dry food grains is also a serious matter, as agricultural labour is often paid in grain, and such labour will not eat rice. Even where money wages are paid for casual labour, this causes great hardship to the labouring classes as they cannot afford to pay the high prices demanded for dry food grains.

(4) (c) *The price of cotton*.—This, after all, is the main reason for a decrease or an increase in the crop. When the price drops below a certain figure, it no longer pays to grow, if it means that the fertility of the soil is depleted, if famine prices have to be paid for fodder and grain and if labour is dissatisfied and is emigrating elsewhere.

(5) (d) *Insect pests*.—Hot weather rains and showers in the south-west monsoon often revive the crop and cause it to give further pickings, with the result that this crop is often left on the ground after the new crop of the next season is sown. This is a serious matter and may be the cause in the future of a decrease in the cultivation of this crop; not only are ordinary pests, such as the cotton bugs, leaf roller, caterpillars, boll-worms, stem-borers, etc., kept going; but in the Coimbatore district, which is the most important permanent Cambodia area, there is a most serious pest—the stem-weevil—the larva of which rings, or partially rings the plant. This causes great damage to the plant and it is more than probable that it causes an uneven staple in the lint.

(6) (e) *Development of buying and agencies*.—There is considerable scope for the extension of this crop in the Salem, North Arcot, South Arcot and Trichinopoly districts but there are no facilities for dealing with the crop. Even Salem, which adjoins Coimbatore and is within easy distance of some of the Coimbatore gins, cannot send its *kapas* there, except by round-about routes because the river between the districts is very inadequately bridged. South and North Arcot have to send their cotton to Madras to be ginned, and I am not aware that there are any local dealers or agencies for selling. Trichinopoly has one ginning factory which, I believe, is not now working. In any case, it is some fifty miles from the railway and was located to deal with the *deshi* crop of the black cotton soils, which are in the north of the district, and not with the Cambodia crop, which is distributed throughout the district.

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2435. (26) *Suitability of existing varieties.*—Cambodia is the only exotic which shows any promise in Madras. Other exotics tested have never thrived. Their leaves turn red and drop. It may be possible to obtain better types of Cambodia by selection; and there may be other exotics, which have not yet been tested, and an agricultural station for this purpose is under consideration.

(2) The Bourbon cotton of Coimbatore is not a desirable cotton to keep in the country. Although it produces a very fine staple of cotton, it is a serious menace to the Cambodia crop, because being a perennial and being grown under the most adverse conditions, it harbours numerous insect pests including the ring weevil.

2436. (27) *Prevention of mixing of different varieties.*—No measures to prevent the mixing of exotic with *deshi* cotton are necessary. The seed of Cambodia is so very much bigger than that of *deshi* cotton that the gins have to be specially set to deal with it. Hence it is in the dealers' as well as the buyers' interests to keep this pure.

2437. (28) *Importation of seed.*—I am of opinion that much more permanent results will be obtained from acclimatized selected strains of exotic cottons.

II.—COMMERCIAL ASPECT.

2438. (31) *Standardization of commercial names.*—This raises the question of the desirability of standardizing the commercial names according to variety. This neglects altogether the question of how far the climatic conditions under which a crop is grown affect the quality of the cotton, e.g., Coimbatore *upham* is inferior to Tinnevely *upham*, although the latter is believed to have been imported from Coimbatore. Trichinopoly *deshi* cotton is still more inferior and is always dirty owing to faulty methods of picking. Our selected strains of *karunganni* grown last year at Coimbatore gave a very weak lint and the cotton was most valueless for spinning. Grades, in my opinion, are formed by the locality in which they are grown. Our *upham* is the same species as the best Broach cotton, but there is no comparison in the quality of the lint.

III.—STATISTICAL.

2439. (34) *Improvement of statistical information.*—The statistical information regarding Madras cotton would be of much greater use if it was prepared at a time when information as to sowings and outturns was available. At present the outturn report has to be framed at a time when it is impossible to estimate what the crop is likely to be, while sowings are not completed much less brought to account when the "final sowings report" is issued.

V.—GENERAL.

2440. (46) *Attitude of buyers to improved cotton.*—At the present time, the buyers are prepared to pay a premium for improved cotton, because they are keen to get it, and there is competition between them for it; but before the distribution of this had reached such large proportions, only one firm was prepared to offer premiums and that at rates which amounted to ten annas to Re. 1 per acre. This was not, however, as good as the terms offered by local dealers who wanted this better cotton to grade up inferior cottons purchased by them. All firms in the Tinnevely tract now are willing to help ryots by dealing direct with them and ginning the *kapas* separately.

Mr. H. C. SAMPSON called and examined.

2441. (President.) Since I joined the Department, I have been stationed in the Southern part of the Province in which there now are three main kinds of cotton—*karunganni*, *upham* and Cambodia. At present, I am in charge of three circles, Nos. V—VII. Cotton is grown in all of them. I was in charge of the fifth and seventh circles before Mr. Thomas went on military duty. He was in charge of the sixth circle which includes the "Tinnevely" tract. The seventh circle consists of Coimbatore and the West Coast, the fifth circle of Salem, Trichinopoly and Tanjore.

2442. My view of the organisation of cotton work is that whoever is put on cotton work ought to have more time to devote to it, be he a botanist or a Deputy Director. As far as plant improvement is concerned, I would go for crop rather than for circle. As far as administrative work goes, I do not see how it would be feasible. The probable solution would be to reduce the size of a Deputy Director's circle. It would be very difficult to fit in crop specialists with administrative work.

2443. As for our policy in regard to Cambodia, we are looking out for land for a farm at present. We intend to start seed farms with seed from the College farm this year. There is always a demand for good Cambodia seed. There is only a little Cambodia grown at Koilpatti as the soils there are not suited to this crop. There is such a big demand for Cambodia seed and the seed supply is so bad that something has to be done. The *karunganni* organization is complete. I have always condemned Bourbon cotton. It is a serious menace to other cottons owing to its liability to insect pests. It is grown as a perennial cotton and gives practically no yield in the first year, the second year's yield is fair, the third year's is less again, and if kept on for a fourth year, it is bad. It might be quite useful for crossing with other exotics. That is a line of work which should be followed up. I think there is scope for *upham* but you cannot work it on the same farm as *karunganni*. I think *upham* on the whole is a hardier cotton than *karunganni*. It has a better colour than *karunganni* but it is coarser; you cannot get the same twist on it. By twist, I mean the natural twist of the fibre. I do not know what "Salems" really are. It is a trade term. Erode cotton used to be called "Salems" cotton and it also included Coimbatore *upham*, but now Cambodia has swamped both.

2444. Work on rotations has not been necessary in Tinnevely as the Tinnevely farmer is a good farmer. This year he has increased his area under cotton on account of high prices. Next year, I expect he will do the same, but he is a very sound farmer on the whole. There is scope for manure for Cambodia, but it is very difficult to manure cotton as a dry drop on black soil. The plant may grow quite well, but if its growth is too luxurious as soon as the hot weather sets in, everything may shed. The bolls and leaves drop on heavily manured land.

2445. My experience is that it is very difficult to get comparatively tests of lint made. I have sent cottons to Mr. Gammie, the Imperial Cotton Specialist, to be valued in Bombay. I have at the same time

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had valuations made in the south by local firms and mills. I have also sent samples home to the Imperial Institute and to the British Cotton Growing Association. The different valuations did not compare at all. None of them seemed to agree. Another weak point about the valuations is that they do not value the cotton as cotton. They pay much more attention to the cleanliness of the samples. That is my experience both in India and in England. Some pay more attention to colour than others. I always get my cotton tested by spinning tests. We never put out cotton until it has passed through the spinning tests. We grow sufficient cotton on seed farms, say on twenty acres, to get thorough spinning tests made. If the report is favourable, then we put the cotton out.

2446. I agree with Mr. Stuart that the dates of the statistical forecast are of no use to us at all. Cotton is being sown now and this never goes into the final outturn of a month ago.

2447. (Mr. Roberts.) When I first saw the Tinnevely tract, twelve years ago, the cotton crop was a mixture of *upham* and *karunganni*. In the north of the tract, it was mostly *upham*. As we got further towards the south, the proportion of *karunganni* increased. A few villages in the south grew pure *karunganni*. On the Koilpatti farm, the first thing done was to separate these two varieties to see whether there was any difference in their yielding properties and we kept a record of the yields for several years. They were practically the same. In one year *karunganni* was a little higher, in another year *upham* was higher. On the average, the yield of *upham* was a few pounds per acre more. *Upam* is a whiter cotton, much harsher and it has not such a good twist. *Karunganni* cotton is very much softer with a stronger and much finer fibre and has a very good twist. The *karunganni* plants showed much more variation than we got in *upham*. We decided to start on this variety and made our selection from these. Our best selections were made from plants which were raised from artificial fertilisation, i.e., *karunganni* fertilised by *karunganni*. This was done for two years by Mr. Benson. In one year's plants there was not much variation (I do not know what the reason was) but the next year there was tremendous variation and I made selections from these latter. From these we ultimately got the selections which we have put out now as Company cotton. I examined the *kapas* from selected plants very carefully giving marks for twist, evenness of staple and fineness. I also noted the length, ginning outturn and yield per plant. In time, my selections were all the progeny of four plants. One of them ginned 34 per cent then, another one ginned over 30 per cent and the other two, which were better quality, ginned about 27 to 28 per cent. I had still finer cottons, but they gave a ginning percentage of from 19 to 26 per cent only: so I dropped them. I kept on one or two for quality, but I paid most attention to the ginning outturn and by selection I improved the one which gave 34 per cent which at that time was short and uneven in staple and from that we got out Company No. 3 which is very even in staple and the quality of which is good, but we have lost one per cent in ginning outturn. The ginning percentage varies from season to season and from crop to crop, but on an average it is 33 per cent. It is an even-ripening type of cotton. All the crop ripens at one time. The other type on which I specialised was a different type of plant altogether. It developed much more vegetative growth and was a very uneven ripening cotton. Looking at the crop, one never saw much cotton on the plant but it kept on bearing continuously. My idea was that this uneven ripening cotton was the one suited for the south of the Tinnevely tract and that the even ripening cotton was suited to the shorter season which we got in the north of the tract. This uneven ripening cotton is Company No. 2. It gins about thirty per cent. As far as quality goes, it is just about the same as Company No. 3 but the colour is not quite as bright. Of course this selection work has been going on every year. We have been selecting single plants each year to try and bring up strains to what we require. We sow the seed of single plants in three or four lines each and from these plants we make a further selection the following year. We mark the best shaped plants taking care to reject those which are too vigorous as this vigour might be due to natural crossing. The crop from each of these plants is harvested separately and then in the off season they are all examined. I give them marks for twist, evenness, yield, length and fineness. I test the ginning outturn and the yield of the plant. On that, I select single plants for the following year. Before we reached the stage when we could put these out in the district we made a general bulk selection of *karunganni* cotton. Until 1913, we were growing pure *karunganni* bulk selection. It was no particular strain. I simply used to go to the field to mark plants of suitable habit of growth and have them harvested separately. We got quite a good cotton crop from that, but the ginning outturn was low. The southern part of the tract was then growing sixty per cent more or less of *karunganni* and there began to be trouble there with the *jari* or *neglectum* cotton coming in and beginning to oust *karunganni*. That was because it gave a high ginning outturn.

2448. I saw *pulichai* first in 1908. It was growing in a village near Koilpatti and I immediately wrote round to the firms warning them against this cotton. Just about that time Cambodia was beginning to come in, *Pulichai*, also being a new cotton, the ryots bought it under the name of American cotton and thought that they were getting Cambodia seed but they really got *pulichai* seed. I think that was the reason why it spread all over the country so rapidly. By 1913, the *pulichai* problem had become a serious one, especially in the northern part of the Tinnevely tract. We got over it just in the nick of time by being ready with Company No. 3. Had it been ready a year earlier, it would have been better. Had it been a year earlier, we should have had 500 acres under it instead of 25. The staple of Company No. 2 and No. 3 is about $\frac{3}{4}$ ths of an inch, whereas that of ordinary *karunganni* is $\frac{2}{3}$ ths of an inch. I think I have obtained a distinct improvement in staple. If this *pulichai* problem had cropped up earlier, I would certainly have put out what we now call Company No. 3 on account of its ginning percentage. I wanted something better, that is why I kept it. The premium it gets is due to the extra length of staple and the quality. It is a finer cotton than ordinary *karunganni* and is more even and of better colour. It is a better cotton for spinning.

2449. My idea of our policy for the future is to give out a mixture of Company Nos. 2 and 3. We have not yet done so. The trouble with a single plant selection is that you do not know when it is going to suit the season. If there is something unfavourable in the season, the loss may be enormous. If an even ripening and an uneven ripening variety are given out together, there is some guarantee that some crop will be got from one or the other, whichever the season suits best. Even if it were decided to put out a mixture, the seed farms would have to be grown with the pure strain. We would have to grow seed on large farms. In fact, we are doing that now. We have got 1,700 acres of seed farms. There would be no difficulty in controlling the seed even if a mixture were given out. My district staff has estimated that 75 per cent. of the cotton area in the Koilpatti tract, which goes as far north as Sattur, is under Company cotton. That is 75 per cent. of 250,000 acres. Between Sattur and Virudupatti, the area under it is about fifty per cent. North of Virudupatti, we started our Company cotton in certain villages which were very bad with *pulichai* last year and we provided them with the seed of Company cotton to stop the cultivation of *pulichai*. The total crop of Tinnevely cotton

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is estimated at 1,30,000 bales this year, of which 70,000 bales are probably Company cotton, if this has been kept separate by dealers and firms.

2450. As to the amount of testing of these varieties which is required before they are put out, I would explain what we do. First of all we started with a five cent plot. I had my single plant selection crop. I picked out six or seven of the plants I had selected from one strain trying to obtain plants as even as possible on the basis of marks for twist, length, fineness, yield and ginning percentage and sowed them on the five cent plot. I had more seed of some and less of others and the spacing was not under field conditions. From that plot I put the strain out on the field crop, i.e., an acre plot grown under ordinary field conditions. I had these in duplicate one after a grain cereal and one after fodder *cholam* (*Sorghum vulgare*). Thus I got some idea what the acreage yield was. After that, I had the strain grown outside under our seed farm conditions on a twenty acre plot at the same time keeping the acre plot on the farm as a check plot. In this way, I got an idea how the strain was going to do out in the district. I had enough cotton to have proper spinning tests made before I put it out. We grow it on a five cent plot only before we put it out on an acre plot. We are duplicating the five cent plots now. We do not do any other preliminary testing of yield before putting the strain out on an acre plot. There are just two series only in the acre plots. You want to carry the work on for three or four seasons to get an idea of the average yield per acre. I would emphasise the importance of testing the yield on a large scale before giving the strain out to the cultivators. We have to do that. Testing on five cent plots even with five or six duplicates is not sufficient because in Tinnevely on black soil areas in some places the soil is five or six feet deep and in some places less than one foot deep.

2451. As to whether I consider selection or crossing of first importance, supposing a new tract were under Cambodia, I would advocate an immediate policy of getting out something by selection rather than depending entirely on the less certain method of crossing. I would rely on selection because it gives quicker results.

2452. Small quantities of inferior cotton cannot be detected in lint whilst it can be done in *kapas* easily. The best method of marketing *kapas* would be if the *kapas* were sold direct to the exporters or users or if ginning were carried out under the control of the buying firms. We get these conditions of ginning in the Tinnevely District. The exporting firms practically control all the ginning. They can examine the *kapas* and the seed and can say what the *kapas* is.

2453. There has been a tremendous boom in Company cotton. Many ryots have sold it co-operatively. They made a lot of money from the sale of seed for seed purposes. I cannot say whether the people will remain as keen when every body gets the seed and the extra price for it disappears. Dealers go round the villages, see a good sample of *kapas* and are prepared to pay as good a price for it as the man would get if he took it to a ginnery so that they can use it for grading up inferior *kapas*. I do not believe in forward selling. If the buying firms would pay for quality more than they do at present, I think that would be an incentive to the ryots to deal directly with the firms. There is no difficulty in getting the big farmers to gin and sell co-operatively. Most of the big farmers are apparently free from financial difficulties, but the smaller ones are not. The bigger proportion of the area of cotton is apparently free from embarrassment but not the greater number of the farmers.

2454. Before the Pest Act is used to prevent Cambodia remaining on the ground for a second or third year, I think it is necessary for the Department to have sufficient good seed to put out. That is an essential point.

2455. (Mr. Holgkinson.) With regard to the *karunganni* tract in Tinnevely, I do not think Company No. 3 is the last thing. We can evolve a better quality than No. 3, but whether we can get a better quality with a high ginning outturn I cannot say. I have had selections which gave $1\frac{1}{2}$ and $1\frac{1}{4}$ inch staple, but their ginning outturn was very low. It usually ran about 23 or 24. We have been trying to improve the length of the staple all the time. I cannot say whether it will be possible to get a cotton a good inch in staple with a 33 per cent ginning percentage.

2456. I think in most parts of the Presidency it is a mistake to grow Cambodia as a dry crop. It will grow as a dry crop in tracts where you have got sufficient rainfall. Cambodia is grown as a dry crop on the greater part of the area under it. It is too speculative altogether as a dry crop. I think there is a good deal in Dr. Barber's theory that the reason why long staple cotton is not a success in India is on account of the long period of drought. All the long staple cottons, Bourbons, Cambodia, American and Egyptian cottons have shallow roots when compared to Indian cottons. That is why they feel the drought more than indigenous cottons. They also recover quicker in the event of rainfall. If there is an inch of rain, exotic cottons recover quickly, owing to their shallow root systems. That is how Bourbon cotton has managed to survive. It grows in a tract where they get rains at fairly regular long intervals but enough to keep the plant going till the next rain comes. The areas available in Madras for long-stapled cotton without irrigation are very limited. *Karunganni* cotton is a long stapled cotton. I would not compare it with cottons like Sea Island or Egyptian. They are of an entirely different class. As far as Indian cottons go, *karunganni* is a long staple cotton. I sent home some samples of *karunganni* to Mr. J. McConille of Andovers, Manchester, last year. He wrote back that he had no experience of short-stapled cotton of this description.

2457. Assuming that the return to the cultivator from long staple cotton and short-stapled cotton was the same, I would be in favour of pushing long-stapled varieties where they can be grown, but this is only on this assumption. In 1912, I think it was, there was a very short American crop. The price of our cotton went up very much because there was a demand from Home. There was a big crop in America the following year. Our prices went down, because Lancashire wanted American cotton and not Indian. The trouble about pushing long stapled cotton in India is the uncertainty of the export demand for the better Indian cottons. If England comes to buy staple cotton in India on a large scale, there must be a constant market here. It will never do if she drops India when she is able to get plenty of cotton from America or tries to take us up again when the American crop is short. Provided there is a certainty of the export demand, I would push long-stapled cotton.

2458. (Mr. Wadia.) In the Tinnevely tract, no steam ploughing is required. Good farmers keep their land quite clean. A field of *hariali* grass means a bad farmer who is indebted. What happens is that a man in financial difficulties gets *hariali* grass into his field because he must grow cotton which is a money crop and thus never has time to get his land clean. This goes on till he is bankrupt when somebody else in the village buys it up and gets it clean in two or three years.

2459. I would like to control the distribution of seed by having a sufficient supply of seed. We must have more seed farms. We have enough seed farms in the *karunganni* tract. We certainly want more seed

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farms in the Cambodia tract. We should want seed farms for *upham*, if we are going to work on *upham*. We have similar seed societies in Tinnevely to those they have in Berar. We have eleven societies altogether, either fully working or on probation. As to the working of the seed societies here, we supply seed to sow one-twentieth of the area from our Koilpatti farm. One member of the union sows the whole of his land with the seed we supply and the seed of the crop they get from that is the seed for the whole of the cotton land of the union. They take their crop to one of the firms and have it ginned. The firms in Tinnevely are offering a premium for our cotton and our men tell the village union which firms are offering the best price. They take their cotton to the gins, get it ginned and take back the seed to the village. That village is advertised all through the surrounding tract as a village where people can get pure seed. People come to us to get seed and we direct them to the seed union. Some of the unions pool the seed. Some keep it separately though the total quantity stored comes into the same account. One trouble is that they have no proper godown accommodation for storing seed. Members very often keep seed in their own houses. Besides getting a premium on cotton this year, they made a profit of 100 per cent on seed. Their seed was selling at double the normal price. One best seed unions have been making a profit of Rs. 10 per acre by co-operative sale and selling their seed. One seed union had about 800 acres of cotton, another one about 500. The estimate of total benefit which accrued to these ryots works out at Rs. 10 per acre in these cases. It is a pretty big item. Last year 302,000 lbs. altogether were sold for seed purposes by co-operative ginning and seed unions. The Tinnevely area is about half a million acres of cotton. Of the two unions, the representatives of which were met by the Committee at Koilpatti, one had 33 members and the other 22 and their profit last year was about Rs. 15,000, more than enough to pay for a Deputy Director. This was last year's profit. They got as high as Rs. 16 premium per *khandi* of 500 lbs. for their improved cotton and they got 100 per cent on seed. They also got increased yield and the increased ginning outturn, which means 25 per cent increase in lint. These are all included in the figure of Rs. 10 profit per acre. When the Tinnevely tract gets the additional seed unions which were being started, I think it will be as many as the tract could carry. As to other tracts for instance, the Coimbatore tract, I think that there it is more a question of Cambodia. But it is much more difficult to work there owing to the very variable conditions under which Cambodia is grown and the fact that you cannot rely on quality as you can on the black soils in Tinnevely.

2460. As to whether there is any chance of getting a better outturn for Cambodia on dry lands, I should say it is a matter of rainfall. Cambodia has undoubtedly extended the area under cotton and there are large areas where they are now growing Cambodia which never grew any cotton at all before. For instance the pollachi Taluk is now covered with Cambodia. It is a tract with a very favourable rainfall. When I first went there in 1909, there was no cotton in it. It is not a black soil tract, it is sandy red soil. Further east, the climate is too dry for Cambodia as a dry crop. The country through which the Committee motored from Erode to Coimbatore is not suitable for Cambodia as a dry crop. Cambodia grown on black soil is a gamble entirely. If Cambodia is grown on light soil as a dry crop in places of uncertain rainfall, it is bound to mean deterioration in fibre and if Cambodia is left on the ground for a second year as is often done in such precarious tracts, the fibre is weaker still.

2461. *Pulichai* was more profitable to grow than the ordinary Tinnevely cotton because it was used to adulterate the Tinnevely cotton and was therefore sold at the Tinnevely cotton prices. If it was marketed separately as *pulichai* and not allowed to be mixed with the long staple cotton, I think there would be a big difference in price between the two. There is a change going on in the Indian mills. They are spinning finer counts than they were doing before. If adulteration were prevented and if the cultivators were to sell pure *pulichai*, it would not pay them, as it might do when mixed with long stapled cotton. It gave a better ginning outturn than the old Tinnevely cotton, the outturn of which was 25 per cent. The ginning outturn of our special selection, viz., Company No. 3 is the same as that of *pulichai*, so it would not pay the cultivator now to grow *pulichai* in preference to this.

2462. As regards marketing *kapas*, I have no experience of the Berar market system: so I cannot say whether it would do here. It might prove useful if somebody went there and studied it. I think this is hardly an agricultural question. Under present conditions, it is rather outside our jurisdiction.

2463. Forward selling has been more prevalent this year than ever before. People were selling forward much earlier in the season. I think it is very largely due to abnormal prices the cultivators are getting at present. They had never heard of such prices for cotton as were offered them in last December and they naturally jumped at them. They thought that it was too good an opportunity to lose.

2464. I do not favour standardising the commercial names of cotton. In theory, cotton should be bought on quality including staple but it is difficult to put this into practice. I would not favour standardising commercial names of cotton according to variety. *Roseum* cotton is grown in the Central Provinces as well as in the Madras Presidency. Cotton varies with the climate where you grow it. Our Company cotton was tried in Coimbatore last year. It was not as good as the same cotton in Tinnevely, and if people here sold it as Company cotton, it would not be the same thing as the Company cotton sold in Tinnevely. It is the same with Cambodia. You can buy Cambodia in Coimbatore which is very much better Cambodia than that at Usilampatti and Tirumangalam. If the name of the station is attached to the cotton, it is therefore of some use. I would not like any change in the present system. Some of the commercial names are very vague. I do not know what "Salems" really are. There is practically no cotton in the Salem district. The name "Salems" appears to be merely a commercial name which the Chamber of Commerce in Madras likes for some reason. I wrote to the Chamber once on the subject, but in reply they said that they did not want the name changed. "Salems" seem to include any cotton grown in the Coimbatore and Salem districts except Cambodia. It therefore includes *upham*, a little *karunganni*, Bourbon and *radam*.

2465. (Mr. Roberts.) I have not time to do much towards keeping in touch with the trade. Mr. Thomas had more time as he had only one circle. He practically spent his whole time on cotton, and so he had time to keep in touch with the trade. When I started with Company cotton, the first spinning test that was done was 26s. The mills were of opinion that they would not be able to spin more than 26s, but subsequently they spun 50s with one of our strains. If the tests had only been done with 26s instead of testing what the cottons were capable of doing the spinning qualities of our Company cotton might have been overlooked. The mills did not appreciate the spinning qualities of this cotton until they actually came to try it. They were surprised to find the high counts it was possible to spin from it. There is no uniformity in the tests carried out by the different mills. For instance, I have got a report of cotton samples we sent home to Lancashire. One mentioned as the best cotton there had already been discarded here in India after spinning tests.

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Mr. R. THOMAS.

Mr. R. THOMAS, Foreign and Political Service, late Deputy Director of Agriculture, VI Circle, Madura, Madras Presidency.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

2466. (10) Experience.—I have been employed in the Madras Agricultural Department as a Deputy Director of Agriculture for the past four years. For six months I was placed in charge of the Northern Division when Mr. Hilson was on leave. During that period, my attention was mostly confined to the system adopted by Mr. Hilson of improving the cotton known commercially as "Northern." For the last 2½ years I have been stationed in the Southern Division and with the exception of six months, while I was undergoing training under Mr. Sampson, I have been in independent charge of cotton improvement work in the Tinnevely tract of the Madras Presidency. During the whole of this time cotton improvement work took precedence over all other work, and on an average 25 days in the month throughout the year have been spent in actual touch with cotton cultivators.

2467. (11) Varieties.—In the Tinnevely tract, which comprises parts of the three southernmost districts of the Madras Presidency, there are two common varieties of long staple *deshi* cotton. These are known locally as *karunganni* (*Gossypium obtusifolium* ? var) and *uppam* (*Gossypium* sp.). These are grown under similar conditions, but *karunganni* predominates in the south of the tract and *uppam* in the north. Both cottons are relatively long and very strong. The average length is about seven-eighths inch, but one inch staple is commonly met with where soil and climatic conditions are favourable. The average lint outturn of both these cottons is about 25 per cent, but it falls somewhat as we travel southwards from Koilpatti where climatic conditions become increasingly unfavourable. Of these two cottons, *karunganni* is in every way superior except in regard to colour. *Uppam* is much the whiter, and if delivered pure, it commands a premium solely for this reason. It is then used to grade up poorer quality Tinnies.

2468. (12) Size of holdings.—The average size of holdings in the Tinnevely tract is about ten to twenty acres. The ryot is at heart a farmer and he cultivates his own land. Even in the *zamindari* villages, it is the rule for tenants to farm their land on a lease-hold system. It is only on small areas in exceptional cases that the *zamin* farms its own land. When it does, it spells dirty cultivation, general poverty of the tenants and altogether a low standard of farming. In introducing improvements, it is this class of ryot that takes up improvements least readily.

2469. (13) Yields and profits and comparative returns.—The average yield of cotton is much the same in the case of *karunganni* and *uppam* cotton respectively. In an average season, this would be above 300 lbs. of seed cotton per acre. This ginning at 25 per cent. would give 75 lbs. of lint per acre. On suitable land and in favourable seasons, the yield might reach 150 lbs. of lint per acre. Cambodia cotton, which under Tinnevely conditions is essentially an irrigated crop, has of late increased in popularity as a dry land unirrigated crop. Along the foot of the Western Ghats, I have seen many instances where unirrigated Cambodia has given from 600 to 800 lbs. of seed cotton per acre—ginning at 33 per cent. equivalent to 200 to 266 lbs. of lint per acre. But away from the hills, to sow Cambodia as a dry crop is always a gamble on getting a favourable season. The yield in such cases may fall as low as 100 lbs. seed cotton per acre and may go as high as 400 to 500 lbs. per acre. This practice, however, is to be deprecated. It results in badly diseased plants, and in the admixing of different types of cotton.

(2) The profits normally made from cultivating country cotton varies from Rs. 5 to Rs. 60 per acre, but as a rule Rs. 20—25 is considered satisfactory. With improved cultivation and by growing improved strains and selling co-operatively, average profits can be increased by Rs. 5 to Rs. 15 per acre. In regard to the relative profits from other *deshi* crops, it is not easy to make a comparison that can be relied upon. Cotton is the only commercial crop grown by the local ryot. His other crops are *cumbu* (*Pennisetum typhoides*) grown as a staple food for man, and *cholam* (*Sorghum vulgare*) as a staple fodder for his cattle. It is only on rare occasions that he grows more of the cereals than is necessary for his own requirements. Cotton, on the other hand, he converts into hard cash. Irrespective of the relative marketable values of cotton and cereals, the local ryots always will grow them in much the same proportionate areas as did his forefathers. This procedure is dictated by reason and by experience as being, in the long run, the most profitable. This brings us to the question of rotations.

2470. (14) Rotations and manures.—The most common rotation practised on the black soils of this tract is cotton, *cumbu*, cotton, *cholam*. Under this system one-half the area would, theoretically, be under cotton. In practice the actual area under cotton varies from one-third to one-half of the area of the holding. On most holdings a special field is allotted to be cultivated each year with *cumbu* (*Pennisetum typhoides*). This field gets first claim on all the manure and it receives a heavy dressing—up to twenty cart loads per acre each year. No rotation is practised in such cases. The remaining *cumbu* fields have prior claim to the residue of manure and lastly comes the *cholam* (*Sorghum vulgare*). *Cumbu* is manured with cattle manure at about fifteen cart loads per acre and the *cholam* with about ten cart loads if available. If the manure is insufficient for these crops, then sheep are penned on to the *cholam* land at 1,000 to 1,500 head per acre for one night. A similar dressing is given to land being prepared for the cotton crop. If cotton follows *cholam*, it is given 1,500 head of sheep, and if after *cumbu*, 1,000 only. The reason for this being that *cholam* exhausts the land, more so than *cumbu*. In cases where "permanent" *cumbu* land (see above) is turned to cotton no manure is given and a bumper crop of 500 to 750 lbs. of seed cotton is expected in the first year. No artificial manures are ever applied to the cotton crop grown under dry unirrigated conditions.

2471. (15) Conditions affecting increase in area.—As regards the prospects of effecting an increase in the area under long staple cottons, it would appear to me that, as far as the Tinnevely tract is concerned, the only agency which would effect a radical increase would be an exorbitant price paid for the cotton. A slight increase could perhaps be effected by assisting ryots to clear *hariali* infested land with deep cultivating implements—especially small motor ploughs. And the actual outturn of cotton could be gradually increased by furnishing greater assistance to the ryots to dig wells and bore holes. There is a fairly considerable demand in this tract for the use of boring appliances and with the present limited staff and limited sets of

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apparatus progress is very slow. By this means the area under Cambodia could be radically increased—but this will take some time.

2472. (16) Suitability of existing varieties.—The long staple *deshi* cottons now being pushed in the Tinnevely tract are two unit strains selections from the *karunganni* variety made by Mr. Sampson some eight or nine years ago. These are called Company 2 and Company 3. The former first reached the commercial scale in 1916 and the latter in 1917. In 1916, it was estimated that there were some 2,000 *khandies* (500 lbs.) of these on the market of which some 700 *khandies* were actually marketed in the pure form. In 1917, I made the conservative estimate of 70,000 acres (out of a total area of 600,000 acres under Tinnies) as being the area under these company cottons during 1917. The actual quantity marketed in a pure form as company cottons has been recorded in the office of the Deputy Director of Agriculture, VI Circle, Madura. I regret not to have these figures at hand.

2473. Co-operative sale of cotton.—The system of marketing these cottons adopted by me in 1916 may be of interest. It must be borne in mind from the outset that the main object of this system was to bring to the notice of the larger exporting houses the merits of Mr. Sampson's improved cottons. Exporting firms as a general rule refuse to dabble in small lots of cotton. To overcome this difficulty a large number of ryots were induced to pool their *kapas* and sell it co-operatively direct to the purchasing firm. The accompanying statement will give an idea of the progress made in this line of work up to 1916.—

Year.	Number of villages concerned	Number of ryots who pooled their <i>kapas</i> and ginned co-operatively.	Average number of ryots per village.	<i>Kapas</i> brought for co-operative ginning.	Good seed obtained.	Ample to sow
1	2	3	4	5	6	7
				lbs.	lbs.	acres.
1913	3	6	3.0	30,000	22,500	1,500
1914	20	63	3.1	132,750	97,500	6,500
1915	29	89	3.1	226,000	169,560	11,300
1916	71	362	5.0	1,004,299	703,002	46,900

(2) Column 6 gives the quantity of seed known to be on the market in 1916. A fairly large quantity of *kapas* was not marketed co-operatively though the seed therefrom must have been used, at least in part, for sowing purposes.

(3) Up to 1916, most of this co-operative work was done with bulk selection *karunganni* for which no premium was paid by the purchasing firms.

(4) Early in 1916, I circularised to all the local firms the fact that there would be on the market in the 1916 season about 2,000 *khandies* of improved Tinnies of the class and quality sent them as sample. They were clearly and explicitly told that this cotton did not belong to Government, but that if they cared to offer a premium for it in excess of the ruling market rate for Tinnies on the date of delivery, then I would communicate their premium to the ryots concerned through my demonstrators who were in touch with all these ryots. Out of the six local firms, four of them offered premiums varying from Rs. 4 to Rs. 10. As the season advanced the premium offered rose steadily and closed at Rs. 16 per *khandi* of 500 lbs., but Messrs. Ralli & Co. largely monopolised the purchases. I have failed to elicit any reports from them regarding the spinning qualities of this cotton, but I was told by their Bombay Agent unofficially that a large proportion of it was delivered against Cambodia contracts and that no complaints were received or allowances made. I wish to place it on record that not in any instance nor on any occasion were the revised premiums of any firm asked for. All firms were circularised in the first instance and after that all offers were spontaneous on their part and unsolicited. Immediately a revised premium was offered, this was telegraphed to my demonstrators who took necessary action. I further desire to place it on record that, on no occasion, was the premium of any firm communicated to any other firm. My demonstrators were warned repeatedly to act in a similar manner. In one or two isolated cases they might have acted with indiscretion—being new to this kind of work. In 1917, this system was modified. Firms were in the first instance again circularised as in 1916, but the system has serious drawbacks. Instead of communicating their offers of premiums to me they now simply advise their out-agencies of the prices they are prepared to offer for Company cottons on any day. My demonstrators keep in touch with these out-agencies and advise ryots accordingly.

(5) No firm would give a premium for these cottons in the absence of a certificate to the effect that the cotton delivered was pure Company cotton. Printed certificates were issued in serial number and no certificate was valid unless it bore the signature of the demonstrator concerned who was held responsible for the purity of any cotton certified by him. The Agent of the purchasing firm took delivery of these certificates signed them, and returned them to my head office at Madura. This and the serial system prevented the misuse of certificates. All unused certificates were called in at the end of the season and destroyed.

(6) Two kinds of certificates were issued. "A" concerned individual ryots and showed the necessary details regarding area of holdings, area under company cotton, variety of cotton, quantity previously marketed, quantity now marketed, etc., etc. Certificate "B" was a consolidated form of all the certificates "A" covered by it. The Agent paid the spokesman of the party for the whole consignment as noted in Certificate "B." The spokesman doled out the money to each ryot holding Certificate "A" in the proportion indicated by Certificate "A."

(7) No complaints have been received from any firm regarding the purity of this certified cotton either in 1916 or in 1917. The system, however, has its limitations. It has served the purpose for which it was originally designed, i.e., the marketing in bulk of improved strains of cotton. In addition it has been the means, more so than any other agency perhaps, of bringing home to the ryot the true value of these improved

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cottons. It would be impossible, in the absence of a huge staff of demonstrators, to attempt to apply this system to the whole of the tract. Besides it leaves much room for corruption though I have every reason to believe that many demonstrators worked honestly and conscientiously in the interests of the work.

(8) I had once hoped that this system of co-operative sales might be extended indefinitely. I now find that this will not be so easy as was once anticipated. Ryots find it profitable to gin and sell co-operatively only when they reap the middleman's profits. The latter has not taken long to appreciate the high ginning value of Company cottons. He literally sits at the ryot's doorstep and offers him a premium of Rs. 4 and even more per *pothi* of 250 lbs. of seed cotton. This he can afford to do because he can recover this from the high lint outturn of these cottons and at the same time sell the seed at a premium. The small holder is nearly always hard up for ready cash and rather than wait for his neighbours to gin co-operatively with him he sells at a moderate premium to the middleman. The obvious remedy in such a case is to advance the ryot money on his standing crop, and here the Co-operative Department should afford much more assistance than they have up to the last twelve months or so. I believe there is still a great future for this line of work if the Co-operative and Agricultural Departments can work sympathetically and in co-operation. (See paragraph 2474 below.)

(9) It is not probable that the system of issuing certificates first inaugurated in 1916 is likely to extend very considerably. Its extension would need more supervision of standing crops and of marketed produce than this Department can conveniently afford. But granted the latter then it may be extended indefinitely. A special line of work in the Tinnevely tract for the next few years should be the bringing of whole villages under Company cotton cultivation. With a strong village *panchayat* it could perhaps be made compulsory. In some villages known to me, I am certain this could be done and the purity of the crop could then be entrusted to the *panchayat*.

2474. *Seed Unions.*—Hand in hand with co-operative ginning goes the question of *Seed Unions*. The necessity for these was not fully realised until 1916. To ensure that seed from Company cottons grown on a commercial scale should be utilised for seed purposes in the 1917 seasons, a number of ryots who ginned co-operatively were induced to pool their seed and hold it up until the sowing season in October. The best villages were selected and four trial Seed Unions were started. These did such good work in 1916 that the number was increased considerably in 1917. If I remember rightly there are now from twelve to fifteen well established Seed Unions. The *modus operandi* in forming these Seed Unions is as follows. Co-operative ginning was done in 71 separate villages in 1916. Those villages were given preference in the formation of Seed Unions which fell in most readily with the recommendations of the Department as regards cultivation of improved strains of cotton and their co-operative marketing. Where a number of influential ryots took up this work, the demonstrator concerned paid frequent visits and lectured to them individually and collectively on the merits and advantages of co-operative effort in the sale of cotton and of cotton seed. The chief difficulty they complained of was to hold up their stocks of seed from March-April to October-November before it could be sold. To meet this contingency, the assistance of the Co-operative Department was sought and it is now the practice to organise and start a co-operative credit society in any village where it is proposed to organise a Seed Union. Seed Union members become *ex-officio* members of the credit society. But the Union and the society have different constitutions. The Seed Union has a President and Secretary elected by the *panchayat*. These two are the most intelligent and influential ryots in the village as a rule and are held responsible for the maintenance of books and records and disposal of proceeds from sale of produce.

(2) It is possible that the question of dispensing with the Seed Union as a separate institution will be discussed by the Cotton Committee, and its work replaced entirely by the co-operative society. There is much to be said for this procedure, and I had hoped to develop work on these lines in the future. Much and frequent assistance would, however, be necessary from the Registrar of Co-operative Societies. And it would be necessary for the latter to modify some credit society by-laws so as to advance money in the form of short loans to those members of a society (who desire to participate in the joint sale or purchase of produce) on the value of either their standing crop or on the stocks of seed on hand. Further, it is particularly necessary that the co-operative societies should forthwith afford assistance by *auditing* the books now maintained by Seed Union secretaries. This would be a concession on their part, but it would be highly necessary to avert bad disasters which might affect the whole work deleteriously.

(3) The formation of Seed Unions on the basis of those of 1916 has been justified by results. It is now quite an easy matter to organise new Seed Unions for the sole reason that those already formed have made such substantial profits by sale of improved seed. This seed was selling at Rs. 15—24 per *pothi* of 250 lbs. when bazaar seed was selling at Rs. 8—9.

(4) It is hoped, in the course of time to make these Seed Unions the chief and the only means of propagating superior strains of cotton. They are selected so as to avert competition. As a rule they should be not nearer than five miles apart. Each year the Seed Union is supplied from the Koilpatti farm with ample seed to sow one-twentieth of the area under cotton belonging to Seed Union members. This is called the Seed Union seed farm. In the next year all members obtain their supply of seed from this seed farm. In the year after they have enough seed to sell to all-comers. Koilpatti continues to supply the Seed Union seed farm every year with fresh blood. When this system is working in perfection, then in theory 100 acres of departmental seed farm should be ample to supply enough seed for 600,000 acres of cotton land. There are many minor difficulties to contend with in practice, but most of these can be overcome. Work done in 1916 and 1917 has proved that the scheme is workable. It involves constant selection work at Koilpatti, the running of at least 100 acres of seed farms and the maintenance of a fair sized establishment to supervise the work of the Seed Unions.

2475. *Improved cottons marketed on a commercial scale.*—The cottons now marketed on a commercial scale. "Company 2" and "Company 3" are each from seven-eighths to one inch long. Company 3 is the more popular with the ryots, and so also with cotton firms. Company 3 gins at 33 per cent., has a nice silky lustre and is much whiter than the general run of Tinnies. It was not marketed commercially until a year after Company 2. Every effort was made in 1916-17 to distribute it on the maximum possible scale. With this object, 2,500 acres of seed farms were cultivated on contract by the ryots on their own land and the seed bought by the department. Before I left the circle, all this seed had been sold at a premium of 50 to 100 per cent. above bazaar seed. And the demand was so keen that we could have disposed of many times the quantity stocked. This I may repeat was Company 3. Company 2 is not so popular because it has a creamy tinge. It gins out 29 per cent. only; it is late flowering and slightly coarser staple than Company 3. Both the cottons spin good 40's yarn.

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2476. *Spinning reports.*—Spinning tests have kindly been conducted for the past few years by Messrs. Harvey & Co., and by the Koilpatti Spinning Mills. Their reports are of considerable use. Messrs. Harvey's reports, however, err on the brief side and they would be of much greater assistance to us if greater details could be given—more especially in regard to the *breaking strength* of the various twist yarns made from each variety. Messrs. Harvey's may be addressed on this point. At present they prefer the *whole* of their reports to be treated as confidential. It would be an advantage if they could mark separately those portions which they are particularly desirous to be kept private and confidential.

2477. *Later selections.*—I would call the special attention of the Committee to Selection Type D grown on the Koilpatti Farm. These were shorts first found mixed with Tinnies on the farm in 1916. The lint is particularly long—quite 1½ inches in 1917. It is relatively strong, fairly white, and even. But the lint outturn is on the low side, being 25-27 only. It might be well if crosses could be made between this and some of the *karunganni* varieties giving a high ginning percentage. I consider it to be a very promising variety to work upon. It was a fairly heavy yielder on the plot scale in 1917.

2478. *Eradication of pulichai.*—Owing to stress of time, I have not expressed my views on the *pulichai* eradication question. I have but little to add to the views and remarks recorded in the Departmental Administration Reports. Reference may also be made to the Reports on the expenditure of the cotton cultivation allotment. Mr. Stuart, the Director of Agriculture, Madras, is fully cognisant of developments subsequent to the time the 1916-17 Administration Report went to press.

(2) I will repeat here my views regarding the necessity and practicability of introducing legislation at the present stage making it a penal offence either to cultivate or to gin *pulichai* cotton.

(3) This intruder, *pulichai* cotton, has now been practically wiped out of the Tinnevely cotton tract. This work has entailed a considerable amount of time and energy of the whole of the staff of the Agricultural Department engaged on cotton improvement work in this tract. In the absence of legislation, this work will have to be continued indefinitely. I feel confident that neither the cotton firms nor the Revenue officials will continue to give us their whole-hearted support for an indefinite number of years in the manner in which they did in 1916-17. It would be asking of them more than could be reasonably expected. When the present measures are discontinued, there must remain the necessary machinery to prevent a recurrence of the situation with which we were confronted in 1915. The introduction of legislation at the present stage would involve hardship on no man. *Pulichai* cotton has been practically wiped out. I anticipate that there will not be a single instance where pure *pulichai* cotton will be cultivated in the coming season. And it is highly improbable that there will be any mixtures even containing more than ten per cent of *pulichai*. There will, however, be isolated *pulichai* plants scattered over a very large area. These will be uprooted in most cases. But where an area of 600,000 acres is involved, it is too much to expect every *pulichai* plant to be detected. In the absence of legislation, it will continue to act as a leaven in Tinnies cotton and immediately the present restrictions are removed, we have no guarantee that it will not re-establish itself through the agency of unscrupulous dealers—whose number is legion!

(4) The form which legislation should take should be of such a nature as to penalise the ryot who will persist in growing it and likewise the gin-owner who persists in handling it. I consider it to be practicable to make it a penal offence either to grow this cotton within the limits of the three districts of Madura, Ramnad and Tinnevely or to gin it. Village officers could be entrusted to record all cases of *pulichai* under cultivation and agricultural demonstrators might be entrusted to inspect the ginned seed in all the local gineries and examine it for *pulichai*. It appears to me that such would be the only means of effecting (a) complete eradication and (b) a prevention of the reintroduction and propagation of this type of cotton.

(5) *Pulichai* cotton has not been grown on comparative plots until the present season. It is unfortunate that we have no reliable figures for comparative purposes. The 1918 figures from the Koilpatti farm may be of assistance, but they cannot be taken as absolutely reliable as it has not been possible to duplicate the plots sufficiently.

IX. Bengal.

Mr. S. MILLIGAN, Director of Agriculture, Bengal.

EXAMINED AT CALCUTTA, MARCH 20TH, 1918.

Written statement.

2479. *Cotton in Bengal.*—Cotton cultivation in Bengal is practically confined to the hills on the extreme east of the Province. The area in other parts of the Province is negligible. Several varieties are grown but the main crop consists of a very short stapled coarse variety, the produce of which has been found useful for mixing with wool for cloth making. The Agricultural Department have no experience of and very little information concerning the cultivation of this crop. The locality in which it is grown is somewhat remote and the total area involved is small in comparison with that under jute and rice. No attention in consequence has been devoted to the subject.

(2) I am therefore not at present in a position to say whether any improvement in the quality or outturn of cotton from this part of the Province is to be expected. The question is largely a local one and will doubtless assume importance when the Department has begun further decentralization. At present, however, it is impossible to pass any opinion on the subject and it is unlikely that our Department will be in a position to take steps in the matter for some time to come.

2480. *Experience in cotton growing tracts.*—My experience of cotton growing is entirely confined to the cotton tracts of the Punjab and extends from the year 1905 till 1912. I have had no experience of the commercial or industrial aspects of the question and do not feel justified in expressing any opinion on matters other than agricultural.

2481. *Possibility of increasing the area under long stapled cotton in India.*—Speaking generally, the greater part of the arable land in the drier parts of India is suitable for growing long stapled cottons. Further, in most of these tracts, the hot season is sufficiently prolonged to mature the common American types. In most localities, however, the rainy season is too short to permit such cottons being grown without irrigation.

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(2) I am, therefore, of opinion that future development in the area under long stapled cottons of the American type will depend largely on the possibility of developing perennial irrigation. Where perennial canal irrigation is available, there appears to be a good field for American varieties if the difficulty of avoiding the necessity of watering the crop at the *rabi* sowing season can be overcome.

(3) Extension of irrigation combined with the growing of suitable American varieties would therefore appear to offer the most hopeful solution to the problem, but there are doubtless many large cotton tracts where this will be found to be impossible. For such areas and also for tracts where a late cotton would clash with the *rabi* crops, the only alternative appears to be an early long stapled variety.

(4) I am, therefore, of opinion that the scientific investigation of the question of the relationship between length of staple and of the growing period will ultimately be found to be of the greatest importance in deciding as to the possibility of developing long staples in many parts of India. There are, I think, the two main considerations in framing a broad policy with regard to long stapled cottons. The question of the relative economic values of the long and short stapled crops will depend on local conditions. In many parts of India, the better stapled cottons have been found to be superior to the short stapled varieties as revenue producers and there seems little doubt that there already exists considerable room for their extension.

2482. *Effect of a late maturing cotton on the rabi area.*—This question cannot be satisfactorily dealt with without a reference to rotations. Although cotton in the Punjab canal colonies often follows wheat in the rotation, the practice is not recommended. The wheat harvest begins in the second half of April. There is thus little time to cultivate land which has been under wheat for a succeeding cotton crop. The result is bad moisture conditions, poor germination, liability to drought and often failure. The best cotton rotation appears to be after such crops as *toria*, sugarcane or a winter fallow. This enables the grower to obtain a satisfactory tilth, which, aided by winter rains, results in optimum moisture conditions. The crop can be sown early and can do without further watering for a long time. Such conditions suit American cotton admirably. In these circumstances, American cotton requires no treatment differing from the *deshi* varieties. It is therefore obvious that the substitution of American for the *deshi* varieties will not effect the *rabi* crop so far as the end of the wheat season is concerned. No more water is required for the crop under normal circumstances and there should be a sufficient supply to carry the same area as has been hitherto grown under *deshi* varieties. The real trouble would appear to come in towards the end of the cotton season which coincides with the time of the *rabi* sowings. It is generally admitted that, at this season, American cotton requires an extra watering to mature the crop fully. Has the cultivator a sufficient supply to sow his usual *rabi* area and also to water his American cotton once? This question can only be answered locally and it would appear from the increase in area of American cotton in the Lyallpur District, that the reply was in the affirmative. If, in any locality, the contrary were found to be the case there would seem to be nothing for it but an earlier variety or change in the system of cultivation to bring about earlier flowering. This I consider is one of the greatest problems facing the introduction of late varieties in perennial irrigation areas where the *rabi* crop is important.

2483. *Water requirements of American as compared with deshi cotton.*—This has been the subject of much controversy and I can only state my own experience. On the whole, while I consider the ordinary *deshi* variety a better drought-resisting plant than the American, my experience goes to show that, during the growing season common to both, the *deshi* crop on the canals is not able to do with fewer waterings than the Americans. Where the extra water is required for the Americans is at the end of the season. In provinces however, where winter rains are scanty, extra irrigation would be required at the beginning of the season for American cotton.

2484. *Outturn from American varieties.*—It is often stated that the acreage outturn from American cotton in India is less than that obtain from *deshi* varieties. That has not been my experience. On the contrary the best American types under suitable conditions give a yield of fifteen per cent. to twenty per cent. more *kapas* than the common *deshi* varieties. This is probably the resultant of a number of factors. One great advantage possessed by the American type is, however, worthy of mention, that is, its power of neutralising the effects of bad seed germination by lateral spread of the bushes. The *deshi* varieties do not possess this power in anything like the same degree. This is a very strong point in favour of the American variety and accounts largely for the surprising yields often obtained after a poor germination.

Mr. S. MILLIGAN called and examined.

2485. (President.) The cotton crop is of comparatively little importance in Bengal. The total area under cotton returned in the Forecasts is about 70,000 acres including the area in Hill Tippera State. The varieties grown are short stapled and rough in texture but, on that account, the lint is useful for mixing with wool. I believe the people use it in the villages to some extent for weaving their own garments. Our Department has little information about it. It is grown in a very out-of-the-way place and the area is so insignificant compared with that under other crops that the question of improvement has not been taken up. The area under cotton is, in fact, only two per cent. of the total cultivated area.

2486. My main experience of cotton-growing was obtained in the Punjab. 4-F is one of the varieties which we selected for multiplication before I left that Province. One of the most important points for decision is whether a long-staple is compatible with early maturity. This question can be investigated while the policy of distributing the best varieties from an agricultural point of view is going on. I am not in favour of deferring seed distribution until this question has been settled and should be inclined to increase mass distribution while detailed work is going on. As the success of mass distribution must rest ultimately on selection at the experimental stations and on the multiplication of the selected varieties, the Department must continue to issue and push the seed with the object of keeping up the quality which is liable to deterioration. I would advocate the establishment of a number of seed farms under the supervision of Deputy Directors and botanists. There must be organisation to see that a supply of fresh seed gets in to the village every year, otherwise the work of the seed farms is largely lost. The central station would send out fresh seed every year to the seed farm where it would be multiplied and be sent to the villages. The villagers would either each have to receive a very small quantity for their own use in the following year or would have to take selected seed from one or two selected growers who would get their seed direct from the Agricultural Department. I think it very necessary that there should be close collaboration between the botanists and the Deputy Directors to see their varieties growing in the hands of the cultivators. The advice of the botanist in regard to purity and staple should be very valuable to the Deputy Director.

2487. I have pointed out two limitations to the spread of cotton in my written evidence, one is water-supply and the other is an economic one, viz., the necessity of a local food-supply in most parts of India.

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[Continued.]

2488. I think that a Central Bureau would probably do good, but great care would have to be taken in order to avoid friction with the local Agricultural Departments.

2489. (Mr. Wadia.) Cotton, of course, could be grown in Kamrup. The rainfall however may be excessive. I think the soil is quite suitable. The tract, however, is very sparsely populated. Experiments have, I understand, been made on the Rangia estates in the Kamrup District. In a season of not too heavy rainfall, cotton might do quite well but there is usually excessive rain from July to September. The climate is against cotton, but the soil is quite suitable. It is a light sandy and well drained soil. The great difficulty is the population. The land would have to be colonized. There would not be a great deal of land suitable for cotton, and I think it is more or less earmarked by the Government of India for sugarcane.

2490. When I was in the Punjab, the total area under American cotton was less than 10,000 acres. There was not much mixing round about Lyallpur but in the Jhang district, the *jangli* people grew American cotton largely to mix with *deshi* and thus to get a better price for the latter. That was deliberate mixing. Admixture with *deshi* as a matter of course decrease with an increase of the area under the exotic. It used to be quite a common thing to take cotton from one place to another in order to get the mark of the superior cotton exporting station. As things are at present, it would be very difficult to stop that practice. The importation of cotton from one centre to another might however be prohibited.

2491. As regards the prohibition of the transport of cotton in any state except to a port or mill, would it be fair to stop it if the place from which the cotton was exported has no ginning factory? If things get sufficiently bad, I certainly would advise drastic steps to prevent *deshi kapas* coming into an area growing American cotton. If there is to be any legislation at all, it should be in the first instance permissive in order to obtain the support of those engaged in the trade. Permissive legislation would, I think, be effective if the decision to apply it in any particular case rested in the hands of a body consisting of representatives of the growers and traders with the addition of local officers. The Collector or Deputy Commissioner should always be a member. A certain station with the area round about could be declared as an American cotton growing area.

2492. As regards measures for stopping the import of fly and waste to mix with cotton how does the trade usually defend itself? I am rather against restrictive measures with a general application. It would not do to leave the administration of legislation to the proposed Central Bureau. A better way would be for Government to act on the suggestions of the Bureau. With regard to the granting of licenses by the Bureau, this would depend largely on the composition of the Bureau. Government would probably be very chary of giving power to grant licenses to the Bureau unless the latter contained a considerable number of Government officers. The license would, at any rate, have to run out till the end of its term and should not be subject to cancellation before then. All licenses would have to be renewed at the expiry of their term. If there was a danger to American cotton-growing from mixing, I would be prepared to recommend a declaration that the mixing of cotton should be considered as an offence, but I would be very careful to find out first whether the danger really did exist. I would certainly recommend legislation before licensing, but I think the former should be permissive in the first instance. The proposed Committee or Bureau would have the power of recommending the extension of the Act to a certain tract in which American cotton is being grown. I am not at all sure whether any action would be necessary with ordinary *deshi kapas* and I would restrict action to American cotton by which I mean any long staple cotton. When a new crop has been introduced which is a great benefit to the country and to the people, all possible steps should be taken to safeguard it.

2493. (Mr. Hodgkinson.) If in the Punjab, where American cotton has been successfully established there was any danger to its existence owing to admixture, I would take steps to safeguard it. I would even go the length of legislation in order to save it.

2494. We started originally in the Punjab by getting one of the Lahore mills to buy the American cotton from the cultivators. That system was not found satisfactory and it led to a lot of complaints, so we were compelled to start the auction system. Finally we were able to establish a premium for American cotton over *deshi*. It was probably fairer all round that everybody should have a chance of bidding for the cotton. The auction system might presumably be adopted in other parts of India. At the very beginning, it would probably be better for the Department to buy the produce. The Department could always finance anything say up to 100 bales. Government would probably raise no objections as they would not lose on the transaction which was merely a matter of financing. The cultivators would have to be given an advance. The balance would be shared subsequently by them.

2495. (Mr. Roberts.) In my time, the premium of American cotton in the Punjab over *deshi* was as a rule about Rs. 1-8 per maund, *kapas deshi* was selling at Rs. 7-8 and American at Rs. 9. Had the premium been higher, the spread of American cotton would have been more rapid. As a matter of fact, at one time it was very doubtful whether American cotton was going to do or not. The fact that the people began to discover the suitability of American cotton as a rotation crop with *toria*, etc., helped considerably. It certainly helped with the *jangli* people.

2496. Demonstration of sowing in lines and interculture was started in 1911. We considered it an improvement and a great advance. In the Punjab, cotton cultivation was deplorable; it was the worst cultivated crop in the rotation. You must have population before you can pick cotton properly. Labour could be imported from Bikanir for picking but cattle would still be required for interculture. As regards soils, the real difficulty with sandy soil is that it gets dry at the end of the season, and there are water difficulties to contend with. In many seasons, sandy soils would do quite well for American cotton, i.e., if there were late rains.

2497. I think that people will find the various points regarding new varieties of cotton out for themselves. I do not think that you are going to get people to put more land under American cotton than they had formerly under *deshi*, for American varieties are generally later than *deshi*, and there might be difficulty both in sowing the *rabi* crop and maturing the cotton crop.

2498. The Punjab is growing far too much wheat from the point of view of the soil. It would be certainly a great advantage if *berseem* could be rotated with cotton. Cotton after wheat is a very bad rotation. It is one of the worst practices I have seen. I do not think cotton as a crop is particularly exhaustive.

2499. One of the chief obstacles in the way of improved staples is that it is the short staple cotton which has the high ginning percentage. In the absence of a high-lint percentage long-stapled cotton, the obvious way out of the difficulty lies in a sufficient margin in price between long and short staples. It has proved very difficult to get the desired combination of length of staple with high ginning percentage. All our experience goes to show that with a long staple cotton you generally get a low ginning percentage. It would certainly be better to produce quality if possible. Unless, however, you can get a sufficient premium for

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long staple cotton over the ordinary varieties or so improve long stapled varieties as to produce higher outturns there seems nothing else for it but to go in for high yield. Short staple cottons with high ginning percentages must always prove very serious rivals to any long staple cotton. It would be very difficult to organize the trade in such a way that it would be possible to buy pure long staple cotton, by having, for example, pressing factories licensed and bales so marked that their origin could be traced. With reference to the policy of the local Agricultural Departments in tracts where the growing of short stapled varieties pays best, it must be remembered that we cannot push long staples down the throats of the cultivators. They must be the ultimate judges.

2500. The work of crop specialists tends to clash with that of Deputy Directors. Rather than go in for crop specialists, it would be better to increase the numbers of both Deputy Directors and Economic Botanists. If the central stations could make detailed surveys of varieties and eliminate inferior types, a selection of the better varieties could be handed over to the Deputy Directors who are perfectly well qualified to carry on the rest of the work. There should be a Deputy Director to each Commissioner's Division and the botanical sections should be strengthened. I am not in favour of crop specialists. I prefer the other plan of making the botanical staff sufficiently strong and increasing the number of Deputy Directors.

2501. (President.) Probably the short season in the Central Provinces is not suitable for long staple varieties. I would not, however, give up the search for something better than existing varieties. We are apt to give up things too quickly, the result being that the question has to be re-opened at a future date.

X.—Bihar and Orissa.

Mr. A. C. DOBBS, Deputy Director of Agriculture, Bihar and Orissa.

EXAMINED AT CALCUTTA, MARCH 22ND, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) and (c) "Deshi" short staple and exotic cotton.

2502. (1) and (20) Experience.—I beg to refer to the note submitted to the Committee by the Director of Agriculture, Bihar and Orissa which shows clearly the position of cotton in the Province. I can supplement the information given there only in respect of Chota Nagpur in which division I have been stationed for three years; but my evidence may be taken to apply generally to the Santal Parganas where conditions are very similar to those in the north of Chota Nagpur.

2503. (2) and (21) Varieties.—Two main classes of cotton are grown in Chota Nagpur:—

(a) Deshi short staple cotton.

(b) A cotton of the Upland America type—'Buri'; these types are referred to in greater detail below.

(2) Cotton used to be generally grown on a small scale for making into thread but its cultivation has declined very much with the opening up of the country and the import of yarn. Where cultivated, each cultivator has usually a small area—perhaps half an acre, frequently sown as a mixed crop—and sells the inferior pickings after supplying his own requirements.

2504. (3) and (22) Size of holdings.—The size of holdings in Chota Nagpur is commonly less than ten acres and not frequently over twenty acres, and half of the land is below the sub-soil water level in the monsoon and, in the absence of artificial drainage, is fit only for paddy.

2505. (4) and (23) Yields and profits.—Under ordinary conditions, the yield seems to be from 1½ to four maunds of seed cotton per acre. Strictly speaking, there are no profits, agriculture in Chota Nagpur not depending on hired labour.

2506. (5) and (24) Rotations and manures.—Except when newly reclaimed from jungle, the soil of Chota Nagpur is, speaking generally, in its natural condition exceedingly poor and produces miserable crops. Large areas of arable land are left fallow, for two years out of four or five, because continuous cropping is unprofitable. No other regular rotation is generally followed and the only manure commonly used is village compost, consisting chiefly of ashes, which is usually given to the best paying crop in the first or second year after a fallow.

2507. (8) Uses of seed and seed selection.—The cotton is locally hand-ginned but no seed selection is practised. The seed is commonly eaten after cooking in a variety of ways.

2508. (9) and (29) General economic conditions.—Agricultural production in a normal year is barely sufficient to support the population, food is imported, and, apart from minerals, the exports consist chiefly of forest products such as lac and of hides.

2509. General.—The above remarks do not apply strictly to the south-west of the Ranchi district and possibly other tracts where forest land is available and the practice of collecting and burning scrub produces good crops for a few years and makes agricultural exports possible. In Biru, the Rev. Father Cardon, S.J., informs me that, 'There is a brisk trade going on. Large bands of buyers come annually from the Khukra Pargana and surroundings, about December. The price which was formerly thirteen to fourteen seers of lint or cleaned cotton per rupee is below five seers now-a-days.' Samples of deshi cotton obtained from this tract and grown on the Ranchi Farm appear to be superior to the ordinary cottons of the division.

2510. Experiments with cotton at Ranchi.—The increase of the area of cotton in Chota Nagpur appears therefore to be dependent on improving the general agriculture, and particularly on introducing the use of purchased manures. Conversely, the problem of introducing manures depends, I believe, primarily on that of finding more valuable crops such as improved cotton that suit the physical conditions and which can be exported to pay for the manures. For this latter reason I started experiments with cotton on the Ranchi farm in 1917. I refer to these experiments because, taken in conjunction with the fact that buri cotton seems to have acclimatised itself, they seem to indicate that the American type of cotton may be peculiarly suited

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[Continued.]

to the physical conditions of Chota Nagpur, the chief of which are a high rainfall and the possibility, which is not generally taken advantage of in practice, of good drainage.

(2) The farm is on the Chota Nagpur Plateau at an elevation of 2,000 feet. Only deshi cottons are grown on the Plateau. Pure types are of course not grown and I have been unable to classify the samples obtained under different local names, but I understand that there are, as stated in Basu's Agriculture of Lohardaga, two main types, one grown on the poor land of the open hill tops, which gives a very small yield on very short lint; and a better yielding variety, with somewhat less short lint, grown on newly cleared land and near villages.

(3) At lower elevations, i.e., below the Plateau, the cotton locally called burhiya, more widely known as buri is also grown, but only on good land and on a very small scale. This appears to be the 'late' cotton of the Manbhum and Singhbhum districts, but if so, the area returned is probably excessive. It is of the hirsutum (American) type and has a much longer lint than any of the local deshi varieties. It is also said to yield better, but the lint is not valued so highly for home consumption, as the cloth made from it is said to be less durable than that made from deshi cotton. It is impossible to find out anything definite as to yield because neither land nor crop are usually measured.

(4) A number of deshi varieties were tried on the farm including two local samples from the plateau and one from a lower elevation, as well as roseum and another from Nagpur and two of Mr. Leake's new cottons. The season was exceedingly wet, and, though all the deshi cottons appeared healthy, only the three local varieties gave any appreciable yield. Buri cotton and several selected American varieties from Cawnpore and Lyallpur were also tried. They all suffered severely from excessive rain but, though they looked unhealthy, four of the Cawnpore selections gave better yields than any of the local deshi cottons. Buri, however, failed completely and so did 4-F from Lyallpur. The Cawnpore selections seemed to be remarkably true to type. Apparently the Central Provinces cottons and buri mature too late for the Plateau where the soil dries rapidly after the monsoon and slight frost is common at the end of December.

(5) The net result of the experiments was (1) to confirm the general experience that suitable varieties of the American type give a better return for good cultivation in Chota Nagpur than the deshi varieties, (2) to emphasise the great importance of suiting the variety to the local conditions, and (3) to suggest experiments in cultivation.

2511. (25) Conditions affecting increase in area.—There are several considerations in favour of the relatively long stapled American cotton as against the deshi varieties for extensive cultivation in Chota Nagpur. Some such valuable export staple is a necessity if cultivation is to be improved by means of purchased manures and, the soil being deficient in the necessary mineral substances, purchased manures cannot be dispensed with. Deshi cotton also requires manure and American cotton gives a better return for manuring than deshi; it can apparently be grown over the greater part of the division without irrigation, and the small extent of the cultivation of deshi cotton should reduce to a minimum the difficulties caused by adulteration. Owing to the economic advantages of a conservative rotation which would minimise the expenditure on manures, the area under cotton would probably always be limited to a proportion, probably not exceeding half, of the land above the normal water level at the end of the monsoon, but the paddy crop supplies most of the people's food requirements, and under the improved cultivation essential for cotton, only about one-third of the area at present under food crops on the upland would be required to supplement the paddy grown at the lower levels. On the Plateau, the quality of the labour is good and the supply ample.

2512. (28) Importation of seed.—Having regard to the necessity for local adaptation indicated by experiment, it seems improbable that the best seed for the general crop can be grown outside the tract for which it is required, but the climate of Chota Nagpur is perhaps more like that of the Southern Cotton States of America than is the climate of the rest of India, and the direct importation of small samples of improved American varieties for selection in Chota Nagpur would avoid the elimination of useful types that may occur in the course of acclimatisation in less favourable environments in India.

2513. Organization for cotton work.—As regards organization, the varying elevation of Chota Nagpur increases the importance of local selection work. Methods of cultivation can be worked out for the whole tract at the central farm at Ranchi but selection work must be carried out on at least one and probably on two or three farms below the Plateau. A small farm is about to be started at an elevation of about 1,000 feet on which cotton will be the first crop dealt with. From experience obtained at Lyallpur as well as at Ranchi, I am of opinion that continued selection is of the first importance with cotton of the American and Egyptian types. A specially trained and selected man is required on each representative farm for this purpose, and seed farms will be necessary later on for maintaining an adequate supply of seed of improved types. But district organization, also, must be developed to suit the local conditions. On the Plateau, the problem is considerably simplified by the existence of numerous co-operative societies of Christians under the control of the Roman Catholic Mission settlements distributed throughout the area, but in large tracts below the Plateau, there are no co-operative societies, and the landlords being apathetic, some new organization among cultivators will be necessary. I think it would be a mistake to attempt any such organization before there is some tested paying innovation to base it on.

Mr. A. C. DOBBS called and examined.

2514. (President.) In Bihar and Orissa, we have no export crop, that is nothing worth carrying for long distances and I propose to take up cotton and ground-nut for this purpose. I have tried all the local varieties of cotton; I also got several from the Central Provinces, and some of Mr. Leake's as well as some American types from Cawnpore. The latter did best. Buri has established itself in Chota Nagpur. It is about three-quarters of an inch in staple. The American types offer better prospects. Co-operative societies are very strongly developed on the Chota Nagpur Plateau and if we could find a suitable good cotton, there would not be much difficulty in spreading it. The trouble is excessive rainfall. I consider the introduction of American types the best line to work upon. The question of manures is also of great importance. I would like to have a botanical assistant on each farm for cotton, ground-nut, rice and other crops. At present, I have only two men for the whole of my circle who have passed through the college, and one of these has not been trained on a farm. I cannot do justice to the circle with such a small staff. No Behari students are passing out from

* The seed was sown on the level ground and not ridged up, as I did not then think it necessary on high land with a considerable slope; but this year's experience has shown drainage to be of primary importance even on high land in Chota Nagpur, and I believe cotton, in particular, will do very much better if grown on ridges or earthed up.

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the Sabour college. Ranchi is a suitable centre for cotton work for the immediate neighbourhood but not for the tracts below plateau which are 1,000 feet lower. I want three farms for preliminary work, and I am trying to get staff for two more farms.

2515. Selection from the Dharwar mixture had been in progress only one year when I left the Punjab.

2516. (Mr. Wadia.) The American types have only been tried this year and we had eighty inches of rain. I tried ten selections from Cawnpore and several *deshi* varieties. *Roseum* produced nothing. Some of the American cotton produced three maunds to the acre with a ginning percentage of 33. The ginning percentage of the best local types was only 28.

2517. (Mr. Hodgkinson.) The local cotton is *buri*; it is supposed to have been introduced seventy years ago. It is an American type and is the "late" cotton of Manbhum and Singhbhum. There are about 2,000 acres of it. It is worth looking after but for the greater part of the division, it is rather late. They grow a good deal of it in the Santal Parganas. Both K-7 and K-22, obtained from Mr. Leake, did very badly; they flowered early in the season and then they stopped. About October they began again. Last year was an exceptionally bad year as regards rainfall. Possibly, the climate of Chota Nagpur is more like that of the American cotton tracts than the rest of India. I think it is certainly worth experimenting with American varieties but we cannot do anything adequate with so short a staff.

2518. (Mr. Roberts.) The average rainfall of the circle is about fifty inches. It is fairly cool in the rains and cotton does very well at the beginning when it is sown in May. I doubt if it is worth troubling much about the *deshi* cotton. *Buri* does fairly well and American should do better in a normal year. I do not know how Mr. Gammie classifies the local cotton. It is probably an *indicum*. I am going on with *deshi* to find out the yield. If I get a good yield in a normal year, it may be worth while taking it up. *Buri* was a complete failure on the plateau which is 1,000 feet higher than its usual habitat. It was too late. The Cawnpore varieties did much better there but only five out of the ten did well, Nos. 5, 23 and 11 and two others. I have made no personal observations of the root development of American cottons.

2519. Cotton is usually exchanged for tobacco and salt. The rate for cotton quoted in my written evidence, five seers to the rupee, is extraordinarily low; they do not know the proper prices for cotton in the district. It is still a very jungly part of the world.

2520. In working on cottons, the great thing is to get a healthy plant with big yield. I would then go for ginning percentage and get the lint valued.

2521. As regards insect attacks, *buri* lost all its top shoots which were eaten off by caterpillars whilst other American types lost their leaves. All the Americans I tried were of the rough leaved type.

2522. The establishment of a central cotton bureau would, I think, be a very good thing. It is very hard to get reliable advice at present.

Mr. G. MILNE, I.C.S., Director of Agriculture, Bihar and Orissa.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

2523. *Cotton in Bihar and Orissa.*—The cultivation of cotton is of no importance in this Province as only a few districts grow the crop on very small areas. The total area in Bihar and Orissa represents on an average of five years ending 1915-16 only 0.4 per cent. of the total area under cotton in India. The most important districts, in regard to early cotton, are Ranchi and the Santal Parganas and also Angul, Sambalpur and Manbhum, and late cotton is chiefly cultivated in the North Bihar districts (Saran, Muzaffarpur and Darbhanga) and Cuttack, Manbhum and Singhbhum. The cultivation of cotton is not at present recommended by this Department.

(2) Before the administrative changes of 1912, when the Government of Bihar and Orissa was constituted, the whole question was carefully examined by the Bengal Agricultural Department. The Deputy Director of Agriculture, Mr. Smith, came to the conclusion that the Department should not encourage the growth of cotton in Bihar. This view was endorsed by the Imperial Cotton Specialist after an inspection of the different agricultural stations in company with the Deputy Director of Agriculture. At that time there was no agricultural station in Chota Nagpur, still the question was examined at the Reformatory School farm at Hazaribagh. The conditions prevailing in all the tracts of the Province were, therefore, before the Bengal Director of Agriculture when he came to the definite conclusion that the cultivation of cotton should not be encouraged.

(3) When Mr. Arno Schmidt visited this country during the course of the year 1911, he addressed the Agricultural Adviser to the Government of India with a view to obtaining certain information as a preliminary to a personal investigation of the cotton tracts in this Province. The information then collected indicated that the cotton question was of no importance in this Province. Mr. Schmidt did not make any tour of inspection in this Province and his note giving the results of his tour does not deal with this Province. The information then collected still holds good.

2524. *Experiences with exotics in Bihar and Orissa.*—Previous to 1911, an attempt was made to introduce certain varieties of cotton in Bengal and Bihar and Orissa, and the result is contained in the extracts of the Annual Report of the Department for 1907-08 and 1908-09 and of the Chaibassa Farm Report for 1907-08 (see Annexure). It will be seen that the experiment generally failed except in the case of *buri* cotton which was recommended and the seed supplied by the Department until 1911 when it was decided that the cultivation of cotton should not be encouraged.

(2) Quite recently, the question of the introduction of American cotton into Chota Nagpur has been taken up by the Deputy Director of Agriculture, Chota Nagpur Circle, at the farm near Ranchi. The first season's plants are now on the ground and it is impossible as yet to say what the prospects of developments are. The excessively heavy rainfall of this year has unfortunately given the experiment a bad start.

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[Continued.]

(a) "Deshi" short-staple cotton.

2525. (2) *Varieties.*—A little medium and short staple cotton is grown but the crop is insignificant. The following varieties of cotton are grown in this Province:—

District, where cultivated.	Name.	Type.	Botanical Name.
Tirhut Division	<i>Bhogla</i> (large podded)	Late cotton	<i>G. Intermedium</i> , Todaro.
"	<i>Deshila</i> (small podded)	" "	" "
"	or <i>Jethi</i> , <i>Jethua</i> or <i>Bhusri</i>	" "	" "
"	<i>Kokti</i>	Early cotton	<i>G. neglectum</i> , Todaro, variety <i>Kakatia</i> (or <i>G. arboreum</i> var. <i>neglectum</i> , Watt).
Orissa Division	<i>Haldya</i> and <i>Acchua</i> .	" "	<i>G. neglectum</i> var. <i>bengalense</i> (or <i>G. arboreum</i> var. <i>neglectum</i> , Watt)
Chota Nagpur Division	<i>Buri</i>	" "	<i>G. Hirsutum</i> , Linn.

(2) A more detailed list as collected from the District Officers in 1911-12 is also given below —

Bhagalpur Division	<i>Gallia</i> or brown coloured <i>Sada</i> or white coloured. <i>Banga</i> .
Patna Division	<i>Buri</i> , <i>Bochia</i> and <i>Jurguria</i> . <i>Deshi</i> and <i>Pachhami</i> . <i>Bochni kapas</i> . <i>Jagar kapas</i> .
Tirhut Division	<i>Deshi</i> or <i>Bigila</i> . <i>Bhogla</i> and <i>Boochra</i> . <i>Kukti</i> , <i>Bhagila</i> and <i>Chota kapas</i> .
Chota Nagpur Division	<i>Buri kapas</i> . <i>Anhia kapas</i> . <i>Tira kapas</i> . <i>Dahia</i> . <i>Buri kapas</i> and <i>Deshi kapas</i> .
Orissa Division	<i>Haldia</i> (early). <i>Achua</i> (late). <i>Haldi kapas</i> (early). <i>Sada kapas</i> (late). <i>Deshi kapas</i> . <i>Tarturi</i> (early). <i>Dalua</i> (late).

2526. (3) *Size of holdings.*—Cotton is cultivated by small tenants as a minor crop mixed with other crops such as *arhar* (*Cajanus indicus*), castor, etc.

2527. (4) *Yields and profits.*—The average outturn as reported annually by District Officers during the last ten years comes to 88 lbs. per acre.

(2) The following statement gives the results obtained at the Bankipore Agricultural Station, the Hazaribagh Reformatory School Farm and at the Chaibassa Tassar Farm with *buri*, *bhogila* and *deshi* varieties:—

Bankipore Farm.

PER ACRE.					
Variety.	Cost of cultivation.	Outturn.	Value in rupees.	Profit.	Loss.
	Rs. A. P.	Mds. Srs. Ch.	Rs.	Rs.	
<i>Buri</i>	18 1 7	1 18 5	49	31	
<i>Bhogila</i>	16 0 3	0 6 4	...	...	
<i>Deshi</i>	16 0 3	0 31 4	...	...	

Hazaribagh Reformatory School Farm.

Variety.	Cost of cultivation.	Outturn.	Value.	Profit.
	Rs. A. P.	Mds.	Rs.	Rs. A. P.
<i>Buri</i>	46 7 0	5	178	131 8 0
<i>Deshi</i>	46 7 0	4	...	...

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[Continued.]

The value and profit per acre given in the tables of this report are based on the figures supplied by Messrs. Tata Sons and Company, Bombay, derived from samples of the various varieties sent from each farm to the Imperial Cotton Specialist and forwarded by him to them for valuation. The values given are, presumably, those that the cottons would have fetched in Bombay and are therefore in excess of that which could be obtained for them locally. That this is the case is shown by the actual profits realised by the Superintendent of the Hazaribagh Farm which are given in the following table.

PER ACRE.					
Variety.	Cost of cultivation.	Outturn.	Rate per maund.	Value, Rupees.	Profit.
	Rs. A. P.	Mds.	Rs..	Rs.	Rs. A. P.
Buri	46 7 0	5	12	60	13 9 0
Deshila	46 7 0	4	12	48	1 0 0

(3) Chaibassa Tassar Farm. An outturn of $4\frac{1}{2}$ maunds of seed and lint per acre were obtained which showed no profit. Total expenditure on account of this crop was Rs. 29 per acre.

2528. (5) **Rotation and manures.**—Cotton is sometimes rotated with *rabi* crops. Generally it is grown mixed with *arhar*, castor, maize, *til*, etc. Cotton and *arhar* as mixed crops are followed by the same mixed crops next year. Sometimes cowdung and ashes are used. But commonly no manure is applied.

2529. (7) **Areas under cotton by districts.**—A statement showing the areas under cotton during last ten years in the important cotton growing districts is submitted below.

Area of Cotton Crops from 1908-1917.

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[Continued.]

District.	1908.		1909.		1910.		1911.		1912.		1913.		1914.		1915.		1916.		1917.	
	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.	Early.	Late.
Saran	900	12,900	900	13,400	1,000	15,300	(a) 600	15,700	600	15,400	600	15,100	600	15,200	600	15,200	600	15,100	600	15,200
Santal Parganas	10,500	..	10,500	..	13,200	..	13,200	..	13,000	..	13,200	..	15,200	..	13,200	..	13,200	..	13,700	..
Cuttack	400	2,800	400	2,800	350	2,500	340	2,300	340	2,300	320	1,700	325	1,200	325	1,200	305	1,300	305	1,300
Angul	1,500	500	2,300	500	3,300	500	3,300	500	3,300	500	3,300	500	3,500	500	3,500	500	3,000	500	3,600	500
Sambalpur	2,200	..	1,520	..	1,100	..	..	..	4,144	..	4,384	..	2,971	..	2,455	..	2,500	..	2,400	..
Ranchi	2,800	..	2,800	..	2,800	..	(b) 28,000	..	28,000	..	28,000	..	(c) 15,100	..	15,100	..	15,100	..	15,100	..
Manbhum	4,000	1,200	5,100	1,200	3,500	1,200	3,700	1,200	3,700	1,200	3,700	1,200	3,700	1,200	3,500	900	3,500	900	3,500	900
Singbhum	4,000	3,000	4,000	3,000	4,000	3,000	4,000	3,000	4,000	3,000	(c) 1,700	1,200	1,700	1,200	1,700	1,400	1,000	1,400	1,400	1,000

(a) Decrease in area due to deficient rainfall.
(b) Revised figures given.
(c) Figures revised.

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[Continued.]

2530. (8) **Uses of seed and seed selection.**—No attention is paid by the cultivators to the selection of seed. They preserve their own seeds or get them from the local shopkeepers.

(b) "*Deshi*" long staple cotton.

2531. (11) **Varieties.**—*Buri kapas* is described as both prolific and long stapled and the lint was said to be quite fit for sale to the Indian and English mills. This cotton has, however, deteriorated. No genuine long staple cotton is grown in the Province.

(c) *Exotic cotton*.

2532. (21) **Varieties.**—Some American and Egyptian varieties of cotton were tried but the experiments failed and no exotic cotton is now grown in this Province, except for the few plants recently introduced at Ranchi.

II. COMMERCIAL ASPECT.

2533. (30) **Local trade customs.**—The cotton trade of this Province is insignificant. Most of the cotton produced in the Province is consumed locally—what little remains after supplying the grower is sold at the local *hats*. There is no system of agency, advances, future buying or contracts.

2534. (31) **Standardization of commercial names.**—The cotton of this Province has been classified as "Bengal-Sind (others)."

	Production.	Imports.	Exports.
	Bales of	Bales of	Bales of
1916-17	400 lbs.	400 lbs.	400 lbs.
	16,281	1,918	11,128

III.—STATISTICAL.

2535. (33) **Improvement of cotton forecast.**—Cotton is not an important crop in this Province. The area under it in the Province represents only 0.4 per cent. of the total area under the crop in India. The forecasts are based on the reports of Police Officers and much accuracy cannot be claimed for them. but owing to the absence of any regular gineries or cotton presses or any organised trade in this Province there is no means of checking the yield of the crop as reported and I have no suggestions to make regarding the improvement of the forecast.

2536. (35) **Publication of Liverpool and Bombay cotton prices.**—The trade in cotton in this Province is so insignificant that no useful purpose would be served by the daily publication of Liverpool and Bombay cotton prices at up-country markets.

IV.—MANUFACTURE.

2537. **General.**—The questions under this head do not concern this department. There are no cotton presses or gineries in this Province. Whatever ginning is done is done on primitive wooden instruments called "*Charkas*."

ANNEXURE.

Extract from Reports relating to Cotton Cultivation in Bihar and Orissa.

(i)

Extract from the Report of the Department of Agriculture, Bengal, for the year ending the 30th June 1907.

24. **Cotton cultivation.** Many varieties of cotton have been tried from time to time in this Province, including a large number of exotic varieties—American, Egyptian and Sea Island—but the results have in most cases been very unsatisfactory. Enquiries made in 1905-06 led me to the conclusion that if anything was to be done towards improving the cultivation of cotton in Bengal it would be best to work upon indigenous or already acclimatized varieties. The cotton locally known in Singhbhum and some adjoining districts as *buri kapas* appeared on the whole to give the best promise of success. This cotton belongs to the species *Gossypium hirsutum*, and is of American origin, though the history of its introduction into this Province cannot be properly traced. Two compact areas were selected for the operations—one in the neighbourhood of Chakradharpur in the Singhbhum district, and the other around Jamtara in the Sonthal Parganas. These localities were selected for the following reasons:—the local conditions were suited to the growth of cotton; the cultivators had been accustomed to grow cotton themselves; the agricultural conditions were similar to those of places where it was known that this variety of cotton had already been grown; and finally the sites were convenient for the purpose of inspection and supervision of the cultivation. A travelling Inspector of the Department was placed in special charge of the work. Seed was distributed to about forty cultivators near Chakradharpur and to about 47 cultivators in the neighbourhood of Jamtara, and money advances were given to them on certain conditions. At the Chakradharpur centre, the seed was sown between the 29th of May and the 16th of June 1906, and at Jamtara centre between the 15th and 29th June. The leaf-roller attacked the plants near Chakradharpur and the red cotton bug appeared in numbers at both centres. In both areas, the cotton did very well and produced a far better crop both in quantity and quality than the cultivators had seen before. Samples of the lint were sent for appraisement to two firms in Calcutta, and they valued it at between Rs. 35 and Rs. 36 a maund. A large quantity of seed cotton from the Chakradharpur centre was sent to the Ramdyal Cotton Mills, Goosery, where it was ginned and spun into yarn. Some of the lint was first spun into 50s. yarn, when it stood a test of 22 lbs. per lea. Some was spun still finer into 80s. yarn, giving an average test of seventeen lbs per lea. The Manager spun nearly six maunds of lint into yarn and reported the result to

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be most satisfactory. Samples were also sent to other mills with somewhat similar results. A sample of the cotton was sent to the Imperial Institute, London. The report of the Director shows that the lint was fairly soft, of good lustre and of normal strength; that the average length of fibre was 1.2 inches and the average diameter .00075. The fibres were regular in diameter throughout. The commercial value of the lint was given as about 6d. per lb., or equal to "middling" American and fine machine ginned Broach. This is very much higher than the value of the ordinary Bengal cotton. In consequence of the satisfactory result of this experiment, arrangement has been made to start a small special farm of five acres near Chakradharpur, where an attempt will be made to improve on the stock by plant to plant selection, and where certain experiments will also be conducted to ascertain the best manure for the cotton plant under the local conditions. At first, at all events, the work will be confined to the *buri* variety. A special leaflet was issued in 1906, with a view to discourage, if possible, useless experiments with exotic varieties and recommending only the *buri* and Dharwar acclimatized American varieties.

25. Over 24 maunds of *buri kapas* and 2½ maunds of Dharwar acclimatized seed was distributed from the Department seed store during the year. Special measures have been taken to try and spread the cultivation of the *buri* variety among the cotton cultivators of the Saran and Palamau districts. A sample of another good variety of indigenous cotton known as *lumbua* was also sent to the Imperial Institute, but the report received showed that the fibre was of very uneven length and strength, and inferior to the *buri* variety. Some Caravonica cotton was sown at the Cuttack Agricultural station where it grew fairly well. Probably Orissa is the most suitable part of this Province to try this variety. Some more seed was obtained during the year with special instructions regarding its cultivation, for trial at Cattack."

26. An attempt to improve indigenous varieties in some of the Bihar Districts by selection and distribution of seed was continued, but the results have hitherto been so unsatisfactory, owing partly to the inferiority of the local varieties and partly to the impossibility, with the inadequate staff at my disposal, of supervising such operations over large areas, that I propose to give up this work, for the present at all events.

(ii)

Extract from the Report of the Department of Agriculture, Bengal, for the year ending the 30th June 1908.

26. **Cotton cultivation.** The small area of five acres taken up at Chakradharpur for cotton cultivation referred to in paragraph 25 of last year's report proved a failure as the land was not suitable. The plant to plant selection and the experiments have been transferred to the Tassar Farm at Chaibassa twelve miles away.

(iii)

Extract from the Annual Report of the Tassar Silkrearing Station, Chaibassa, Bengal, for the year 1907-08.

B.—Cotton grows fairly well in this district. The *buri kapas* variety which is acclimatized Upland Georgian is undoubtedly the best local variety in Bengal and from reports obtained from the trade there are few varieties anywhere in India to equal it in quality. This variety is indigenous now in many villages of Singhbhum, but how it first came to the country is not known—probably eighty years ago when the first introduction of American varieties took place (Voelcker).

An outturn of 4½ maunds of seed and lint per acre were obtained which showed no profit. Total expenditure on account of this crop was Rs. 29 per acre. Seed was sown on the 19th May 1907 and the crop was harvested from the 29th September 1907 to the 27th November 1907.

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Mr. G. A. GAMMIE, Imperial Cotton Specialist.

EXAMINED AT BOMBAY, FEBRUARY 2ND, 1918 AND AT SIMLA, APRIL 15TH, 1918.

Written statement.

Part I.

THE COTTONS OF NORTH INDIA.

2538. **Punjab cottons. Deshi short staple.**—The following are the indigenous cottons occurring in the Punjab:—

- (1) *Gossypium sanguineum*, Hassk. Multan cotton.
 - A.—Varieties with red flowers—
 - (a) broad lobed leaves. *Bagar siah*, *bagar safed*.
 - (b) narrow lobed leaves. *Bagar siah*, *bagar safed*.
 - B.—Varieties with pink flowers var. *minor*, Gammie—
 - (a) broad lobed leaves. *Bagar siah*, *bagar safed*, *deshi Multan*.
 - (b) narrow lobed leaves. *Bagar siah*, *bagar safed*.

NOTE.—There are again two varieties of the dark flowered and broad lobed forms [A (a) above] (1) with dark stems, (2) with green stems. Great differences are found in these plants and by experiments in selection up to 1911 a length of staple of 0.8 inches was obtained. It was also ascertained that the shortest staple is associated with the hardest and darkest coloured plants.

- (2) *Gossypium obtusifolium*, Roxb. var. *hirsutius*.
- (3) *Gossypium indicum*, Lamk.
 - Gossypium indicum*, Lamk. var. *mollisoni*.
- (4) *Gossypium neglectum*, Todaro, var. *verum*.
 - Gossypium neglectum*, Todaro, var. *verum* sub var. *malvense*.
 - Gossypium neglectum*, Todaro, var. *roseum*.

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(2) The cottons of Hansi and Multan are considered to be the best in the Punjab. It is said that a good deal of Punjab cotton is sold in Europe as Surtee Broach.

(3) As regards the annual red flowered cottons, it appears that they were at one time grown largely in India but they were ultimately so thoroughly supplemented by the yellow flowered sorts that, excepting the Punjab, they have disappeared entirely from India. Dr. Hove, in 1787, says that the yellow flowered cottons in Gujarat (W. India) were grown in the heavier and the red flowered in the lighter soils.

(4) *G. obtusifolium*, var. *hirsutius*.—Its prolonged season of growth is said to be a drawback to its profitable cultivation. Mr. Robertson Brown reported thus on this variety: "I have just visited a tract in the Peshawar district which is famous in the North-West Frontier Province as producing heavy crops of high class cotton. I was accompanied by the Revenue Assistant, who fixes revenue, etc., so my information is correct. I found that the *baniyas* in purchasing the crops pay for six maunds per acre and take their chances of profit on the outturn beyond that weight. Good, average cotton fields in the tract yield fifteen maunds per acre and twenty maunds is occasionally produced. I have not seen such heavy outturns of cotton recorded as being produced elsewhere in India and I am writing to you to find if equally good crops are yielded in any other part. The soil is deep red alluvium and the tract is irrigated very sparingly and irregularly from the rich muddy Bara river." There are indications in several of the "Punjab District Gazetteers" that this is often a triennial crop, for instance, of the Attock district it says "Cotton is a plant which can be ratooned and if another crop is desired, it is cut down in December. But this is not done in irrigated lands. On *barani* lands it stands for two, and in Tallagang, as a rule, for three years, yielding best in the second year; when the plants are more vigorous and bushy, and worst in the third year, when there is a great falling off both in quality and quantity. If it is intended to take a different crop off the ground in succession to cotton, as on irrigated lands, it is necessary to dig out the roots carefully." In the Bahawalpur State Account, it is mentioned that "the plants yield cotton for three years in succession, but it is usual to sow a fresh crop every year."

(5) It will be gathered from the following published surveys how great is the mixture in the fields of Punjab cotton.

Lyallpur.—Lyallpur *tehsil*.—*G. indicum*, yellow flowered.

Toba Tek Singh *tehsil*. *G. sanguineum*, both broad and narrow leaved, chiefly near Gojra and *G. indicum*, yellow flowered in almost as great quantity.

Sumindri and Jaranwala *tehsils*. *G. indicum*, yellow flowered and *G. neglectum*, yellow flowered, in almost equal quantities. There is everywhere a fairly considerable admixture of the white flowered varieties of *G. indicum* and *G. neglectum* and these popular opinion regards as heavier yielding.

Hissar.—In Hansi and Fattahabad *tehsils*, two-fifths are yellow flowered *G. indicum* and one-fourth to one-third is white flowered *G. neglectum*. White flowered *indicum* and yellow flowered *neglectum* are also common. There is no *sanguineum*.

Lahore.—Yellow flowered *G. indicum* represents 74 per cent. in Chunian, 78 per cent. in Kasur and 91 per cent. in Lahore *tehsil*. In Chunian about ten per cent. is yellow flowered *G. neglectum*. In Kasur there is a good deal of broad leaved *G. sanguineum* in canal irrigated villages.

Jhang.—*Tehsil Jhang*. *G. indicum*, yellow flowered, predominates but is closely followed by *G. hirsutum*.

Tehsil Shorkot. *G. indicum*, yellow flowered, predominates to the extent of nearly thirty per cent. followed by *G. sanguineum*, fifteen per cent. and *G. hirsutum*, eleven per cent.

Tehsil Chiniot. *G. hirsutum* predominates with 45 per cent. followed by *G. indicum* thirty per cent. and *G. sanguineum* seventeen per cent.

(6) As regards work on the indigenous cottons of the Punjab, the Department has not yet arrived at any very definite results, excepting that the white flowered *neglectum* (roseum) as in other Provinces proves to be most profitable under the present circumstances of the cotton market and the white flowered *indicum* runs it very closely.

(7) The opinion I personally formed was that the broad lobed *sanguineum* is probably the best indigenous cotton of the Punjab but that all parts do not suit it. The heavy yielding form of *G. obtusifolium*, which extends into Baluchistan and Afghanistan and probably still further westward, deserves far more attention than it has ever received as it yields so enormously under irrigation and the samples I have seen prove it to be intrinsically a good cotton. One I examined thirteen years ago had a staple of 0.75 inch. My best sample of red flowered annual cotton had 0.85 inch. The best *indicum* from the Punjab had 0.70 inch, the best of the variety *mollisoni* of this had 0.72 inch; the best *neglectum* had 0.72 inch and the best *roseum* had 0.65 inch. These were not picked but field samples and show that, with careful selection, much could be done in the way of improvement of Punjab cottons. The present mixtures of types of cottons in the field are so involved that the Department should maintain a special staff to separate them and to test each thoroughly. At present the work is entangled with that of the introduction of exotic cottons. The two problems are so divergent in their nature that they cannot be solved on parallel lines, so they should be dealt with by two sets of workers.

(8) The Report on Cotton Cultivation in the Punjab for 1881-82 (Financial Commissioner's office No. 1313, Lahore 16th December 1882) gives figures of outturn, cost of cultivation and other information, by districts. The cotton area then was 918,265 acres against 1,740,000 of the present year.

2539. *Sind cottons*. *Deshi short staple*.—The following sorts have been distinguished botanically:—

(1) *G. obtusifolium*, Roxb. var. *sindicum*.

(2) *G. neglectum* Tod. var. *verum*.

G. neglectum, Tod. var. *verum*, sub. var. *malvenum*.

G. neglectum, Tod. var. *verum*, sub. var. *kathiawarensium*.

G. neglectum, Tod. var. *roseum*.

G. neglectum, Tod. var. *roseum*, sub. var. *cutchicum*.

(2) Sind indigenous cottons, therefore, consist of most of the types occurring in "Bengals." The best local cotton is said to be found in the neighbourhood of Bhitshah, a village in the Hala Taluka of the Hyderabad district.

(3) The *G. obtusifolium* appears to be grown by the people outside the regular cotton tract for their own use. The *neglectum*, in its many varieties, is the field crop of the cotton area.

(4) The improvement of Sind cotton can therefore be treated along with "Bengals" generally.

(5) The growth of Sind cotton is more robust than that of Berar or Khandesh cotton, and it is assumed that the whole difference is due to irrigation. This view is perhaps correct, as I have seen irrigated *neglectum*

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at Sholapur in the Bombay Deccan quite as robust as any Sind cotton. From an experiment conducted with a view of seeing how far Sind cotton would respond to better methods of cultivation it was found that an acre plot yielded 1,710 lbs. seed cotton, a yield never before attained except perhaps on very good virgin soil. The average is said to be about 800 lbs.

2540. *Punjab and Sind. Long stapled cotton*.—The American cottons grown in the Punjab fall into three series:—

(1) Upland Georgian.

(2) New Orleans.

(3) Soft Peruvian.

(2) The first, on account of its hardiness and comparative immunity from pests, is accepted as being obviously the type which should be grown under canal cultivation. The second is less hardy and more liable to the attacks of insects and its intrinsic superiority to the first named is so slight that it is not worth incurring the added risk for it. The soft Peruvian (annual form) is one of the finest cottons ever grown in India. In spite of its higher price, its lower outturn brings it on a level with Upland Georgian. It would be a remunerative crop to a farmer willing to undertake the extra attention it requires.

(3) Mr. Keatinge, in his note on improved and exotic cottons in the Bombay Presidency (1911), gives full details of the operations in Sind.

(4) It is mainly to the Punjab and Sind we have to look for the production of long staple exotic cotton in India.

2541. *Central Indian cotton. Deshi short staple*.—In this tract the cottons have been distinguished botanically as follows:—

(1) *G. arboreum*, Linn. *Deo kapas*.

G. arboreum, Linn. var. *vagans*, with khaki cotton from Bundelkhand.

(2) *G. indicum*, Lamk. *bani, bana, malvi, deshi malvi*.

G. indicum, Lamk. var. *mollisoni*, with white flowers.

(3) *G. neglectum*, Tod. var. *verum*.

G. neglectum, Tod. var. *verum*, sub. var. *malvense*.

G. neglectum, Tod. var. *roseum*.

(2) As elsewhere the *G. arboreum*, the red flowered Indian tree cotton, is grown sporadically, its chief use being to supply sacred threads and wicks for lamps. From my notes I find it varies in staple from .80 to .90 inch, so that is, so far, good.

(3) *G. indicum*, from my own observations in the fields, only occurs as a slight mixture. I find in the yellow flowered variety that its staple varies from .65 to .92, and in the white flowered, from .60 to .85. There is thus a wide scope for selection not only in staple but also in ginning percentage, which in the former varies from 21 to 39.5 and in the latter from 26 to 42.2.

(4) The white flowered *neglectum, roseum*, also only occurs as a mixture in the fields. The cotton of the Malvi tract, as distinguished from the Nimari below the Vindhya, is undoubtedly *malvense*, which all over the "Bengala" tracts runs *bani* very closely indeed.

(5) Upland Georgian exists as a distinct mixture all over Central India, just as it does over Berar and Khandesh.

(6) *Malvense* is undoubtedly the finest cotton in Malwa, but its low ginning percentage is against it. It appears to run from 25 to 27. By search, better ginning strains could be found and worked up.

(7) A discussion of the improvement of Central India cottons can also be relegated to a final summary.

2542. *United Provinces. Deshi short staple*.—The cottons have been separated botanically as follows:—

1. *G. arboreum*, *Deo kapas*, red flowered Indian tree cotton. Occurring sporadically as explained elsewhere. I found the staple to vary from 0.76 to 0.98 inch.

2. *G. intermedium*, Tod, *Bagli, radhia kapas*, with broad and narrow lobed forms and a white flowered variety, var. *album*. This peculiar type of cotton has only been recorded from the eastern parts of the United Provinces and in Bengal as far west as Bihar. It appears to be cultivated in small patches for personal use only and its long period of growth is considered objectionable. Its staple varies from 0.55 to 0.88 inch and its ginning percentage is astonishingly low, ranging from 15 to 24.5 only.

3. *G. indicum*, Lamk. is found rarely in its two forms, neither of them good.

4. *G. neglectum*, represented by some of its inferior varieties is the prevailing type of cotton in the United Provinces. In a long list of tests, I find the staple to vary from 0.38 to 0.76, most of them being about 0.5 inch.

(2) At present, selected varieties of *neglectum* are being introduced into the tracts most suitable to them. Mr. Leake is attempting to evolve a hybrid which will in time take the place of these. The white flowered cotton is, however, supplanting the others and as the cultivators are quite alive to its merits from the view of profit alone, it will be difficult for anything else to make headway against it.

2543. *United Provinces cottons. Long staple*.—Two American annual cottons have been long under trial in these provinces. The New Orleans, known locally as Dharwar-American, and the Upland Georgian, known as Cawnpore-American. The former has been discarded for reasons given elsewhere and the Cawnpore-American holds the field. Mr. Parr has also distributed largely the seeds of *buri*, an acclimatized Upland from Chota Nagpur. The final success of American cotton is highly problematical. Its lower yield per acre and its uncertainty does not allow it to compete with the indigenous cotton.

2544. *The Central Provinces and Khandesh. Short staple cottons*.—These are adjoining areas growing the same types of cotton and they have been visited by the Members of the Cotton Committee.

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[Continued.]

The cottons are distinguished botanically as follows :—

1. *G. arboreum*, Linn. Red flowered Indian tree cotton *Deo ban*, *Deo kapas*, *Deo paratti*, *Manua kapas* occurs sporadically as in other tracts.
2. *G. indicum*, Lamk. *Bani*, *Hinganghat cotton*, *Chanda cold weather jari*.
G. indicum, Lamk. var. *mollisoni*, white flowered *bani*.
3. *G. neglectum*, Tod. var. *verum jari*.
G. neglectum, Tod. var. *verum*, sub. var. *malvensum jari*.
G. neglectum, Tod. var. *roseum*, *katil vilayati*, *varhadi*.
G. neglectum, Tod. var. *roseum*, sub. var. *cutchicum*.

(2) The local race of cotton in Khandesh is known as *varhadi* or *Berar* and is said to have come from Malva. Before 1880, it was largely supplanted by two foreign varieties, *Hinganghat* of two kinds, *bani* and *jari* from the Central Provinces and Dharwar or acclimatized Upland Georgian and New Orleans from the South Mahratta Country. The last still exists as an admixture in Berar and Khandesh.

(3) In Khandesh and the Central Provinces, excepting for the above mentioned mixture, the whole of the crop consists of a variety of forms which are botanically aggregated under the species *G. neglectum* of Todaro. Commercially they come under the head of "Bengals" which prevail over the greater portion of the whole area devoted to cotton which was covered by the Committee in its first tour.

(4) *Malvense* is, in most respects, equal in staple and quality to Broach but fails in this tract on account of its low yield and ginning percentage; *verum*, slightly inferior to the above and failing on the same points; and *roseum*, a white flowered variety, which, although producing a cotton of practically no staple, heads the list by its productiveness, hardness and high ginning percentage. It seems to yield generally about Rs. 15 more profit per acre than any variety of the mixture.

(5) Large seed farms, assisted by certified cultivators, are established at Jalgaon and Akola, and great quantities of seed have already been distributed much to the detriment of the general staple. There are indications of the setting in of a more insistent demand for finer cottons and it would be well for the Agricultural Department if it be prepared in good time to meet this demand. The last two seasons have been characterized by abnormally late rainfall and there is evidence to show that the yellow flowered cotton recovers from this better than the white flowered which appears to be a drought crop while *bani* and the yellow flowered *jari* require a better rainfall. If the seasons continue to be of the character of these prevailing in the last two years, it is possible that the white flowered cottons will fall out of favour.

(6) In the adjoining districts of the Deccan and of the Nizam's Dominions there is the same tendency to abandon the old strains in favour of the white flowered cottons. Along the Godavari valley, *bani* still exists in moderate purity and the bulk of the crop is brought on the spot by millowners.

(7) In the Central Provinces, an acclimatized sort of Upland Georgian called *buri* from Chota Nagpur has been introduced with good results into wilt infested areas. On the eastern side, Mr. Clouston is exploiting the *bhata* soil under irrigation with Cambodia and *roseum*. The value of the former worked put to Rs. 172 per acre and of the latter Rs. 77.

(8) At Sindewahi in the Chanda district, where attention is being paid to the possibility of growing better cotton under irrigation, a very promising cross between *bani* and *deshi* Lahore has been tested, but its yield is still too low. Cambodia, under the same conditions, gave a gross return of Rs. 202 per acre, *roseum* Rs. 122, Sindewahi cross, Rs. 81 and *buri* Rs. 31. Cambodia is a plant manifestly adapted for irrigation and it should always occupy a place in any scheme proposed for growing irrigated cottons. The Sindewahi cross was grown at selected places throughout the "Bengals" area and its valuations in Bombay were as follows:—taking the market price of Fine Broach of the day at 100. In Khandesh, Dhulia at 101.2, Jalgaon at 97.3, in Berar, at Akola, 97.3, in the Central Provinces at Sindewahi at 95.4, in the Panch Mahals at 97.3, in Central India, at Indore, 76.8. It is therefore possible to have a short season cotton which compares favourably with Broach.

(9) To show that the cultivators, for the present are fully justified in their choice of white flowered cotton cultivation, it has been found that *roseum* and *Saugor jari*, both white flowered cottons, give a gross return per acre of Rs. 57, the yellow flowered *Berar jari*, Rs. 41, *bani* Rs. 39, *malvense* Rs. 33 and *verum* Rs. 31. Two Cawnpore selections, K22 and K7, gave Rs. 43 and Rs. 33. *Buri* was worth Rs. 51 per acre.

2545. *Summary*.—The above notes comprise a short review on the cottons found in the tracts visited by the Committee and correspond roughly with the areas under *Oomras* and *Bengals* or more than half the cotton grown in India. The Committee will have seen that, everywhere, the popular bias leans strongly in favour of extending the cultivation of high ginning low grade varieties, which, under present circumstances, are certainly the most profitable to grow. They will continue to hold the field until buyers are willing to pay a higher premium on the better staple cottons. It must be borne in mind that superior varieties such as *sanguineum*, *bani*, *malvense* and *verum* are probably almost equal to anything produced in India in the way of staple cotton and if a remunerative demand for these arises in the future, the Departments of Agriculture concerned possess the necessary facilities for their dissemination and it is quite obvious that if the prices offered encouraged them to do so, the cultivators would willingly take up the finer sorts, which, after all, are just as easy to grow as the coarser. The sole reason for the impulse to concentrate on coarse cotton is that it is most profitable to the grower. If the finer varieties are wanted, a proper organization of their supply and marketing would have to be arranged.

(2) As regards greater crop production, the question of a proper manure supply is a very vital one. It would appear that poudrette or nightsoil is the most valuable, but in many parts prejudice forbids its use. Where the people have learned to overcome their objection, its use is attended with excellent results. The application of artificial manures often increases the yield which is not commensurate with the cost of manure given. Cattle-dung of the proper description, also gives good results, but the ordinary farm-yard manure in India generally consists of the ashy remains of the cow-dung cakes which are burnt as fuel.

Part II.

THE COTTONS OF SOUTH INDIA.

2546. *Cottons of Bombay*.—There is a great variety of cottons in the Bombay Presidency and these are not normally found in general mixture as in the *neglectums* or *Bengals* but are, in most cases, severely restricted to tracts in which they appear to have developed their special characteristics by environment and in which also they are known by different local names.

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Mr. G. A. GAMMIE.

[Continued.]

2547. *Indigenous cottons of Bombay*.—(1) *Gossypium obtusifolium*, roxb. *Roz* or *Jadia* of Gujarat.—The yellow flowered Indian tree cotton. A perennial, growing four or five years as a mixture in other crops, *bajra kodra*, etc., in the light soils of the Kaira and Ahmedabad Districts and also in similar soils in Baroda.

(2) *Gossypium arboreum*, linn. *Dev Kapas*, *hirvani*. The red flowered Indian tree cotton. According to Hove, this was formerly cultivated extensively in Gujarat. Now it is only found as isolated plants in temples and house compounds where it is grown to supply sacred threads and lamp wicks. Even for these purposes, it has been supplanted by the Bourbon cotton (*G. mexicanum*) to such an extent that *G. arboreum* has practically become extinct in Gujarat.

(3) *Gossypium herbaceum*, linn.—The cotton, *par excellence*, of Gujarat and the Southern Mahratta Country. The typical form is found from the south northwards under the names of *Navsari*, *Surtee Broach*, *kanvi* and *lallo*. It has also been introduced with a certain amount of success on the western side of the Dharwar District which is under the influence of the southwest monsoon. An inferior variety called *goghari*, existing in its purest form in the Amod and Jambusar Talukas of the Broach District, is rapidly becoming a serious adulterant of the higher class cotton on account of its high ginning percentage and general hardy character. Its advance is so rapid that steps must be taken to restrict its distribution if it is desired to maintain the reputation of the better Gujarat cottons in the south.

Gossypium herbaceum, linn. var. *Sakalio*, *wagad*, *dhumad*, closed boll cotton.—In this the bolls do not open and the operation of extracting the cotton by the separation of the valves by hand is done by people in their homes.

Gossypium herbaceum, linn. *kumpla* cotton; *jawari hatti*.—A small balled form, found in the Southern Mahratta country of the Bombay Presidency, extending southwards into Mysore and eastwards in a slightly different form as the "Northerns" and "Westerns" of Madras and the adjoining parts of the Nizam's Territory.

(4) *Gossypium neglectum*, Todaro.—Under the name of *mathio* this species has supplemented the original varieties of *Gossypium herbaceum* which predominated in Kathiawar until they were killed out in the famine year of 1899. The seeds were undoubtedly brought from Khandesh. A large area is also under this in the Dhanduka Taluka of Ahmedabad.

2548. (1) *Exotic cottons of Bombay*.—Dharwar American, consisting of two species of acclimatized cottons, *Gossypium hirsutum* Miller, the Upland Georgian, a hairy plant and a smooth plant, the New Orleans, *Gossypium purpurascens*, Poir, the first being probably an annual derivative of the Smooth Peruvian, *Gossypium peruvianum* and the second from *Gossypium mexicanum*, Tod. the Bourbon cotton.

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(7) *Gossypium mexicanum*, *Bourbon cotton*, with which repeated trials in acclimatization have been made in North Gujarat and the Konkan.

2549. *The indigenous cottons of Gujarat*.—Dealing in the first instance with Gujarat cottons generally, we have come to the conclusion that their quality is determined by the physical constitution of the soil and the prevailing climate of each tract. The different varieties are so closely allied botanically that their distinctions are difficult to express in words but the final product is of diverse value in the cotton market. Experimental introductions of cottons from the south into the north have shown us that quality is certainly not an inherent character of the cotton plant and that it depends upon general environment. The increasing value of cotton to the southward appears to depend on a higher rainfall and perhaps a milder climate. The different races of cottons in Gujarat have very nearly the following values in normal years.

Basis of Broach at Rs. 300 per khandi of 784 lbs.

Variety.	Values.
Rs.	
Navsari	360
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Wagad	295
Mathio	255 to 260
Dhollera	250
For comparison on the same basis.	
Khandesh	260
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(2) It is clear that, in Gujarat, these well-known differences must be due to the physical properties of the soils and climatic conditions. A number of soil samples were taken some years ago and submitted to Dr. Leather for physical and chemical analysis and at the same time samples of cottons were taken from the same soils for valuation in the market. The first three sets of soil were all of *goradu*, which bears early ripening varieties of the *herbaceum* type, called *lallo* and *kanvi*, the average rainfall of the first set being 41 inches, of the second 35, of the third 29. The proportion of clay and silt in these ranged from 29.1 to 32.5 per cent, and of sand from 57 to 76.2 per cent., and the percolation test gave to 1.6 c.m. per hour. Taking the Navsari cotton of the day as equal to 100, the cotton of this tract was valued at 87.5. The next sample was a *besar* soil growing *wagad*, also a comparatively early variety of *herbaceum*. The rainfall in this tract averages 29 inches. The proportion of clay and silt was 53, sand 47, and percolation test gave 0.7 c.m. per hour. Taking Navsari again at 100, the cotton of this tract is worth 89.28. The succeeding set of samples were from the Broach District, average rainfall 41 inches; proportion of clay and silt 77.4, sand 22.5, percolation test 0.1 c.m. per hour. Value of the cotton equal to 92.8. The next two samples were from the Surat District, rainfall average 41 inches, proportion of clay and silt 74, sand 26, the percolation test 0.3 c.m. per hour. The value of the cotton was equal to 98.21. The best samples were from the Navsari District, average rainfall 44 inches, proportion of clay and silt 66, sand 34, the percolation test 0.4 c. m. per hour, the market value of the cotton equals 100.

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[Continued.]

The cottons are distinguished botanically as follows :—

1. *G. arboreum*, Linn. Red flowered Indian tree cotton *Deo ban*, *Deo kapas*, *Deo paratti*, *Manua kapas* occurs sporadically as in other tracts.
2. *G. indicum*, Lamk. *Bani*, *Hinganghat cotton*, *Chanda cold weather jari*.
G. indicum, Lamk. var. *mollisoni*, white flowered *bani*.
3. *G. neglectum*, Tod. var. *verum jari*.
G. neglectum, Tod. var. *verum*, sub. var. *malvensum jari*.
G. neglectum, Tod. var. *roseum*, *katil vilayati*, *varhadi*.
G. neglectum, Tod. var. *roseum*, sub. var. *cutchicum*.

(2) The local race of cotton in Khandesh is known as *varhadi* or *Berar* and is said to have come from Malva. Before 1880, it was largely supplanted by two foreign varieties, Hinganghat of two kinds, *bani* and *jari* from the Central Provinces and Dharwar or acclimatized Upland Georgian and New Orleans from the South Mahratta Country. The last still exists as an admixture in Berar and Khandesh.

(3) In Khandesh and the Central Provinces, excepting for the above mentioned mixture, the whole of the crop consists of a variety of forms which are botanically aggregated under the species *G. neglectum* of Todaro. Commercially they come under the head of "Bengals" which prevail over the greater portion of the whole area devoted to cotton which was covered by the Committee in its first tour.

(4) *Malvense* is, in most respects, equal in staple and quality to Broach but fails in this tract on account of its low yield and ginning percentage; *verum*, slightly inferior to the above and failing on the same points; and *roseum*, a white flowered variety, which, although producing a cotton of practically no staple, heads the list by its productiveness, hardness and high ginning percentage. It seems to yield generally about Rs. 15 more profit per acre than any variety of the mixture.

(5) Large seed farms, assisted by certified cultivators, are established at Jalgaon and Akola, and great quantities of seed have already been distributed much to the detriment of the general staple. There are indications of the setting in of a more insistent demand for finer cottons and it would be well for the Agricultural Department if it be prepared in good time to meet this demand. The last two seasons have been characterized by abnormally late rainfall and there is evidence to show that the yellow flowered cotton recovers from this better than the white flowered which appears to be a drought crop while *bani* and the yellow flowered *jari* require a better rainfall. If the seasons continue to be of the character of these prevailing in the last two years, it is possible that the white flowered cottons will fall out of favour.

(6) In the adjoining districts of the Deccan and of the Nizam's Dominions there is the same tendency to abandon the old strains in favour of the white flowered cottons. Along the Godavari valley, *bani* still exists in moderate purity and the bulk of the crop is brought on the spot by millowners.

(7) In the Central Provinces, an acclimatized sort of Upland Georgian called *buri* from Chota Nagpur has been introduced with good results into wilt infested areas. On the eastern side, Mr. Clouston is exploiting the *bhata* soil under irrigation with Cambodia and *roseum*. The value of the former worked put to Rs. 172 per acre and of the latter Rs. 77.

(8) At Sindewahi in the Chanda district, where attention is being paid to the possibility of growing better cotton under irrigation, a very promising cross between *bani* and *deshi* Lahore has been tested, but its yield is still too low. Cambodia, under the same conditions, gave a gross return of Rs. 202 per acre, *roseum* Rs. 122, Sindewahi cross, Rs. 81 and *buri* Rs. 31. Cambodia is a plant manifestly adapted for irrigation and it should always occupy a place in any scheme proposed for growing irrigated cottons. The Sindewahi cross was grown at selected places throughout the "Bengals" area and its valuations in Bombay were as follows :—taking the market price of Fine Broach of the day at 100. In Khandesh, Dhulia at 101.2, Jalgaon at 97.3, in Berar, at Akola, 97.3, in the Central Provinces at Sindewahi at 95.4, in the Panch Mahals at 97.3, in Central India, at Indore, 76.8. It is therefore possible to have a short season cotton which compares favourably with Broach.

(9) To show that the cultivators, for the present are fully justified in their choice of white flowered cotton cultivation, it has been found that *roseum* and *Saugor jari*, both white flowered cottons, give a gross return per acre of Rs. 57, the yellow flowered *Berar jari*, Rs. 41, *bani* Rs. 39, *malvense* Rs. 33 and *verum* Rs. 31. Two Cawnpore selections, K22 and K7, gave Rs. 43 and Rs. 33. *Buri* was worth Rs. 51 per acre.

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Part II.

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(3) The black soil area of Gujarat is therefore capable of producing cotton approximating to Navsari over its whole extent, the *besar* soil, suitable for Wagad, runs it fairly close, and the *goradu* soils in the north would also yield a better style of cotton supposing the present jumble of sorts was replaced by *lallo*, the most valuable of the mixture.

(4) On the Surat farm, four selections have so far proved superior to the local cotton. Thus ordinary Surtee Broach gives a gross return of Rs. 89 per acre, Selection 1 A gives Rs. 106, Selection 111 Rs. 100, and Selection 11 Rs. 98. Taking the average of five years, local cotton has a ginning percentage of 33.2, Selection 1A 36.6; Selection 11, 35.2. Fairly large areas of selected cottons have been sown with the following results. In 1908-09, the growers got Rs. 108 per *bhar* against Rs. 101 for local cotton without any intervention by the Agricultural Department. In 1909-10, cultivators got Rs. 7 per *bhar* more or five per cent in advance of local rates. In 1910-11, it was arranged by a Bombay Syndicate to pay a premium of five per cent. for improved cottons. This arrangement unfortunately fell through. In 1914-15, Mr. Bhimbhai formulated a scheme whereby the cultivator was to benefit in two ways: (1) by getting the advantage of his higher ginning percentage; (2) by receiving a premium on the quality of his clean cotton. The cultivators made an extra profit of 7½ per cent; being three-fifths increase on the lint and two-fifths on higher ginning percentage.

2550. *Experiments with exotic cottons in Gujarat.*—These were carried out at Surat and Nadiad on a very long series of cottons brought from all parts of the world and also from other parts of India. In the black soil area, it soon became clear that only the local variety was suitable while, in the lighter soils, e.g., at Nadiad, a number of American varieties, annual and perennial, gave results which were extremely promising at first but afterwards they failed under the vicissitudes of seasons. The Bourbon cotton had been introduced into this tract many years ago and now again its cultivation is sporadically successful. Mr. Spence boomed it but he had to admit failure in the end. Cambodia did fairly well under irrigation in the Kaira District but the cultivators established the fact that it did not pay them so well as their indigenous *lallo*.

2551. *Cottons of the Southern Mahratta Country.*—*Gossypium herbaceum*, *kumpla* or *jowari hatti*.—The cultivation of this begins at Tasgaon in the Satara District. In the Dharwar District, the prevalent types are *kumpla* and Dharwar-American, and Navsari has been introduced. In Belgaum, Athani, Gokak, etc., are the principal cotton-growing tracts. The cotton produced round Bailhongal is the best in quality in the *kumpla* tract and fetches Rs. 15 to 20 more per *khandi* than the ordinary *kumpla*. In Bijapur, the local variety is very inferior and contains a great deal of broken leaf and dirt and also gins less. In order to ascertain whether the quality of cotton, ginning percentage, etc., have any direct connexion with the condition of the soil a number of soil samples from the representative tracts were taken and samples of cotton were also taken from the same land. The results are tabulated below:—

<i>Kumpla</i> samples.	Ginning percentage.	Valuation.
		Rs.
1. Tasgaon	24.0	277
2. Bhilwadi (Satara)	26.	272
3. Miraj	26.	280
4. Sangli	26.5	285
5. Pachhapur (Belgaum)	25.2	300
6. Huligo (Gadag)	28.	290
6. (a) Dharwar (near Farm)	23.2	..
7. Dharwar	..	280
8. Halgeri (Ranibennur)	28.	270
9. Bijapur	24.8	265

At the Dharwar Farm a few selections of improved *kumpla* have been worked out to field scale. They are of better and more uniform staple than the ordinary *kumpla* and their decidedly higher ginning percentage also appeals to the cultivator.

(2) *Navsari cotton.*—Imported and home grown Navsari seed has been distributed for the past twelve years. The prices realized from 1913-16 by the special class having a ginning percentage of 34 have averaged 20 to 25 per cent. over that of the local cotton and the lowest class with a ginning percentage of 29.5 has averaged about Rs. 20 more. The difficulties in the way of the extension of Broach cotton are:—

- (1) The want of timely rains in the end of June to sow the crop before the middle of July.
- (2) The tendency shown by a number of plants to become barren.

Marketing of the produce is another difficulty which, however, has been overcome by the Departments. From trials on the Dharwar Farm it is proved that fresh seed should be imported every three or four years to maintain the quality and ginning percentage at a proper level.

(3) *Dharwar-American.*—This type is grown late, in tracts which enjoy the advantage of two rainy seasons, the south-west and north-east. The north-east monsoon is absolutely necessary for this type. It is found mixed to a greater or lesser extent with local *kumpla* as well as Cambodia towards Ranibennur. This mixture of Dharwar-American and *kumpla* cannot be treated as fraudulent but must be understood to be a precautionary measure to ensure a crop from at least one of the varieties. In a normal year, Dharwar-American ripens first and the crop is mostly off the ground before the *kumpla* comes in, so that they can be marketed at different times. In 1912-13, I pointed out that the deterioration of Dharwar-American was caused by the mixture of an Upland and New Orleans type. By separate tests, we have proved that the Upland type is far more promising both in outturn, ginning percentage and quality of fibre. The Upland type, on an average,

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gives 50 lb. more *kapas* per acre than the ordinary Dharwar-American mixture, gins three to four per cent. higher and commands Rs. 10 to 15 more per *khandi* of lint. The New Orleans type not only gives a lower percentage (29 per cent.) but it also lags behind in outturn. It is also less resistant to disease and unfavourable seasons.

(4) *Cambodia.*—The *talukas* of Ron and Gadag seem to be the most suitable for this variety and the area is gradually extending. Taking one season with another, however, Dharwar-American is a more certain crop than Cambodia. At last year's sale, Cambodia cotton sold at Rs. 65 to Rs. 100 per *naga* over Dharwar-American.

2552. *Cottons of Madras.*—(1) *Gossypium obtusifolium*, Roxb. var. *nadam*.—Percentage of seed to lint 22.00 to 22.83, staple 0.63 inch. The following is information supplied to me by Mr. H. C. Sampson some years ago regarding this and its admixture Bourbon cotton. "The Bourbon cotton is practically confined to the east of the Coimbatore District, though there is bound to be some extension into the Salem District. Stray plants are sometimes seen in other places. It is reported to be grown to a slight extent in the Nanguneri Taluk, Tinnevely District, where it is supposed to be a remnant of the crops introduced by the American Cotton Planters employed by the East India Company in that District. I have also seen samples of *kapas*, which have seed and lint identical with that of Bourbon obtained from crops grown from seed brought down from the Godavari District. The people who are now growing it, state that this is reported to be the cotton which made the Godavari famous in the past for its muslins. To all intents and purposes, there is, however, only the one tract in which Bourbon cotton is grown, viz., in the east of Coimbatore and, even here, it is seldom seen as a pure crop. It is usually mixed with the cotton called *nadam*, but the proportions of the mixture varies with the soil and this is evident, even in the fields of one village. Where there is *kankar* (nodular lime stone or tufa) in the soil or sub-soil, Bourbon forms a substantial part of the mixture, while, if this is absent *nadam* is practically a pure crop. If there are larger number of pebbles of nodular limestone, Bourbon as a rule largely predominates. Even under these conditions, it is possible to get samples of each variety of cotton practically pure as the bolls burst at different times. Bourbon ripens mainly in November-December and *nadam*, though it bears some cotton all the year round, yields a main crop in December-January, just after the Bourbon. Occasionally if there be rain in April-May, as happened this year (1909), the Bourbon will give a second crop which also, will be practically pure as rain, in sufficient quantity to produce this, is too heavy for the *nadam*, which drops its flowers without forming bolls. The Bourbon as well as *nadam* are both treated as perennial crops without irrigation, the plants being left in the ground for three or four years and sometimes even longer. It can readily be understood that, in such a tract with uncertain, small and widely distributed rainfall and a shallow, loose soil, the crop is often in a very unhealthy condition, making it much more liable to insect attacks. The crops in the tract are all badly attacked by the cotton stem weevil (*Lefroy's* Insect Pests, page 103) which rings the plants. Often every plant in the field is attacked and often in two or three places. The extension of pure Bourbon cotton in its own area as a dry crop is not practicable for the reason that the area suitable is confined to such land which overlies *kankar* also for the reason that a certain amount of *nadam* is necessary as this is the petty cash of the cultivator, who can always pick sufficient of this all the year round to barter in the weekly markets for the necessities of life."

(2) *Gossypium obtusifolium*, Roxb. var. *Coconada*.—Percentage of cotton to seed 23 to 30.4, staple 0.60 inch colour *khaki*. The centre of trade in this cotton is at Guntur. The actual difference between this and *yerrapatti* has never been clearly made out. Mr. Mankad says that in the *yerrapatti* region there is little or no admixture of *herbaceum*. In the Westerns and Northern tracts, *yerrapatti* is only grown in the lighter kinds of soils. The Coconada tract grows only *yerrapatti* in both kinds of soils. It ought to be suggested that the Madras Department of Agriculture should work out the possibilities of the Red Coconada cotton.

(3) *Gossypium arboreum*, Linn.—Red Flowered Indian Tree cotton. There is nothing to show that this exists anywhere as a crop. A long series of samples were received from the Madras Presidency and two distinct varieties were separated by me, (a) var. *platyloba*, with broad lobed leaves and (b) var. *vayans* with *khaki* lint.

(4) *Gossypium herbaceum* Linn. var. *madraspalana*, with fuzzy seeds and var. *melanosperma*, with naked seeds. *Jowari hatti*, Northern, Westerns, *mungari* or *belai upam*, *mundai kai*, Udumalpet Cotton. At Hagari, experiments are in progress with a view to the improvement of Westerns and at Nandyal of Northern. In the Tinnevely District, *upam* is considered to be inferior to *karunganni* with which it exists as a mixture so efforts are being directed to its elimination from the tract.

(5) *Gossypium indicum*, Lamk. *Yerrapatti*, *karungani*.—The first is a cotton of the lighter soils in the Northern tract and the latter is the superior component of the mixture with *upam* in the Tinnevely District. Mr. H. C. Sampson deals fully with the subject of the distribution of *karungani* in his annual report.

(6) *Gossypium hirsutum*, Mill.—Cambodia cotton. Full details are given regarding this in the Madras Department Reports.

(7) Bourbon cotton has already been dealt with in conjunction with (1).

2553. *Cottons of the Nizam's Dominions.*—There is a note on these by Mr. J. H. Burkill in my preliminary paper on cotton, page 24 (1905).

2554. *Cottons of Burma.*—The same gentleman gave me a note on these, page 15.

Mr. G. A. GAMMIE called and examined.

2555. (Mr. Roberts.) I have seen *G. obtusifolium* in Peshawar. I have not seen it actually growing in Multan but have seen samples.

2556. The American cotton work in the Punjab is becoming so very large that I think it would be too much for one man to undertake work on both American and *deshi* cotton. It would be very much better if there were one man for each. I do not think it is absolutely necessary to have a botanist in charge of each. In other Provinces, you must remember that a great deal of cotton work is done by agriculturists. Mr. Houston in the Central Provinces, Mr. Sampson in Madras and Mr. Roberts in the Punjab have all done a lot of work on cotton. The botanical work on cotton is practically completed; all that is wanted is selection. Agriculturists with a certain amount of botanical training can carry on the work. It has been proved that the Deputy Directors of Agriculture are quite competent to do selection work on cotton. Mr. T. F. Main who is now in Sind has done a great deal of such work in Bombay.

2557. As regards the Punjab, my idea would be to test varieties in the south western and western tracts, for example, the various types of Multan cotton, the *indicums* and, in the eastern part of the province,

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the *neglectums* and *indicums*. What a man working on cotton would have to do would be to test the varieties he thinks most suitable for particular tracts. I consider that the separation of the types and testing them is the first thing to be done. These experiments must be carried out on a very large scale. As a rule, experiments are carried out on such a small scale that acreage outturns are not obtainable. I would suggest that a start should be made with large field tests. Very valuable time is wasted by small experiments. Tests should be carried out on nothing less than an acre. I always prescribe an acre as the minimum. Duplication is of course necessary. Selection should come in after the type has been decided upon. You have your types now; all that you have to do is to pick out what you want; suppose you want a short staple cotton with a high outturn or suppose you want a long staple cotton you can pick that out. It has been proved that you can go on improving by selection and that there is no limit to improvement. I would make it general field selection, i.e., hand to hand selection of plants. I think we all agree that very little can be done by crossing but that a great deal can be done by selection. There may be room for crossing but I think there is room only for it if you want something for a special purpose. For the time being, it would be a mistake to waste time on much crossing until the selection work has been carried to some kind of fruition. I think you will get on very much quicker if you confine yourself to one thing at a time.

2558. The impression that I have formed in Sind is that the cultivator is too careless to make a success of exotic cottons. The climate and other conditions are quite suitable and provided that new irrigation works were started, a great deal of land could come under cotton cultivation. There is no doubt whatever that exotic cottons would succeed but it is the cultivator who is against it. The cultivation is not good enough for exotic cotton. The cultivation in Sind is probably the worst and most careless in India. The only way that I can see, in which improvement could take place would be to start cotton plantations as in other parts of the world, i.e., large estates with fully qualified men who could work them as they ought to be worked. If things are left to the Sindhi cultivators cultivating small patches of land, satisfactory results will never be obtained. The giving out of large estates which can be cultivated with steam tackle is absolutely essential to any improvement. The Punjabis make good cultivators. The Gwalior State has found that the Punjabi cultivator is much better than its own. My personal opinion is that the Sindhi cultivators would do more cultivation if they could get more water. At present only 33 per cent. of the land is cultivated and the remainder simply lies fallow in a dirty condition. I did not follow the trials of American or Egyptian cotton in Sind very closely because they were never actually referred to me. I have not been following Sind conditions very closely but I believe that Punjab and Sind are tracts for long staple cotton in the future. Provided the Rohri Hyderabad Canal materialises, work on exotic cotton should be considered the most important part of the work in Sind. There is no other cotton there worth bothering about. The indigenous cotton can be left to look after itself. I should certainly have everything in readiness so as to be able to put out exotic cotton when the perennial canal system is developed. I would advocate starting experiments now so that the Department may be in a position to give definite advice when the time comes. If farms were started under pumping installations, the problems of perennial irrigation could be worked out. As far as the Sind indigenous cotton is concerned, I do not think that any mixture in it matters. All the cottons in it are all equally bad and all equally coarse. The work that the Department was doing as regards the issue of the seed of Bhitshah cotton was quite feasible and sound. Work of that kind in order to keep the cultivators in touch with crop improvements is quite sound. The cultivator must be trained to understand the necessity of growing pure types because after all it must be remembered at his present stage of knowledge that he grows cotton as cotton. The work on indigenous cottons in Sind should be of a similar nature to that in the Punjab.

2559. I have not seen samples of Triumph American. The samples of 4 F. Punjab American usually come to me for valuation. I consider 4 F. a very much better cotton than Berar cotton i.e., Khamgaon. Akola. If, at the present time, it is fetching very little more than the Berar cottons, there is something wrong because it ought to fetch a very great deal more. That is the opinion that I have heard in Bombay. It is worth very much more. Messrs. Tata have tested it in their mills and according to them it is practically equal to "Middling American" and ought to fetch more than the Berar cotton.

2560. As I have already mentioned, experiments with American should be started in Sind so that something definite may be known by the time the new canal systems are opened. As a general rule, I think that work on exotic and indigenous cottons should be supervised by different men. That applies to the Punjab and Sind and perhaps to the United Provinces.

2561. Work in Central India should proceed on similar lines to those in the Punjab and Sind. The Malwa plateau in Central India is capable of turning out a very high quality of cotton. The reason why that cotton does not get a better price is because it must get very badly mixed on its way down. Actually in the fields *malvense* is one of the finest cottons in India. The Central India people ought to be warned not to introduce anything else in the Malwa plateau. I notice that in some of the evidence before the Committee the introduction of an outside cotton there has been thought of. A cotton from outside will not be of any use there. I would get them back to the pure *malvense* and they must see that it actually comes into the market pure. I cannot understand why it is valued so low in the market. It must be very badly mixed. In tracts in Central India other than the Malwa plateau, the work should be exactly similar to that in the Central Provinces because the Nimari tracts are adjacent to the Central Provinces.

2562. The fields of pure American cotton which the Committee has seen in Central India are a survival of the introduction of American cotton into the Central Provinces and Berar about sixty years ago. American cotton has persisted in the fields ever since throughout the whole of the Central Provinces and Central India and I do not think it would be possible to find a single field without a mixture of Upland in it. I think the reason why in some places in the Central Provinces especially in the west, they get a higher value for the cotton than in the east is simply because there is a big proportion of Upland cotton mixed with it. At Berhampur near Khandwa and towards Khandwa, I have seen fields of almost pure Upland. I do not think that this tract is it all suitable for American cotton, and would not advise its introduction. It has been tried and failed. I do not think it is worth considering among the suitable cottons. The seasons are not quite certain. If a fairly late rain could be depended on it would be quite all right but it cannot. For instance the last two years were quite suitable and there is a good deal of Upland in the fields just now.

2563. On the question of rain generally, I would not consider the American type of plant more resistant to continuous rain than ordinary *neglectums* or *indicums*. It will stand heavy rainfall for a short time provided it has germinated and is say about three inches to four inches above the surface of the ground. If heavy rain falls in the flowering period it loses its flowers and bolls. If a cotton of that character is wanted to stand heavy rainfall, it would be better to try Cambodia and *huri*.

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2564. If anything at all is to be done in Central India, there must be a strong department of agriculture. Central India particularly requires a strong Agricultural Department. The difficulty is that it is divided into several States.

2565. They grow an excellent quality of cotton in Malwa and my impression was that the opium lands could be very easily utilized for the cultivation of Cambodia cotton. I have advocated experiments with Cambodia but I am not quite certain whether my advice has been carried out or not. The agriculture in the Malwa plateau is extremely good; people have been used to growing good crops such as opium. There is not very much that you can teach them beyond keeping their varieties pure.

2566. There is far too much overlapping in the United Provinces. There have been three men working on cotton. If they accepted my recommendations, they would only require two, one for American cotton and one for indigenous. There is not only overlapping but there is a certain amount of independent work. One man does not know what the others are doing. The position is very bad. I am not sanguine about the possibilities of success of American cotton in the United Provinces. It has been tried for a good many years. I know the United Provinces very well. Numbers of people have told me that the objection to the American cotton there is that it falls off so rapidly in yield and that there is difficulty in getting the proper price for it. I do not think the conditions in the United Provinces are so favourable as they are in the Punjab and Sind. But if the work were only properly organized and properly carried out, we should be in a better position to judge. One man works on Cawnpore American, another says that *huri* is worth trying while the third is trying to evolve something new and strange in the way of indigenous cotton. The spread of *roseum* in the United Provinces is a danger. As regards Aligarh white flower, I think the cultivators themselves are taking it up and that it is rather difficult to go against them. Our only hope is that the last two bad seasons we have had may have destroyed the cultivator's faith in white flowered cottons. They are not so resistant to heavy rain as the yellow flowered. So that they may go out automatically. A great number of the cultivators object to the white flowered cotton on that account. It would certainly be a very sound policy for the Agricultural Department to satisfy itself that a short staple cotton of this kind is the most profitable for a particular tract before allowing it to be distributed. At present we find if a short staple like *roseum* proves successful in one part, the tendency is to spread it indiscriminately all over the place. Mr. Leake's work is of very high scientific value apart from any agricultural results. He has really found many of the principles that underlie the production of cotton. As regards the Aligarh white flowered cotton, I would give rather strong advice. I certainly think that it is not the duty of the Agricultural Department to encourage the spread of a cotton like that which is little better than rubbish. I am dead against such a course myself. If the cultivators want it let them get it for themselves. I do not see why the Agricultural Department should help them.

2567. The same general remarks apply to the Central Provinces and to the work there. I think I pointed out in my last year's report that it is high time that the Agricultural Department should bestow more attention on the spread of finer varieties. They are doing absolutely nothing. At present the cultivators are insisting on getting *roseum*. They can get it for themselves. I do not see why the Department should supply it. I feel very strongly in regard to that. I think the real function of the Department is to try to improve the better cottons and not to play about with these inferior ones. The suggestion that I made to the Central Provinces was that in the new tracts that they were going to open out for cotton, they ought carefully to exclude the white flowered altogether. They ought not even to experiment with it. I would not allow the introduction of white flowered cotton. As to the argument that the Department would be open to the attack that even though the cotton was profitable to the cultivator, they did not introduce it, I think if the trade knew that there was a large tract in the Central Provinces a long way from the ordinary cotton growing tract which would produce a very fine quality of cotton, it would probably pay a good deal more for it. If there were no other type grown in that tract, there would be more chance of the cultivator getting a better price, for large quantities of superior cotton. I certainly do not recommend their keeping the present mixture in the Central Provinces. My contention is that they ought to pay more attention to the high class varieties than they are doing. They should try to get something out of them better than the present mixture. The possibilities of growing pure lines of long staple cotton in the Central Provinces have not been thoroughly worked out. They have been lost sight of.

2568. This year the difference in price between the finer and coarser varieties is considerable. The difference in price between long and short staple cotton is increasing in favour of the long staple. I do not think that *neglectum roseum* cotton in Khandesh gives a better price to the cultivator after it is ginned than he would get for the ordinary mixture. I have had samples of both valued every year in Bombay. The cotton from yellow flowered varieties is always valued at higher prices than the cotton from the white flowered varieties. The Department ought always to go on the valuation on the basis of staple which are made in Bombay. The Bombay people would be quite willing to pay the price at which the cotton is valued if they could get the cotton in sufficient quantity and in a pure state.

2569. The wilt question is very serious in certain parts of the Central Provinces. I think wilt has been very bad for a number of years. It has died out in the Deccan. Dr. Butler has never been able to give any satisfactory explanation of wilt. My own belief is that it is due to continuous cropping with cotton. In some cases in the Central Provinces, in Khandesh and in Gujarat, the cultivators grow cotton seven or eight years successively. That is an unnatural system.

2570. I have seen Cambodia in *bhata* soils at Chandkuri and consider it is very promising. The Sindewahi cross is also very promising. It has the advantage that it differs in no way from ordinary *neglectums*. It has the same habit and period of growth. The Bombay people seem to consider it about equal to fine Broach. It could replace the whole of the mixture if one wanted it to. I have tried it in several parts of the *neglectum* area and have found that it does equally well in all. Apart from the Sindewahi cross, there is not much in the Central Provinces to fall back upon. The Sindewahi cross beats *malvense* in ginning percentage by about six per cent. The ginning percentage of *malvense* is about 32 and that of the Sindewahi cross 38. Still *malvense* if it were improved by selection might have as good a ginning percentage.

2571. I consider that there should be much more work done on testing the finer varieties of cotton in the Central Provinces. Quite enough work has been done in the case of the coarser varieties. I should think that a very large staff would be wanted in the Central Provinces for work on cotton because there is an enormous area under cotton. A quarter of the cotton crop of India is grown in the Central Provinces. The work is far too big for one man to run. A man like Mr. Clouston who has worked on cotton for such a number of years could supervise the whole thing but he would require a big staff under him to go into the question of testing and selection work on a large scale.

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2572. I do not see that the cultivators would suffer particularly in the Central Provinces by the substitution of long staple cotton for short staple, because after all there are only about 200,000 acres at present under white flowered cotton and the total area under cotton is about five million acres. *Roseum* is very seldom grown pure. There has been a tendency for the margin between *roseum* and Broach to widen in favour of Broach. *Roseum* had not been spreading as quickly as one might expect because a number of cultivators do not believe in it. It all depends on the character of the season whether white flowered cotton is going to be successful. If there are late rains it is spoilt and does not recover. The yellow flowered cottons do recover. Very few of the cultivators care to grow white flowered cotton absolutely pure on that account. They are not certain of it. I have talked to numbers of cultivators in the Deccan. They all tell me the same thing. They are not at all certain of the white flowered cotton and the yellow flowered undoubtedly stands late rain better. The white flowered cotton at Jalgaon this year has been absolutely wiped out.

2573. (Mr. Wadia.) It is the peculiarity of American cotton in India that the first and second pickings are better than the third. The second picking is the best, the first is good and the third and later pickings are bad. That is the case with Dharwar American. The first and second pickings of Dharwar American are always kept separate from the later pickings by careful people. Mixed staple will, of course, be due to the pickings being mixed. The later pickings ought to be kept separate from the first pickings. Mixed staple in the Punjab is also due to the great admixture of varieties there was years ago when they first introduced American cotton. It would pay the Punjab people to buy up the whole of the American seed and make a fresh start with their own seed.

2574. The Central Provinces people are determined to extend the cultivation of *roseum* as much as possible. As I have said, they ought to confine themselves to Cambodia on the new areas in the east of the Provinces. It is my opinion that it is profitable to grow Cambodia in those areas. This year I am supplying about 5,000 lbs. of seed so that the thing can be thoroughly tested. Mr. Clouston is putting down a thousand acres.

2575. The millowners send buyers to Hyderabad because they cannot get pure cotton in Bombay. One point which the Committee ought to emphasize is that practically no experiments have been conducted on *bani*. The greater part of it grows in the Nizam's Dominions outside British territory and it is rather difficult to suggest what should be done. I have been told that, during the last ten years, the *bani* crop in the Nizam's Dominions has deteriorated. They are taking Khandesh cotton seed right down the Godavari Valley Railway from Manmad.

2576. I have always understood that the evil of mixing is caused by the mixture of seed cotton. The seed cotton is mixed before it is ginned and therefore the resulting seed that is given to the cultivator is mixed also and that causes the trouble. The policy of the Agricultural Department should be to give out nothing but pure seed in the various provinces. They are doing that now as far as they are able. I would advocate the extension of seed farms and of seed unions on the lines of Berar seed unions for the longer stapled varieties too. I would also recommend the employment of what are called registered growers; i.e., people who are willing to grow cotton under Departmental supervision. That is the only way in which seed can be produced in sufficiently large quantities.

2577. Hinganghat cotton has been ousted by the yellow and white flowered *neglectum* cottons in the Central Provinces because the yield of those varieties is very much greater as well as the ginning percentage, and the merchants will not give the cultivator Hinganghat prices for the Hinganghat cotton. The cultivator always gets the market rate for the cotton in the local market no matter what it is. These white flowered and yellow flowered *neglectums* are whiter in colour than Hinganghat. That is why they are mixed in the darker varieties—*bani* and *buri*—in order to improve the colour. That is for the Bombay market where so much stress is laid on the colour of cotton. In my opinion, it is possible that if white flowered cotton such as *roseum* were marketed separately and not mixed, there would be such a plethora of short staple cotton that its price would fall materially. That is happening now. As a matter of policy, I do not think that the Agricultural Department is doing right in giving out the seed of *roseum* and other short staple varieties. The Agricultural Department could quite easily spread the seed of *sanguineum*, *bani*, *malvense* and *verum* by means of exactly the same organization which is spreading short staple cotton. The Department should take steps to have seed ready when the demand for better cottons springs up. That is where I say that the Department is making a mistake. My view of the matter is that where new cottons are under experiment the Department should conduct auctions and assist the cultivators in every sort of way in order to bring the cotton direct to the notice of the trade. If the cultivators are allowed to bring cotton to the markets indiscriminately, they simply get the local price and the trade perhaps never really knows that these cottons are in existence. It is necessary that a new crop of that nature should be fostered by Government until the trade gets quite accustomed to it and then it can stand on its own merits.

2578. (Mr. Hodgkinson.) As regards the impression at home that one of the chief reasons why long staple cotton does not do well in India is that they gradually in the course of time develop the characteristics of the local cotton, that only happens in tracts which are not suitable for them. It is not so in the Punjab. In the Southern Mahratta country, where Dharwar American has been acclimatized for a great number of years, it certainly has not deteriorated. American cotton will deteriorate in India if it is grown on soil which is not suitable for growing cotton. That applies to all types. The fact of the matter is that there are only two types of exotic cottons which succeed in India—the Upland Georgian and New Orleans. I look upon Cambodia and *buri* as Upland Georgian. Dharwar American is a mixture of the two. I recommend long staple American cottons for tracts which are suitable for them. As far as I know the only tracts suitable in India are the Punjab, Sind, perhaps some parts of the United Provinces and some parts of the Central Provinces.

2579. I do not think that we shall get any good results from hybridization. Plants have organs which represent male and female organs. For hybridization, pollen has to be brought from the anthers of one flower to the stigmas of another and the resulting progeny is supposed to be intermediate between the two. If you cross a horse and an ass, you get a mule. We cannot hybridize Indian cotton and American cotton because they belong to two different species. We can cross one Indian cotton with another because they belong to the same species. My impression that what is wanted in England is something like "Middling American" with a staple of say about an inch. Some of our Indian cottons by selection would give staple of an inch at once. It is possible by selection to bring cotton of three quarters of an inch in staple on an average up to one inch. If the bulk of the cotton gives an average staple of three-quarters of an inch, some of it must have a longer staple than three-quarters of an inch and therefore by selection it is possible to get up to one inch. Some of our Indian cottons give you practically an inch now. By selecting the cotton

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and supervising the growers it is possible to get up to one inch. In my written evidence, I have mentioned Peruvian cotton in the Punjab but there is very little of it.

2580. (Mr. Roberts.) In the Punjab, you must begin all over from the beginning because several people have complained to me that the mixture in Punjab American is due to the seed which was introduced several years ago. The people introduced it on their own account. Things will come right in time of course. It is a good thing to remember that there is a feeling in the trade that the Punjab American cotton is mixed. If that feeling could be removed, the trade would probably have greater confidence in the cotton. It would make a great difference if the trade were to realize that the whole of the cotton area is grown from the same seed.

2581. As regards Bombay, *lalia* is nearest to the Broach cotton. It is the indigenous species of North Gujarat and Kathiawar which was practically swept away in the famine year of 1899-1900. It was after that that *mathio* was brought in from Khandesh and Berar. It has become acclimatized in Kathiawar and has developed larger leaves. *Wagad* and *lalia* are the two indigenous species now left in North Gujarat and they ought both to be tested. They should be both botanically tested and agriculturally tested to see whether they can be improved and whether improved strains can be developed from them. The different strains in them have not been isolated. If improved strains could be isolated, they will replace *mathio* in the whole of northern Gujarat and Kathiawar. I would most certainly try to restore Broach to its original character and to confine *goghari* to just one corner of the Broach district. It grows on a peculiar soil in Jambusar and Amod on which Broach does not grow properly. There one could not interfere with it. It should be replaced in Broach where it is interfering with the name of Broach. I would introduce fresh seed from the Surat farm into the other parts of the Broach tract where *goghari* is at present grown. If the cultivator is determined to grow *goghari* cotton, there is nothing which could stop him. No law would stop him. I have questioned a number of people on the subject and think that the actual profit on *goghari* works out at Rs. 3 an acre more than from Broach. *Goghari* has a heavier ginning percentage and is a heavier cropper. If *goghari* were marketed separately and not mixed with Broach, it might get a lower price but still the ginning percentage and the extra cropping would give it an advantage though perhaps not to the extent of Rs. 3. The margin just now is very narrow. I have never made any calculation as to what difference in price would be necessary between Broach and *goghari* to make the cultivation of Broach profitable. For purposes of staff, I would recommend that Gujarat be divided into two tracts: North Gujarat which produces *Dholleras* cotton should have a staff of its own and South Gujarat which produces Broach cottons should have a staff of its own. By staff I mean a Deputy Director of Agriculture and a botanist with the necessary assistants. In the *Dholleras* tract, they would have to work on two distinct types—*wagad* and *lalia*, if not more. In South Gujarat, the difference between the cottons are so very slight that very careful study would be required. North and South Gujarat are two distinct tracts. They do not differ only in regard to cotton but also in regard to other crops. In the south you have *juar* as a rotation with cotton whereas in the north you have *bajra*. The whole of the work on cotton comes on at the same time and therefore two botanists are required. One man could not do the work in the north and the south at the same time. The botanist would have to develop the types and the Deputy Directors take them in hand, arrange about seed distribution, testing on a large scale, marketing, etc. The botanist's duty will be to prepare the types for the Deputy Directors.

2582. As regards the Southern Mahratta country, I think that the Department might reasonably drop Cambodia as it does not seem suitable for the tract. I think that the experiments with American cotton should be continued especially with the Upland type. I consider that for the last few years the interests of Upland have been sacrificed to those of Cambodia. At one time it was much the same in regard to *kumpla* and Broach but that is not the case now. The Department has now taken up *kumpla* strongly and is not now actually experimenting on Broach. The outside staff is partly employed on it but it will never be a big thing and I do not think it is worth while going on with it. It is too small. *Kumpla* is the big thing. There ought to be two botanists in the Southern Mahratta country, one to work on the indigenous *kumpla* and the other to work on Upland. Bijapur cotton really comes under Westerns. It is not considered *kumpla* in the market. The aim of the Department is to bring Bijapur in the *Kumpla* area. The trade does not recognize Bijapur cotton as *kumpla* as the staple is not so good, but it is our aim that it should. Two distinct centres are necessary, because the *kumpla* work would have to be conducted at Dharwar and the Upland work at Gadag. The best *kumplas* grow in the Belgaum district at Bailhongal. The cotton from Miraj which is a small Native State is also very good. I do not quite know how we could interfere very much with that. It would all depend on the State authorities. The Dharwar farm might remain as a centre for the *kumpla* works.

2583. As to *Westerns* and *Northerns* in Madras, the present centre is at Hagari. I consider that the work is being carried out on proper lines and should be continued on the same lines. Introductions from Broach and *kumpla* do not seem to be particularly successful there. The indigenous cottons are the best. There does not seem to be much chance of the introduction of Broach there. I would recommend a botanist for *Northerns*, one for *Westerns* and one for Coconadas. A botanist should always be associated with a Deputy Director. I would not like to commit myself, but my argument is that a Deputy Director should always have a botanist associated with him. If there are seven Deputy Directors in Madras, there should be seven botanists. I do not advocate Deputy Directors specially for cotton anywhere. If a Deputy Director for instance is established in the northern part of Gujarat, I do not say that he should confine himself entirely to work on cotton. If the *Northerns* and *Westerns* tracts came under one Deputy Director of Agriculture I think even in that case it would pay to have two botanists, one for each variety. The season for both is the same and I do not see how you can expect one man to work in two places. By botanist I mean a man who is capable of carrying on botanical work—not necessarily a professional botanist. It would be better if he were a man practised in plant breeding, etc. If the man in charge is a good man and if he fulfils these conditions, let him stay there. I strongly recommend that the Coconada tract should be developed. It has never been properly tested so far.

2584. Taking the whole of Madras, Cambodia is far and away the most important crop. I would advocate its being taken up separately. I have always advocated that exotic cottons should be taken up separately in each Province. Coimbatore would be a good centre for work on Cambodia.

2585. In regard to the Tinnevely and Salems tract, it seems to me that the Salems tract deserves a staff of its own because there are great possibilities for Bourbon cotton there. It used to suffer from insect pests but now that there are trained entomologists to keep insects in check, it might be possible to do something with it but I think it will give more trouble. *Uppam* is the main constituent of "Salems" and of the Tinnies, except in the *karunganni* tract, *Uppam* requires a good deal of investigation as

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[Continued.]

some people consider that *upham* after all is more certain than *karunganni* and some people say that it is quite as good as *karunganni*. For the southern tract the same staff would be wanted as for the other tracts. I do not know how the work is to be co-ordinated in the tract. If it were considered worth while there might be a botanist working on *upham* and the other on *karunganni*. These varieties seem to be important enough to have a man working on each. Cambodia also requires a man. That would mean three botanists in the south of India.

2586. (Mr. Hodgkinson.) I do not agree with the view that it is advantageous for many reasons to work both on *deshi* and American cotton together. I am strongly opposed to the idea of growing indigenous and American cotton together on the same farm. It is very important that there should be a separate farm for each. If crossing is feared, I do not see how it can be prevented by any amount of interstripping. It is better to grow different varieties on separate farms. In the case of indigenous cottons, the first thing that one has to do is to find out which is the most favourable tract for a particular strain and then to establish a farm there. *Indicum* is the commonest type in the east Punjab. That points to the necessity of having farms to test those cottons in the east of the Punjab. Then we get the red flowered annual cottons in the west of the Punjab and they ought to be tested in that locality where they are the commonest types. It is not fair to test all these varieties in one spot, whether that spot happens to be suitable or not.

2587. As to the possibility of Indian cottons replacing American cottons for Lancashire, such a possibility only exists in a very few tracts in India. There are the irrigated tracts of the Punjab; there is Sind; in the Southern Mahratta country, you may get Upland in time, in the Madras Presidency there is Cambodia and you may have Cambodia in the Central Provinces under irrigation but that is still a doubtful point. I have no faith in the chances of American cotton in the United Provinces. It has been tried for years and years but the cultivators have never taken it up. There seem to be practical difficulties in the way; the climate does not suit it. As to indigenous cotton, South Gujarat might give Indian cotton suitable for Lancashire such as Surat and Navsari cotton and so might the *kumpla* area in the Southern Mahratta country and the Tinnevely area in Southern Madras. I do not know about Northern and Westerns: I am rather doubtful about them. There is also the *bani* of the northern part of the Nizam's Dominions. Hinganghat is practically moribund. It is scarcely worth mentioning. I cannot remember any other tracts. It is quite possible to increase the length of the staple of all the cottons I have mentioned so as to bring them up to an inch. Generally speaking, that would be about the maximum. If you increase the staple beyond the natural point, the ginning percentage would suffer. It would not make any appreciable difference to the growing period. Cotton of $1\frac{1}{2}$ inch in staple is the best that could be produced in India in commercial quantities. I do not think there is any hope of increasing the staple beyond that in present conditions. I am talking of the country as it is now. Sind would have to be tested later on. I could not give any idea as to the total quantity which could be produced in the tracts I have mentioned. Mr. Roberts and I are working it out by provinces. At present I have made an estimate of roughly half a million bales of cotton of seven-eighths inch and over in staple and a million bales of over six-eighths inch in staple. 25 per cent of the total yield would be over six-eighths inch in staple.

2588. If it paid the cultivators throughout the whole of the cotton tracts in India, they could produce a very much finer quality of cotton than they do now. They are selecting the worst at present but it would be just as easy to select the best. Under the present system of cultivation, the yield would be lower. In regard to possibilities of an increase in the yield per acre, I am of opinion that by sowing in lines, by interculture and by various methods of improved cultivation the crop in India could be doubled on its present acreage. The reason why the outturn is so low is that the crop has no proper cultivation. There must be proper preparation of the ground by ploughs. Land at present is often not ploughed every year. It is only harrowed. In some parts ploughing is very much better than it used to be owing to the use of iron ploughs. Then of course sowing by drills is better than the broad-cast system. What we still have to get in India is a drill which will automatically drop the seed at proper distances. At present as the result of sowing by hand some parts are thickly oversown, others undersown and others are left blank altogether. Then, of course, if plants are in lines, the crop can be intercultured two or three times in the season to keep the weeds down. Manure is a very necessary thing but it is very difficult for the ordinary villager to obtain the amount of manure that he would like to put into the ground. The production of cotton could be doubled without any system of manure.

2589. (Mr. Wadia.) As to the staff required for the Punjab, my idea is that ultimately each district in the province should have its own agriculturist. There are 21 districts in the Punjab and I think it ought to have 21 Deputy Directors. I should think that it will ultimately come to that. I should be inclined to recommend that for the present each province should have a staff for each distinct agricultural tract. In the Punjab there are at least three distinct cotton tracts, the irrigated tract, the eastern tract, and the western tract. At the present moment what I would recommend would be a Deputy Director for each agricultural tract, with a botanist and, of course, the necessary establishment. I am only talking of cotton. I would divide the irrigated tract into two parts, with a Deputy Director and a botanist for each. That would mean four Deputy Directors in all, i.e., two Deputy Directors and three botanists extra. In the United Provinces, there are only three Deputy Directors at present and practically only one botanist who is engaged in work at the College. Bundelkhand is a distinct tract and then there are an eastern tract, a western tract and the Cawnpore American tract. One Deputy Director and one botanist would be required for each of those tracts so that three more botanists would be required. In the Central Provinces, there are already three Deputy Directors and three Assistant Directors. I think the present sanctioned staff is sufficient. The work in Chhattisgarh ought to be developed as there is a strong possibility that it might become producer of good staple cotton. One botanist would be wanted for Chhattisgarh, one for the country round Nagpur and for Berar and one for Hinganghat. Another would be wanted for the northern districts for work on wheat as well as on cotton. The Central Provinces could easily find work for four botanists. In Bombay proper, there are only two Deputy Directors at present; one is in charge of the whole of Gujarat and Khandesh and part of the Deccan and the other is in charge of the Southern Mahratta country and the rest of Deccan. I consider that Gujarat should have two Deputy Directors, Khandesh and the Deccan one, the Southern Mahratta country one, and the Konkan one. That would be five in all or three in addition to the two already sanctioned. On reconsideration, I do not see how the Southern Mahratta country could be divided for botanical purposes as the *kumpla* and Dharwar American tracts are so intermingled. I would therefore propose five botanists altogether. There are two botanists now but neither of them is working on cotton. The educational staff ought to be quite separate. My proposals are for the district staff. Sind is absolutely different from the Bombay Presidency proper, the problems are different and the conditions of the country are different. I would recommend a

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separate Director for Sind and two Deputy Directors—one for the north and the other for the south though it is difficult to divide the country up until the irrigation schemes are matured. In accordance with my other recommendations, I should say that there ought to be two botanists in Sind, one for exotic cottons and the other for indigenous. In Madras there are at present three Deputy Directors. Seven have been sanctioned. There are five cotton tracts and two in which no cotton is grown. I would therefore recommend seven botanists—five specially for cotton. In the North-West Frontier Province, I should think there is a fairly big cotton crop. I would have one botanist who could work on fruit as well. Bengal, Bihar and Orissa and Assam are not cotton tracts. Burma is an unknown country to me. At present they have only an Assistant Botanist, a man who was trained at Poona. I have seen some of his writings, and he strikes me as fairly capable. My total recommendations therefore are eight extra Deputy Directors over and above the nine parts already sanctioned but not yet filled up and 24 botanists altogether. I think a botanist could probably serve several districts. He would not have to travel about so much as Deputy Directors. A scientific man usually requires good pay to give him a chance of doing any work at all. They ought to start with a good deal more than Rs. 400. I would recommend that they should begin at the same rate as other Departments. They would probably come for Rs. 500 rising to 1,500 in fifteen years. That should be held out as the minimum. As far as I can make out, men on lower terms will not be got. Deputy Directors, if they prove fit, should be eligible for the position of Directors after ten years.

2590. In regard to demonstration the only way in which the Department has been overcoming the difficulty is by carrying out demonstration work on fields either hired or lent by cultivators so that the demonstration can be carried out on the cultivators' own land. I do not think that there is such a thing as an actual demonstration farm in the whole of India. Experimental farms as a rule are required to fulfil the double purpose of research and demonstration. The Committee might recommend that demonstration farms purely for demonstration work should be started separate from and distinct from farms for research. Demonstration farms should be run on business lines so that the cultivator can see for himself whether a process pays or not. The total expenditure on the staff, on cultivation, ploughs, bullocks and other things and all outgoings should be recorded on one side and the proceeds recorded on the other. But after all, the best way to demonstrate the superiority of a new crop is to grow it on the cultivators' own fields. Then he can watch the whole thing from beginning to end. Government should guarantee compensation to the cultivator against loss. That is absolutely necessary.

2591. On the whole, the Agricultural Department should not waste effort in experimenting with low qualities of cotton. If the cultivators insist on growing these lower grades, it is the duty of the Department to see that he grows cotton which is at any rate pure. Personally I think that the Agricultural Department has done quite enough for low grades of cotton and that it should be brought back to its proper functions which are to encourage better ones. The staff should be there to improve the quality of cotton and not to depreciate it.

2592. It should be understood that the staff I have recommended should be entirely separate from the staff of the Colleges. The teaching staff should be entirely distinct from the district staff. That ought to be definitely laid down. I do not know whether in time, say ten or fifteen years hence, it will be possible to create an Indian staff for the Department of Agriculture. I consider that the present system is the best for developing an Indian staff. Quite a number of men pass through the Colleges and a selection can be made from amongst these. I would not advocate any more Colleges. I think we have quite a sufficient number of them. It might be an advantage to reduce the number. I would not suggest any change in the course of teaching. I think it is just as good as it can be made. The present idea is that after the student passes through his course, he should be allowed to go through a post graduate course in any subject on which he wishes to specialize. By the end of the probationary period, the Department should be in a position to say whether he is worth keeping on or not. After two or three years' training under a senior officer, he should be fit for a subordinate position such as that of an Assistant Agriculturist or Assistant Botanist and then according to his merits he should be allowed to rise to any post in the Department. He should be allowed to rise to the post of Director of Agriculture if he is fit for it.

2593. An Entomologist should be put on work on a stemborer. Cambodia should not be allowed to stand on the ground from one year to another. That is obvious.

2594. I have said that the yield could be doubled. That is a slight exaggeration but it approximates to the truth. That has been my experience in several parts of India.

2595. (Mr. Hodgkinson.) If it is necessary that the cotton for hosiery purposes should be soft and clean, the use of the word "clean" might rule out most of the Indian cottons at once. As far as I can say, provided the cotton is picked clean, Navasari and Surat cotton, the Southern Mahratta country cotton and most of the Madras cottons would be suitable. The Assam cotton has always been used for mixing with wool and would be too coarse for hosiery. The staple of the Comilla and Garo Hills cotton runs to about three-quarters of an inch. I have picked samples of Garo Hills cotton fully an inch in staple. It is mostly exported to Austria and Germany to be used for mixing with wool.

Dr. E. J. BUTLER, Imperial Mycologist, Pusa.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

2596. *Fungus diseases of cotton in India.*—The cotton crop in India suffers relatively little from fungus diseases. It is practically free from the anthracnose, which does much damage in the United States and elsewhere: the boll rots (except those due to insects) are much less severe than in most other countries, there are no important leaf diseases and there is only one serious root disease certainly due to a parasite—the wilt.

2597. *The Indian cotton wilt.*—The Indian cotton wilt is caused by a hitherto undescribed species of *Fusarium*, allied to but distinct from *Fusarium vasinfectum*, the cause of the cotton wilt of America. It occurs in an area extending from the Berars, through Khandesh, to the Southern Mahratta country. It is not known in the Punjab, Sind, North Bombay, Madras or Mysore, though it is probable that extension is going on from Dharwar in a southerly direction. The worst attacks have been reported from the Berars and it is likely that extension has taken place from a centre in that area. Khandesh is less affected, and Dharwar still less. At the latter place I was informed by a competent observer (Rai Sahib Kulkarni) that there has been a decided increase in the disease of late years and this suggests that extension is still going on. Rela-

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tively little loss is caused so long as the percentage of deaths is low, as the neighbouring plants fill the gaps by branching, but the yield begins to be affected as soon as the deaths approach ten per cent, and above this figure no amount of branching will replace the lost plants. In the Berars, total loss of a field can sometimes be seen and patches twenty to thirty yards broad are common. In Khandesh, I found few bare patches but many fields where the deaths approached ten per cent. In Dharwar, on the other hand, anything above one per cent was rare in 1912.

(2) The increase in the disease reported from several localities in the last ten years may be due to progressive extension, which would imply that it is a comparatively new disease, or may be due to the fact that a long period of high prices has led to cotton following cotton too often on the same land. The fungus is a soil dweller and can remain in the absence of cotton (it is not known to attack any other plant) for at least three years, but a good deal of it probably dies out after the first year. Hence rotation is all-important in checking it. But I found in 1912 that there were parts of Khandesh where sixty per cent of the cultivated land was under cotton and hence there must have been many fields in which cotton followed cotton. Under such conditions a rapid increase in severity would occur.

(3) Besides rotation, no other method of fighting wilt is known except the growth of resistant varieties. In America a good many wilt-resisters have been developed, mostly by single plant selection; and much land which was being abandoned for cotton growing is again carrying the crop. In India, there is every hope that the same measures will succeed, since we have already found, in *buri*, a cotton which is entirely immune to the disease. This discovery is due to Mr. Clouston, who has successfully introduced *buri* in some wilt-infested areas. The other broad-leaved constituents of the *jari* mixture also show some slight degree of resistance as compared with the *neglectums*, but Broach and Cambodia both seemed liable to wilt at Dharwar.

(4) *Buri* will not compete with Broach or Cambodia in Dharwar and is not ordinarily a profitable variety to grow in the Berars, except where wilt is really severe. Hence I am strongly of opinion that great pains should be taken to improve this variety. It is probable that wilt is increasing, especially in Khandesh, to the point where it will be necessary to take active measures. In *buri* we have (what is practically unknown in other parts of the world) a cotton which appears to be wholly immune to wilt, and since immunity in allied cases has been shown to be a germ-character, it should be possible by modern methods of plant-breeding to improve the yield and lint characters while retaining the resistance to disease.

(5) In areas liable to wilt, I consider that the production of wilt-resisters on the above lines should be a prominent feature of the cotton work of the Agricultural Department.

2598. *Root rot of cotton*.—A second root disease of cotton, liable to be confused with wilt, is the root rot found in the Punjab and Northern Bombay. Its cause is unknown, but it is probably not directly due to a parasite but results from some unfavourable soil conditions. There is no evidence that it is increasing, it occurs usually on the same patches of land year after year and it is not a disease which need cause anxiety for the future. It is being investigated in collaboration with the Punjab Department and is probably a problem of local soil improvement.

Mr. T. BAINBRIGGE FLETCHER, Imperial Entomologist, Pusa.

THIS WITNESS WAS NOT ORALLY EXAMINED.

Written statement.

2599. *Preamble*.—A resumé of our knowledge of the Insect Pests affecting cotton and other Malvaceous plants in India is contained in pages 98—132 of the recently published "Proceedings of the Second Entomological Meeting." I do not think there is much to add to this as regards the insects without writing up a complete account from all our information on the subject. I do not think there is any necessity for this as the present summary should suffice to place the Cotton Committee in possession of the main facts.

2600. *Recommendations in regard to future entomological work on cotton pests*.—As regards future work, the main requirement, in my opinion, is a more intensive study of the insect pests concerned. With the present staff and organization it is impossible to pay the requisite attention to any one particular problem, such, for example, as cotton boll worms and even in such a case two distinct pieces of work are concerned, viz., *Earias* and *Gelechia*. What we require is a sufficient staff of really competent entomologists to enable one or more investigators to be detailed to give their whole time to the study of each such insect, its occurrence, bionomics and control. This point of view is beginning to impress itself on the Provincial Agricultural Departments also as is shown by the following extract from page 5 of the Report on the Administration of the Department of Agriculture of the United Provinces of Agra and Oudh for the year ending 30th June 1917 :— "One of the most pressing needs for the improvement of cotton generally in these provinces is the appointment of an entomologist. It is only necessary to look at the lint as it comes on to the market to form some idea of the extent of the loss suffered from the pink boll worm (*Gelechia gossypiella*). There is a considerable proportion of stained lint and the damage done in destruction of bolls must be great. The heaps of cotton standing in the ginneries may often be seen infested with the worm. It is possible that nothing short of the control of seed in the ginneries will be effectual to check this pest, but whatever is done should be carried out under the direction of an expert who has an opportunity for closely studying local conditions. Cotton was not the only crop which suffered from insect pests during the year; both rice and cane being attacked with unusual severity. The latter in parts of Rohilkhand was reduced to such an extent by the borer that some of the fields were ploughed up for the *rabi*. There would be ample scope, therefore, for a branch of economic entomology in the department." But I would point out that such an investigation is essentially not a provincial, but an imperial requirement. In the case of *Gelechia gossypiella*, for example, although the damage done is very serious in the United Provinces, this insect also occurs throughout the whole Indian Empire and any investigation of it should therefore not be confined to the United Provinces. It is possible, for example, that an effective parasite might be discovered in Madras or Burma. Similarly with *Earias*. Although the Punjab and Sind are mainly concerned, these insects occur throughout India and all cotton-growing districts are therefore interested in their investigation and control, whilst any such investigation should not be a provincial matter.

(2) With a view to providing for such intensive investigational work, I have already submitted to the Agricultural Adviser to the Government of India a scheme* for the expansion of entomological work in India

* Not printed.

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and this has also been submitted to the Indian Industrial Commission. I attach a copy for the information of the Cotton Committee and will only add that, in my opinion, our most urgent present requirement is the adoption of some such scheme, to provide for a proper scientific investigation of the numerous problems connected with the insect pests of cotton in the Indian Empire.

XII.—Bhopal.

Mr. MAHMUDUL HASAN, Director of Land Records and Agriculture, Bhopal State.

EXAMINED AT SEHORE, NOVEMBER 19TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short-staple cotton.

2601. (1) *Experience*.—My services are lent to the State of Bhopal. I am a member of the Central Provinces Provincial Service. I had been an Assistant Settlement Officer in the Central Provinces for several years working in cotton-growing districts and was subsequently appointed as an Extra Assistant Commissioner. I have been working in Bhopal State for more than four years as :—

(1) Director of Land Records and Agriculture, (2) Settlement Officer, and (3) Registrar, Co-operative Societies.

In all the different capacities mentioned above, I have to deal directly with the cultivators, generally having to tour and inspect villages throughout the State.

2602. (2) *Varieties*.—The cotton seed which is sown throughout the State is a mixture of numerous varieties of short and long staple cotton. No separate statistics can be ascertained either for short or long staple cotton. My answer for the subsequent questions will therefore refer to the cotton crop generally.

2603. (3) *Size of holdings*.—The average size of holdings is about 23 acres out of which the average area under cotton is about 2½ acres only.

2604. (4) *Yields and profits*.—The average yield of cotton (*kapas*) per acre in different localities varies from 144 lbs. to 288 lbs. per acre. The normal yield may be put at 200 lbs. per acre. In manured plots, the yield per acre rises up to 500 lbs. But the number of such plots is quite inconsiderable. Average profits amount to Rs. 7 to Rs. 10 per acre.

2605. (5) *Rotations and manures*.—Wheat, *gram* or *juar* is sown in rotation with cotton. As a rule no manure is applied to fields intended for sowing cotton. There are of course exceptions to it but they are too few to be considered.

2606. (7) *Conditions affecting increase in area*.—The area under cotton has been increasing yearly. It showed a decrease only in the year 1915 on account of the slackness of trade in 1914. With the price of cotton having risen, the area under that crop is again increasing. It is hoped that the area under cotton in this State will continue to increase yearly because the cultivators do realize that it is a profitable crop. Scarcity of labour and shortness of funds are the chief factors which are checking the extension of the area under cotton and may ultimately put a limit to its further extension.

2607. (8) *Uses of seed and seed selection*.—Beside sowing the cotton seed is used as cattle-food. It is utilised in no other way. No selection of seed is practised.

2608. (9) *General economic conditions*.—The cultivators are in majority short of money which they require for weeding and watching the cotton crop. At present they are meeting the difficulty by borrowing money from the *mahajan* (money lender) who advances the required money on the condition that it should be repaid in kind (*kapas*) at Rs. 20 per *mani*, that is 384 lbs. By such transactions, the larger part of the profit goes to the *mahajan*. If the cotton grower be supplied with money at a reasonable rate of interest, the net profits to the grower will considerably rise and must in that case induce the grower to grow cotton on larger areas. This difficulty has been realized by the Durbar and arrangements are being made to supply money to cultivators at six per cent per annum or thereabout. As regards scarcity of labour, it is no doubt checking the extension of area under cotton but if the cultivator is supplied with sufficient money at a reasonable rate of interest the area under cotton can with the existing labour be increased by fifty per cent because in that case cotton will no doubt oust minor *kharif* crops which also require weeding and the labour will thereby be saved for weeding more cotton crop.

(b) "Deshi" long staple-cotton.

2609. (16) *Suitability of existing varieties*.—It has already been stated that long and short staple cotton are grown mixed in this State. The Agricultural Department of the State has realized the necessity of selecting varieties of cotton which should be introduced in the State. Cotton, K-22, is recommended by the Agricultural Adviser to the Central India States and it is being tried. It is a cotton of superior type with a high percentage of lint. If also its yield per acre is high enough and other local conditions suit it, it will be the best cotton for the State. Still superior cotton, if not a long season one and not less paying than the other types, can be introduced in this State. Any cotton, whether long staple or short staple, which yields the highest net profit per acre to the grower will be the best cotton to be introduced. I would prefer to introduce and encourage the cultivator of such cotton in the State.

2610. (17) *Prevention of mixing of different varieties*.—In order to prevent the mixing of *deshi* long staple cotton with *deshi* short staple cotton and exotic cotton in the factory, rules for the classification of cotton before ginning should be prescribed and the ginneries compelled to observe them. In order to prevent the above-mentioned mixture in the field, seed farms should be established at convenient localities from where the cultivators may easily obtain unmixed seed and the trade should combine to make it a point to purchase mixed cotton at a much lower rate.

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Mr. MAHMUDUL HASAN.

[Continued.]

Mr. MAHMUDUL HASAN called and examined.

2611. (President.) I am the Director of Land Records and Agriculture, Bhopal State. I am also Registrar of Co-operative Societies and deal with any settlement questions that arise. My department has a staff of three officers in all. As regards settlement, we have only isolated cases now and then. I have had no special training in agriculture. We have one experimental farm at Bhopal under a farm superintendent who is a trained man from Cawnpore lent by the United Provinces Government. He was in Pusa for some time. We have no other experimental farm. We opened that farm last year. The farm was opened last year after the appointment of Mr. Coventry as Agricultural Adviser to the Central India States. Before that there was a farm at Sewania Unkara, which is six miles from Bhopal. There was no *pukka* road to it. The farm was there for two years. As there was no *pukka* road, Mr. Coventry recommended its transfer to its present site, four miles from Bhopal. We are proposing to open demonstration farms, one for each of the four districts of the State. These have already been sanctioned by Her Highness and will be started this year. We shall demonstrate irrigation and improved instruments on these demonstration farms and shall try any cottons, wheat or sugarcane that succeed on the Central Farm.

2612. All the cotton that grows here is badly mixed. Even the best *deshi* type is a mixture. The best type grows in Ashta, a tahsil of the State in the Western district, and also in some parts of the southern district. The fibre of all the cottons which are produced here is silky, but not very long. I have tried *roseum* here and found that the fibre of that cotton improved here. We are doing selection work amongst *deshi* cottons but there is no good variety which I could recommend for distribution. We have not found anything yet. The first selection was made only last year. We are trying to find the best indigenous cottons. We are also trying K-22 and some Americans like Cambodia. If American succeeds, we shall not be able to push it for some time yet as there is no irrigation. We have schemes for irrigation. One tank has already been constructed, and some other projects are under consideration. Boring machines have already been sent for from Poona as recommended by Mr. A. Schutte who was here last year inspecting certain localities in the State. The general policy for us to follow will be to select the best of our local *deshi* and when we have made up our minds in regard to it and it has been tried in the farm with success to push it in the State through district seed farms. We shall also go on with K-22 and Mr. Leake's other cottons as well as with American varieties on irrigated areas.

2613. The local money lending system is highly impoverishing for the ryots and the State is combating it hard by providing other means. At present if he borrows Rs. 20 in June in the sowing season, he has to give four maunds of cotton at the picking season. Our maund is 96 lbs.; 96 tolas make one seer and 48 seers make one maund. The price of *deshi kapas* just now is Rs. 60 per *mani* of four maunds so that the *mahajan* (money lender) gets three times the value of his loan in four months' time. The ordinary rate here varies between Rs. 35 and Rs. 40 per *mani* of 384 lbs. In order to get rid of all this, the State is making arrangements with a bank in Allahabad and with another bank at Bombay. The idea is that the State should give five lakhs of rupees to the bank without interest and that the bank should add another five lakhs to that amount and open a branch here which would lend money to the cultivators at six per cent. The bank would practically be a Central Co-operative Bank lending money to village co-operative societies on joint securities.

2614. In order to prevent mixing of cottons in the gins, I suggest the framing of rules for the classification of cotton before ginning. Mr. Coventry has written a detailed note on the subject. I think that to prevent mixing in the field, seed farms are the only solution.

2615. (Mr. Wadia.) Cotton is damped here. It is the *kapas* not the ginned cotton which is damped. It is done before it is sold by growers. I do not know whether the gineries dry the cotton before they gin it. There are cotton markets at Ashta, at Bhopal, at Sehore and one at Bareilly Tehsil. There are no cotton market rules. There are three ginning factories in the State, one in Bhopal, one at Ashta and one at Bareilly. The ginning factories belong to a company organized by Sir Ibrahim Rahimtoolah of Bombay in which the State has a half share. I do not know the rate they charge for ginning and pressing cotton. There are no other ginning factories. The agreement provides that no other gins worked by steam power should be established in the State and is therefore a bar to setting up co-operative gineries like those in the Central Provinces.

2616. (Mr. Henderson.) The gins do not sell pure seed. Some cultivators get their seed for sowing from the ginning factories and others from *mahajans* whilst, in some parts, where there are no *mahajans* and the ginning factories are at a distance they gin it themselves by hand gin. There is no pure seed here and it is impossible to get it. The agreement has nothing to do with the mixture of seed. It is not the factories who mix. In whatever condition (mixed or unmixed) *kapas* is presented, the factories gin it and return the lint and seed. It is impossible to get pure seed for the cultivators. There is no special price for seed for sowing. The same seed is used for cattle feeding and for sowing. There is no demand for pure seed. The cultivators do not know the value of it. We are practically beginning the purification of seed.

2617. (Mr. Roberts.) Mr. Coventry has suggested that certain rules should be framed under which traders should be compelled to have separate varieties of cotton ginned separately. Even if you had one thousand or two thousand bales of cotton, it could be arranged to have each type ginned separately.

2618. We have not gone far with the separation of types in the cotton-growing area. We are just at the beginning. Selection work is being done by the superintendent of the farm at Bhopal. He was trained at Pusa and at Cawnpore. The average yield of cotton is 200 lbs. per acre. The chief thing is that the cultivators have realised that the cultivation of cotton is very advantageous and there is every hope that if something is done towards the improvement of cotton cultivation, the cultivators will adopt it and will try to follow our advice. They used to grow poppy but cotton is now taking the place of poppy to some extent. I have examined the records for the last twelve years and I find that the area under cotton never exceeded 85,000 acres and that shows that there must be some natural limitation to it. One limitation may be the rainfall. The normal rainfall is between thirty and forty inches. For the last two years it has reached a very high figure. At present there is scarcity of labour and shortage of funds as I have said and these are checking the progress of the cultivators.

2619. (President.) The shortage of labour is due to the decrease in population. It is not due to much recruiting for the army. People say that since plague broke out here for the first time, many people ran away and many died.

2620. The irrigation schemes that we have under consideration are all for tank irrigation. There is no possibility of big areas under irrigation. It is under consideration to improve wells by boring and that may have a good effect.

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Mr. M. ZIAUD-DEEN HYDER.

Mr. M. ZIAUD-DEEN HYDER, Superintendent, Experimental Farm, Nabi Bagh, Bhopal State.

EXAMINED AT SEHORE, NOVEMBER 19TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "*Deshi*" short-staple cotton.

2621. (1) Experience.—I was attached to the Government experimental farm at Cawnpore, United Provinces, from May 1913 to December 1916, and since then have been on the experimental farm at Nabi Bagh, Bhopal State. My experience has been mostly limited to the experiments conducted on these farms. I have, however, visited fields of some cultivators and conversed with them.

2622. (2) Varieties.—I have as yet visited only a few villages in the northern district of the Bhopal State. The *deshi* cotton grown there is not of a fixed variety. One will come across plants bearing leaves of different types and yellow and white flowers in a field; of these yellow flowered ones predominate, and these generally have cotton finer than the white flowered ones.

2623. (3) Size of holdings.—In Islamanagar Paragana, not more than about one-fourteenth acre of the cultivators' holdings is put under cotton. But this area does not represent the truly cotton growing tracts of the Bhopal State.

2624. (4) Yields and profits.—The average yield is said to be two to four maunds per acre in a good year, but during the last year yields of not more than 1½ maunds were obtained, due to the excessive rainfall. *Roseum* cotton yielded five maunds of *kapas* per acre at the Sewania Farm as compared to four maunds of the local cotton. From the enquiries made I gather that about Rs. 9 used to be the profit per acre to the ryot when cotton used to sell at Rs. 8 per maund, but last year the prices rose to about Rs. 15 per maund and the profit may be put at about Rs. 19 per acre.

2625. (5) Rotations and manures.—Cotton is rotated here with *juar* or wheat. It is often sown as a mixed crop with *tuer* (*arhar*) or *til* (*sesamum*). In unirrigated lands, it is not manured as a rule, but in irrigated ones it is manured with the farmyard manure and the yields are better in this case.

2626. (6) Comparative returns.—The staple crops of this district are (1) *juar*, (2) gram and (3) wheat. The cost of their production and the prices obtained for them are said to be as under:—

(1) *Juar*.—(Generally grown as a mixed crop with *arhar* and *mung*):—

(a) Cost:—

	Rs. A. P.
Rent of land at Rs. 3-12 per acre	3 12 0
Seed	0 12 0
Other charges	4 2 0
TOTAL	8 10 0

(b) Income:—

Price of 4½ maunds of <i>juar</i> (average produce per acre) at Rs. 2 per maund.	9 0 0
Price of 2 maunds of <i>arhar</i> at Rs. 2-8 per maund	5 0 0
Price of 1 maund of <i>mung</i> at Rs 2-8 per maund	2 8 0
TOTAL	16 8 0

(c) Profit:—

Say	8 8 0
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There is hardly any profit in *juar* grains, but its stalks (*karbi*) are used as fodder, and if saved from frost and grazing of cattle then *tur* is the profit, as also *mung* if it is saved from excessive rains.

(2) Wheat:—

(a) Cost:—

	Rs. A. P.
Rent of land	3 12 0
Seed	5 10 0
Other charges	3 0 0
TOTAL	12 6 0

(b) Income:—

Price of 4 maunds at Rs. 4 per maund	16 0 0
Price of <i>bhusa</i>	3 0 0
TOTAL	19 0 0

(c) Profit:—

Say	6 10 0
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(3) Cotton:—

(a) Cost:—

Rent of land	3 12 0
Seed	0 9 0
Other charges	15 0 0
TOTAL	19 5 0

(b) Income:—

Price of 3 maunds at Rs. 11 per maund	33 0 0
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(c) Profit

Say	13 11 0
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N.B.—It may be noted that as the payment of wages, etc., is made by cultivators in kind, it is not possible to arrive at accurate figures and the above are approximations based on local enquiries. The price of seed noted above has been calculated at the market rate but according to the local custom the ryot has to return his supplier of seed (be he a *mustajir* or a *bania*) double the quantity of any *kharij* seed received excepting in case of cotton seed which is *kapas* for the seed and 1½ for a unit of seed wheat.

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Mr. M. ZIAUD-DEEN HYDER.

[Continued.]

A statement of the outturn of crops grown on the Sewania Farm is appended (Annexure).

2627. (7) **Conditions affecting increase in area.**—(a) The weeding operations require a large amount of labour, of which there is scarcity here. I expect that if sowing in straight lines were practised with the Gujarat seed-drill, which admits of interculture with bullock-hoe, a good deal of the saving of labour will be effected, only the first weeding being necessary by hand until plants are small, and the subsequent interculture by the bullock-hoe. I used this hoe on the Nabi Bagh Farm in cotton, groundnuts and tur, and was satisfied with its work. Skilled hands and trained bullocks are, of course, required for the use of these implements. At Cawnpore, I found American cultivators (and their imitations, manufactured at Cawnpore) to execute still better work of after-cultivation.

(2) From what I have seen on this farm and on the cultivators' fields, I am convinced that early sowing is essential for any cotton grown here (as is evident from the fact that only the cottons sown with irrigation on the farm before the end of May last have survived, and those sown after the rainfall could not withstand ravages of the heavy rains). It is therefore advisable to manage for the early sowing.

(3) To maintain and improve the fertility of land, it is essential to regulate its drainage. The lands here seem to be suffering for want of a proper drainage. The cotton plant is very susceptible to water-logging. When considering the question of increasing the areas under cotton, attempts will have to be made to improve their drainage and at the same time prevent erosion.

2628. (8) **Uses of seed and seed selection.**—Cotton-seed is generally fed to cattle here. The seed is generally got from the mills or from the *pinjaras* (who hand-gin it) and is sown as it is, viz., a mixed lot.

2629. (9) **General economic conditions.**—The general idea of the local men is that this district is not suited for cotton cultivation. But before making any definite suggestion, it is necessary to have a survey of all the cotton growing tracts in the State to make sure as to what stuff they locally grow so far, and how they grow it. I however give below my views based on the local enquiries made from the cultivators. Before trying to bring new areas under the cotton crop, it seems advisable to introduce the best type of cotton in the localities already famous for cotton growing in the State, and try to replace it for the mixed lot of cotton grown at present. When attempts in this respect are successful and a regard for our work is created amongst the cultivators, we might then be in a position to induce them to replace their other crops with cotton. In *roseum* we have got a reliable short staple cotton of high yield and high ginning percentage, and can introduce it after making sure of a suitable locality.

(b) "*Deshi*" long staple cotton.

2630. (11) **Varieties.**—No special variety of long staple cotton is grown locally. K-22 cotton sown with irrigation in May last on this farm has stood the heavy rainfall this year.

2631. (13) **Yields and profits and comparative returns.**—The pickings taken from the K-22 plot up till now weigh some two maunds of *kapas* per acre, and it is expected that it will compare favourably with local cotton in yield while it is superior in quality.

2632. (17) **Prevention of mixing of different varieties.**—To prevent the mixing of different varieties of cotton both in the field and in the factory, the organisation for the introduction of Cawnpore American and superior varieties of *deshi* cottons employed in the Central Circle of the United Provinces Agricultural Department is probably worth following. It consists in arranging previously with:—

- Land-holders and cultivators to grow the specific type of cotton in a named area.
- With the Irrigation Department to supply water for sowing cotton under irrigation before rains, and for another watering if monsoon gets late.
- After sowing the area is tested, and lists compiled by Agricultural Inspectors, to enable them to deal with it further on.
- "Rogueing" of undersired plants from the fields is done by the Inspectors.
- Purchases are made either at the cultivators' houses by the Inspectors, or the cultivators carry their produce to a named place (the ginning mills or the village market), fixed according to the convenience of the cultivators.
- Kapas* is collected, dried and stored at the factory by the Agricultural Inspector. He also gets good cotton separated from the stained and supervises ginning and baling.
- The payment of price is made in cash together with a fixed premium over the Cawnpore market rate, which is daily ascertained.
- Previous arrangement is made with some of the Cawnpore mills regarding sale of the named variety of cotton in two different lots of "good" and "stained," who use it, and report on its behaviour.
- When the suitability of a variety is established by the Agricultural Department for a district, the seed of no other variety, excepting that one, is distributed there by the Department.
- If a cultivator brings in a mixed lot of *kapas*, it is rejected as such, and not purchased.

2633. **Improvement of the plant.**—Under instructions from Mr. B. Coventry, Agricultural Adviser in Central India, I made selections of fine long staple cotton from the fields of local cultivators in small quantities, plant by plant, last year and after ginning them, discarded those having less than thirty per cent of lint in *kapas*. The seed of each plant was sown separately on 27th May last, and the observations so far made may be summarised as below:—

- The growth of plants has been much better than their parents in many cases.
- The flowering commenced on various dates. All bear yellow flowers.
- There seems to have been natural crossing in the cottons collected last year, as the type of leaves split into "long" and "broad" lobes.
- Ginning has not yet been done.

There seems to be a field for the improvement of the local plant by selection and breeding.

2634. **Production of seed.**—It will probably be necessary to establish some seed farms in good cotton-growing districts of the State, but it will be desirable to import labour to carry on the necessary operations in time, as I feel the same necessity on this farm. I find, however, that several educated *mustajirs* (contractors of villages) are ready to grow good seed of a new crop. I have no experience of demonstration work in the State, excepting that the seed of a high-yielding variety of wheat was given to a cultivator last year, and he was highly pleased with its produce. A craving for good seed of wheat now exists amongst the local men. But the case of cotton is not identical with a *rabi* crop. A good district staff of Agricultural Inspectors, similar to what they have in the United Provinces, is essential for carrying out such

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Mr. ZIAUD-DEEN HYDER.

[Continued.]

responsible work as the introduction of approved cotton varieties on the desired lines. These Inspectors should devote the whole of their time on this work alone.

(c) *Exotic cotton.*

2635. (21) **Varieties.**—No exotic cotton is known to me to be grown here. Cambodia cotton, grown under irrigation, seems promising on this farm this year. Of the American varieties tried, Allens Long Staple and Black Rattler are worth trying again. This year has been of an abnormal rainfall and no definite conclusion can be drawn from the present experiments until they are reported another year.

ANNEXURE.

Statement showing the outturn of crops sown on the Sewania Unkara Farm in 1914-15 and 1915-16.

No.	Name of crops.	Outturn per acre in 1914-15.			Outturn per acre in 1915-16.			REMARKS.
		Mds.	Srs.	Ch.	Mds.	Srs.	Ch.	
1	<i>Roseum</i>	4	8	0	5	9	9	
2	Local cotton	3	30	6	4	1	9	Tur sown as mixture with cotton— 1914-15. 6 mds. 1915-16. 1 md.
3	Local <i>piasi</i> (wheat)	5	11	0	9	20	0	
4	Groundnut, large Japan	48	24	0	30	16	0	

Mr. M. ZIAUD-DEEN HYDER called and examined.

2636. (President.) I got my practical training at Pusa. I was at Pusa for eight years working on the farm under Mr. Ikram-ud-din, the Farm Overseer. I did not come here straight from Pusa but went to Cawnpore where I was attached to the Government experimental farm for six months and was then in charge of it for three years. There I did work on cotton. I came to Bhopal in December 1916 and started the farm at Nabi Bagh in June last year. I have not done any work in the district of Bhopal but have seen the villages in the vicinity of our farm. We have only got a mixed lot of cotton. The yellow flowered cotton is better than the white flowered. It has not got any special name but people call it *ban*. I have not ascertained what the botanical names of the cotton are.

2637. My object on the farm is to see which variety of long staple cotton will suit the State best. We are trying to see which is the best cotton as regards staple, outturn and ginning percentage. I have started selection work. I made selections from the cultivators' fields in the district last year and sowed the seeds in single plants in rows. The cotton from these was collected and ginned. Only those yielding more than thirty per cent of lint were retained. These will be planted out again next year. The ginning percentage and the quality will be taken into consideration. I shall be receiving instructions from Mr. Coventry. I made the selections last year under his orders.

2638. I have not seen any of the Aligarh white flowered cotton in this State. I know that variety of cotton and I used to grow it in Cawnpore. I do not think Aligarh white flowered would be a good cotton for this tract. It has a very short staple and is very coarse. I do not think I would recommend it. Of course if short stapled is wanted, then we could grow either Aligarh white flowered or *roseum*. We are not growing either at present.

2639. I have had some experience of long stapled cottons here. We are growing Cambodia cotton and six American varieties on the farm this year. Last year they all failed. This year we have not got a good crop. Cambodia is not bad but the American cottons are no good at all, owing to the abnormal rainfall this year and last. *Roseum* was grown on the farm some two years ago, but we are not growing it now. We have not distributed any of it. When we get something good on our farm which we can recommend to the cultivators, I think some organization in this way of seed farms, agricultural district inspectors, etc., will be required but at present we are in the initial stages and we have nothing to recommend to the cultivators. We are now going on with K-22 and it is promising.

2640. (Mr. Wadia.) In paragraph 2632 of my written evidence, I have recommended that landholders and cultivators should grow specified types of cotton. The arrangement for this can be made in the following way. When we get a good variety, we shall ask the cultivators to replace their present seed with the seed we give them. They cannot be compelled to do so but we can shew them by actual results that it is a better cotton and that in this way they can make a bigger profit. If the trade offers a better price for good cotton, cultivators will be induced to grow good cotton. Agents buy our cotton. Some are Japanese agents and some come from Burhanpur. The ginning factories do not buy cotton. They only gin it on commission. Agents coming from outside buy cotton and get it ginned at the factory.

2641. (Mr. Hodgkinson.) Cambodia is in its first year so that I cannot give you the exact ginning percentage from what we are growing. Last year it failed. I cannot tell you what the yield per acre is. My opinion about Cambodia is that it is promising. Our plot of Cambodia is the best cotton plot that I have seen this year in Bhopal. It is a late cotton but I cannot say anything further yet. It was planted on the 28th May and we hope to go on picking till the end of January but I am not sure about it. I have given only two waterings so far; one before sowing and the other before the monsoon broke. I cannot say

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whether I shall have to give any more waterings, I shall have to take advice about that, as I have had no previous experience of it.

2642. (Mr. Henderson.) We have only one farm and one demonstration plot. The latter is four miles from the farm. The area of the farm is about 150 acres in all but it is not all under cultivation. We have got testing plots. They are mostly one acre in size. Some of them are uniform; others are not. The plots were tested by the last year's yields of wheat and gram. We are testing our cotton on $3\frac{1}{2}$ acres. That is all capable of irrigation from one well. $2\frac{1}{2}$ acres of cotton which was not irrigated was spoilt by rain. We are going to lay out plots and to test them later on.

2643. The cultivators have not so far asked me for any seed. They do not take any interest in the cotton experiment. They are only asking for wheat seed now. There are very few wells in this part of the country. The ordinary outturn of produce in the district is small and the outturn of cotton is very small. The area under cotton in the district is only one-fourth. Nothing has yet been done in the way of growing leguminous fodder crops. We have grown wheat after cotton and *arhar* on the plots of last year.

2644. (Mr. Roberts.) From what I have heard this farm is not typical of the cotton tract of the State. I have not seen the whole of the State but I learn that in other districts cotton will grow on a larger scale than in this district. The best cotton growing tracts, so far as I know, are the districts on the borders of the Bhopal State in the neighbourhood of Hoshangabad where there is some *bani* grown but I have not seen it. I do not know the varieties of *deshi* cotton which are grown in the fields. It is a mixed lot.

Mr. N. H. GHAZI, B.A., Barrister-at-Law, Assistant Director, Land Records and Agriculture, Bhopal State.

EXAMINED AT SEHORE, NOVEMBER, 19TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short-staple cotton.

2645. (1) Experience.—As representative of the agriculturists of this State I may depose as under:—No districts of this State are especially adapted by nature for cotton growing. This commodity is grown by almost every tenant who can afford to keep a pair of oxen. The proportion of cotton thus grown in a holding seems to be limited by his poverty, his dread for rental arrears, the numerical strength of his family, the influence of his *bania* or money-lender.

(2) As Assistant Director, my business is to tour all round in the villages of this State with a view to induce the cultivators to better their condition by the adoption of up-to-date methods and means in the work on which their bread hangs. As owner of several villages, I have a deep intimacy with rural economy and the *modus operandi* of the average cultivator.

2646. (2) Experience.—The white flowered or the so-called Aligarh is chiefly grown because its seed is so very common and easily procurable and also because its yield is so very heavier than any variety known to the cultivator.

2647. (3) Size of holdings.—The average size of holdings in which cotton is grown is somewhere between twenty and fifty acres, and the area devoted to cotton varies with the *kist* or instalment in which the *khari* rental is collected in the particular village in which the holding is situated. For instance, a holding of which the annual rental is Rs. 100 and the *khari* instalment Rs. 75, then the average cultivator would sow 75 per cent more cotton than he would if the *kists* were half and half.

2648. (4) Yields and profits.—The average yield of *deshi* cotton is about 400 to 500 lbs. per acre, and the net profit is scarcely over Rs. 40 when market for cotton is fair.

2649. (6) Comparative returns.—The *deshi* short is the best yielder, but its quality and ginning percentage are both low. There are other *deshi* crops, for instance, the *bindia*, which is only a mixed variety, is of inferior grade and sells at only Re. 0-8-0 per *mani* below the price of the best *deshi*. Pure *deshi* long staple is not an article of commerce here, and exotic cottons are nowhere grown.

2650. (7) Conditions affecting increase in area.—Abnormal rainfall is a prime factor which limits the production of cotton, but not its sowing. Normal rainfall, a good market, and the introduction of bullock-driver weeding implements, would possibly bring more area under cotton.

2651. (8) Uses of seed and seed selection.—The seed is generally exported for its oil and cake, very little being kept at home to feed cows and bullocks. It is fed undecorticated. Seed selection is never practised here. Hand-ginned seed is probably the best for sowing, but the cultivator does not care about it.

Mr. N. H. GHAZI called and examined.

2652. (President.)—I am Assistant Director of Land Records and Agriculture. I was trained in the East Scotland College of Agriculture, Edinburgh. I was there for three years. I did not take the B. Sc. I also read law at the same time. I did no practical farming in Scotland but I used to go on excursions with the professors. I read law in the vacations. For five years I have been running my own private farm in a village called Mali Kheri. The principal crops grown on the farm are groundnut, wheat and cotton. I have been Assistant Director of Agriculture for the last three years.

2653. For my own farm I got some cotton seed from Hoshangabad of Mr. Leakes cotton K-7. I showed one of the fields to Mr. Coventry. It did wonderfully well in 1915. I thought it a very good cotton but I only got the price of ordinary *deshi* for it. I had the *kapas* ginned before it was sold. Unfortunately the seed got mixed in the factory, so it was of no use to me afterwards.

2654. My duties as Assistant Director of Agriculture are the same as those of the Director of Agriculture. I take a portion of the work from the Director. I do the land records, survey and settlement work. On the agricultural side, I inspect the State farm. That does not take up much of my time. When I go about the villages, I give lectures to the farmers about improved implements, better seed and also improved methods of cultivation. It is more precept than example. I think the Agricultural Department of this State ought to be developed. There should be more farms. Mr. Coventry has devised a scheme for

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introducing shifting farms from one place to another so that the agriculturists of the whole State should get the benefit of it. The scheme will not be very expensive to the State in the end.

2655. The local cottons are almost of the same type and are very badly mixed. I have had experience of American cotton. It spoils the land as the following crop is a very poor one. I sowed wheat afterwards and it gave a bad crop. I did not manure the land before sowing it again.

2656. (Mr. Roberts.) In this State there is every grade of soils, light as well as heavy. In Sehore, the soil is heavy but in the Barussia district the soil is much lighter and that is the reason why cotton is generally grown there.

2657. (President.) I have not visited any agricultural stations in India except the Powarkhera farm at Hoshangabad. The land on my farm is of the same type as in this neighbourhood. I grew some groundnut at my farm. The produce was very good but the cost of lifting was terribly high and it did not pay. I planted cotton after groundnut, and got a better crop. It is a very good rotation, I should think. I can furnish figures showing the extent of land under irrigation in the State. I can furnish figures both for land under irrigation also under cotton.

Khan Bahadur Maulvi MUHAMMAD MATINUZZAMAN KHAN, Revenue Minister, Bhopal State.

EXAMINED AT SEHORE, NOVEMBER 19TH, 1917.

No written statement was submitted by the witness.

2658. (President.) I control the revenue administration in the Bhopal State and my powers are practically the same as those of the Financial Commissioner and the Board of Revenue in British territory. All agricultural and co-operative questions come to me. Her Highness the Begum is very anxious to develop any agricultural scheme which may be of an advantage to her State and people. We have made a start. We have got a Director, an Assistant Director of Agriculture and a Superintendent of the Central Farm. The central farm will produce improved varieties of seed and introduce improved implements and methods of cultivation. Her Highness has already sanctioned a scheme of opening up demonstration farms at the headquarters of the districts. It is my policy as Revenue Minister and it is especially desirable that the cotton area should be increased to compensate for the loss of poppy cultivation. That is very important. Any progressive policy in regard to cotton would be acceptable to Her Highness and especially so as the State has a half share of the cotton ginning mills and pressing factories and thereby it would be developing its own revenues. So I can give an assurance that any reasonable progressive policy for the development of cotton will receive sympathetic consideration as far as financial limits permit. While during the war there has been a very great demand upon the State's funds, ordinarily there is no difficulty in finding money. We have already started an agricultural department of our own and there is no likelihood of its development being retarded on account of the lack of funds.

2659. The returns from cotton presses and cotton ginning factories do not go from my department. Perhaps they are sent to the Bombay Chamber of Commerce direct. The punctual submission of these returns could easily be arranged by the Darbar.

2660. As regards irrigation possibilities, I may mention that we had a whole-time irrigation engineer till recently. We have made some *bunds* and there are some big projects for damming up a few large nullahs but they are held up for lack of funds for the time being. Our engineer was a Sikh gentleman. He was a Roorkee man but not in British Government service. We have no irrigation engineer in the State at present. I mean that there is no separate officer holding that appointment. Our State Engineer and the District Engineer combine their ordinary duties with irrigation engineering. There is a project suggested by Mr. Coventry for boring and pumping operations and we are going to send *mukaddams* (foremen) to be trained by Mr. Schutte in Bombay. That proposal has been approved by the Darbar. The other irrigation projects have been held up temporarily but Mr. Coventry is of opinion that this well boring project is much bigger than the irrigation projects. As to any rough idea of the possible additional area that might come under cotton, I cannot give you figures because I have not come prepared for it but I think that most of the area that was under poppy before ought to come under cotton. The figures can be given later on.

2661. There is an export duty on cotton. The export duty is Re.1 per maund on *kapas*.

Mr. SOBHAGMAL, Banker and Zamindar, Ichhawar, Bhopal State.

EXAMINED AT SEHORE, NOVEMBER 19TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

2662. (1) Experience.—I live at Ichhawar, in the Magrib District, State Bhopal. In this tract *deshi* short staple cotton is grown. My residence in this place has been for the last thirty years. I lend money to cultivators and am in close touch with them.

2663. (2) Varieties.—The cotton grown in this tract is only of one kind, which is the *deshi* short staple cotton. Its plant reaches a height from four to five feet and produces nearly eight or ten pods with three cotton leaves each. In some places the cotton known as *bani* is also produced.

2664. (3) Size of holdings.—The cotton producing area is nearly one-tenth of the whole tract, in the rest other crops are raised.

2665. (4) Yields and profits.—The "land measure" here is the *bigha*, which is nearly fifty by fifty square yards. The average produce of a *bigha* is one maund and the profit made by the cultivators is Rs. 2 per *bigha*.

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2666. (5) **Rotations and manures.**—Only one crop is raised per year. No manure is used. On the whole cotton is grown here on forest plains. Only a few cultivators produce it in fields near wells. These use the manure of cow-dung.

2667. (6) **Comparative returns.**—The produce of short staple cotton, as far as my experience tells me falls shorter than the *deshi* long staple cotton. (I do not compare it with exotic cotton, for I have not seen it.)

2668. (7) **Conditions affecting increase in area.**—When opium-plant (poppy) was produced in this district, the plantation of cotton was short. But from the time the poppy was forbidden by the Government and a ginning factory was established at Bhopal, cotton cultivation has appreciably increased. And it will go on increasing if more ginning factories are established by the merchants.

2669. (8) **Uses of seed and seed selection.**—The seed is never selected beforehand. Only seed which comes out of ginning factories is sown everywhere. This seed is of a mixed kind and has broken seeds also in it. But the establishment of more ginning factories would, in some time, it is hoped, give better seed to cultivators; and this is because only one kind of seed would be produced from the cotton brought from neighbouring villages.

2670. (9) **General economic conditions.**—When the merchants can freely establish ginning factories, there can be expected a fair economy in the carriage of goods, both of cultivators as well as of merchants. Seed, too, would easily be distributed among cultivators. The factory-holder would all the more help cultivators in bringing much cotton for the factory to carry on its business. Because there are only three ginning factories in the Bhopal State, all cotton is carried to these only. Seed is also brought from them. This takes much expense and time. Sometimes the cotton does not reach the place in time and hence the ginned cotton cannot reach the foreign countries in time. Through these causes, a great loss is often experienced owing to the alterations in rates. Sometimes much cotton accumulates at one factory and thus the cotton gets all spoiled owing to winter rains. In conclusion, more ginning factories would mean an increase both in the produce and trade of cotton in this tract of the State.

II.—COMMERCIAL ASPECT.

2671. (30) **Local trade customs.**—Mostly the merchants themselves take their cotton to ginning factory by carts but sometimes the cultivators themselves do so. The goods are sold by auction by the manager of the factory. The traders buy the cotton of carts and have it ginned and in this way send it to Bombay in the form of bales (each bale being 400 lbs.).

2672. (31) **Standardization of commercial names.**—No special commercial names are used in this locality. But there is no harm if some standardized names are to be applied.

Mr. SOBHAGMAL called and examined.

(Translation.)

2673. (Mr. Wadia.) Bhag Mal Giyan Mal is the name of my firm. We have branches at Ichhawar, Bhopal and Ashta. I know the cotton that is produced in this part of the country. I buy *kapas*, get it ginned and pressed and send to Bombay. It is all of one kind, short stapled *deshi*. I sell it under the name of Bhopal cotton in Bombay.

2674. There is no market rate for *deshi* cotton at present here, because cotton has not begun to come in. Bhopal cotton is sold in Bombay about Rs. 40. to Rs. 50 under good Broach. I lend out money to cultivators for food as well as for seed. I advance cash loans for *kapas* and also for wheat. I get back these advances in kind. I advance grain for sowing wheat at the rate of 25 per cent and take it back in kind, i.e., for 100 lbs. of seed I get back 125 lbs. I advance cotton seed which I get from factories. The factories do not keep the seed for sowing and for cattle food separate. The price of seed is Rs. 14 in Ichhawar Tahsil and in Bhopal Rs. 12-8 for 4½ Bengal maunds which are equal to one local *mani*.

2675. I have sometimes to get my cotton surveyed under the Bombay Cotton Trade Association arbitration rules and sometimes an allowance against me is made according to the surveyor's report. I sell sometimes on sample sent from here and when the bulk of the cotton reaches Bombay and is not up to the standard of the sample it is only then that surveys are held by the Cotton Trade Association. But if the bulk of cotton has already landed in Bombay and the buyer sees the bales, examines them and fixes the price for them then there is no necessity for a survey as the price is arranged accordingly.

2676. I never damp cotton. That is not the practice here. It is done in Khandesh and Jalgaon. There is no mixing here because we get only one type of cotton in this State. There is no sand or other foreign substance put into the cotton.

2677. (Mr. Roberts.) We purchase from Bind and sometimes from Ujjain but most of our purchases are made here. I buy from a thousand to fifteen hundred bales a year in Bhopal. In normal years, ten thousand to twelve thousand bales are pressed in the Bhopal State. Last year only five thousand bales were pressed but this year I do not expect more than two thousand. The ginners do not buy cotton. They only gin it and make a fixed charge for doing so.

XIII.—Gwalior.

Rao Bahadur BAPU RAO PONWAR, Subah of Ujjain District, Gwalior State.

EXAMINED AT UJJAIN, NOVEMBER 21st, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

2678. (1) **Experience.**—I have spent nearly six years in the Tawarghar District of the Gwalior State. Short staple cotton is generally grown there. In the Ujjain District, however, where I have spent about five

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years, short staple cotton like *bani*, *Nimari* and *Mewari*, is grown only to a very small extent. I have been in actual touch with cotton cultivators.

2679. (2) **Varieties.**—During the past five or six years the growth of the staple cotton like *bani*, *Nimari*, *Mewari*, has been on the increase in this district.

2680. (3) **Size of holdings.**—In Malwa and specially in the Ujjain District, the growth is still small, being extended only to about a tenth part of the whole cotton-growing area.

2681. (4) **Yields and profits.**—The yield of the short staple cotton like *bani* in unmanured fields, is from two to 2½ maunds per *bigha*. But as a rule this kind of cotton is grown on manured soil (*adan*) where its yield is from four to five maunds per *bigha*. In the former kind of soil the profit per *bigha* (after deducting expenses) is not less than Rs. 15 while in the latter it is estimated at Rs. 30.

2682. (5) **Rotations and manures.**—In a cotton soil the rotation of crops is as follows :—

- 1st year.—Cotton.
- 2nd year.—*Juar*.
- 3rd year.—*Rabi*.
- 4th year.—Cotton.

But in manured land, it is sown even in the third year. The usual manure used is cow-dung, etc.

2683. (6) **Comparative returns.**—The cultivators gain more by growing short staple cotton like *bani* than long staple cotton. But this gain is obtained on manured and watered soil. The reason is that the dealers generally mix this variety of short staple with long staple cotton and thereby they seek very good prices. It is, therefore, that cotton dealers give good prices for this short staple kind which differs slightly from the long staple variety.

2684. (7) **Conditions affecting increase in area.**—The area under cotton cultivation is not constant. In the beginning of the war, the rate of cotton was very low and hence that very year they reduced the area under cotton cultivation. This fluctuation depends upon the rates they secure for their produce. During recent years cotton has fetched a good price and so more area is placed under it. The seed of *deshi* short staple cotton grown in this district is mixed at the ginning factories with that of long staple cotton and hence this sort of staple cotton is increasing. If this process goes on, it is feared that the good variety of long staple cotton in Malwa will shortly disappear.

2685. (8) **Uses of seed and seed selection.**—The cotton seed is on this side generally used for cattle. No seed selection is practised. Cultivators take it from ginning factories and this is why the long staple variety is being spoiled. Seed selected for sowing is not hand-ginned these days.

(b) "Deshi" long staple cotton.

2686. (10) **Experience.**—I have lived in Districts Mandsaur and Ujjain of the Malwa Division. In the former district I was for about fifteen months, in the latter for 4½ years.

2687. (11) **Varieties.**—*Malvi* cotton of the long staple variety is generally grown in the Ujjain District.

2688. (12) **Size of holdings.**—The average area under cotton cultivation during the past five years is 179,822 *bighas*.

2689. (13) **Yields and profits and comparative returns.**—The average yield per *bigha* of *Malvi* long staple cotton is from 1½ to 2 maunds. Deducting the expenses, the profit per *bigha* is not less than Rs. 15, the gain for short staple kind. But this gain cannot compare with the gain on *bani* cotton grown on manured and *adan* land.

2690. (14) **Rotations and manures.**—The following is the rotation of crops :—

- 1st year.—Cotton.
- 2nd year.—*Juar*.
- 3rd year.—Wheat and gram.
- 4th year.—Cotton.

In some places, after a cotton crop is gathered, I hear that *rabi* or *kharij* crops are grown during the second year, and the cotton sown again during the third year. For *Malvi* cotton, no manure is generally used. Where, however, this is done, cow-dung, etc., is used.

2691. (15) **Conditions affecting increase in area.**—Cotton growing and the area under the long staple kind are on the increase in Malwa. It is possible to preserve and improve the pure *Malvi* variety only when arrangements are made at the ginning factories not to let its seed mix with any short staple kind. Wages are rising daily and various difficulties are now arising in the matter of securing farm labour. The need for the introduction of a "Labour Act" has begun to be felt in consequence.

2692. (16) **Suitability of existing varieties.**—Even with the present area under cotton, *deshi* long staple kind can be encouraged. In addition, the *roseum* cotton of Akola and the Cambodia cotton of Madras have, by experiment, been found by me to be more profitable. Both these varieties can be grown and encouraged here. Cambodia cotton has been introduced in some places but as yet it is only in the initial stage.

2693. (17) **Prevention of mixing of different varieties.**—At present, short staple cotton seed has not been mixed with *Malvi* cotton seed to such a degree that the preservation of the pure *Malvi* variety is impossible. It is still easy to arrange to have the seed of pure *Malvi* cotton ginned and kept separate from the short staple cotton at the factories, and thus preserve the pure *Malvi* variety. If the ginning factories supplied pure *Malvi* seed of cotton to the cultivators, the short staple kind would naturally be displaced and the two would not be mixed in the fields.

(2) In the cotton presses where pure *Malvi* cotton is mixed with a small staple *bani* or *Nimari* or *Mewari* this is usually done under orders of the cotton dealers who thereby secure better profits. In consequence, two different seals have been used by the owners of the presses to enable dealer in Bombay and other places to distinguish between bales of pure *Malvi* cotton and mixed cotton. The press owners are held responsible for the purity or otherwise of the bales, according to the seal used.

2694. (18) **Uses of seed and seed selection.**—The seed is usually used by cattle. No seed selection is practised. Usually the cultivator buys it at the ginning factories where he generally gets mixed seed, in consequence of which the two varieties are grown indiscriminately in the same plot. Hand-ginned seed is not generally sown in these parts now.

2695. (19) **General economic conditions.**—The most important suggestion I have to make here is that steps should be taken to remove the chief defects that threaten the extinction of the pure *Malvi* cotton

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variety, which deserves to be preserved. This will encourage people to grow the long-staple variety with advantage.

(c) *Exotic cotton.*

2696. (26) *Suitability of existing varieties.*—I have tested some varieties of cotton, viz., Dharwar American, Broach, Egyptian, *buri*, *roseum*, Cambodia and Mr. Coventry's K-No. 22 in short staple growing districts and also in Malwa. As a result, my experience is that long staple cotton does not grow well in districts that usually have grown the short staple variety.

(2) In Malwa, Cambodia and *roseum* cotton are found to yield a profitable outturn in districts like Ujjain which produce the long staple kind. The former variety is likely to be very popular here. The yield of this kind is still greater if the fields are irrigated; but even without irrigation, it is greater and more profitable than the *malvi* kind.

(3) I have not yet had full experience of Mr. Coventry's K-No. 22. But some plants that were grown one year were of the long-staple kind and were in good condition.

2697. *General.*—I am of opinion that the long staple variety of *malvi* cotton should be improved first and that the long staple variety of other places be properly tried and experimented upon, and if proved profitable, introduced here.

IV.—MANUFACTURE.

2698. (45) *Effect on cotton market of replacement of short staple cotton by long staple.*—If the long staple variety of *malvi* cotton or some other good variety of long-staple cotton be encouraged, it will produce a good effect on the cotton market, and the rate for Malwa cotton will then compare favourably with the rates of other long staple varieties.

V.—GENERAL.

2699. (46) *Attitude of buyers to improved cottons.*—There is nothing on record to show that buyers in the past helped or encouraged the cultivator to grow more cotton. At present the State cultivators' banks afford the cultivator very great facilities.

2700. (47) *Effect of water-rates.*—Our water-rates are not exorbitant. There is no request to lighten the water cess.

2701. (49) *Effect of tenure of land.*—The present land cess does not unfavourably affect the growth of cotton in the district. During the last settlement the land cess has been considerably reduced by the Darbar.

Rao Bahadur BAPU RAO PONWAR called and examined.

2702. (Mr. Henderson.) Two varieties of cotton are grown in this district—*Malvi* and *bani*. *Malvi* is long staple and *bani* is short staple; neither of them is pure; both of them are mixed. They are grown together on account of the mixture of the seed. They have to be grown together as pure seed cannot be obtained except in some portion of the State. *Bani* came from Nimar and Mewar (Udaipur). Of the two kinds of cotton, *bani* gives the bigger outturn and the higher ginning percentage. On irrigated soil, *bani* produces about four to five maunds of 82 lbs. to the *bigha* (a *bigha* is equal to half an acre) whereas in unirrigated soil the produce is from two to 2½ maunds. The yield of *malvi kapas* is 1½ to two maunds per *bigha* on unirrigated soil. *Bani* is the variety grown on irrigated land, not *malvi*. The ginning percentage of *malvi* is 12½ seers per maund of forty seers of *kapas*, i.e., about thirty per cent. and that of *bani* is thirteen to fourteen seers, i.e., about 35 per cent. At present the cultivators prefer *bani* on account of its higher ginning percentage and also on account of its higher yield. The cultivators would prefer the pure *malvi* if they could get pure *malvi* seed.

2703. Pure *malvi kapas* can be bought in the bazaar. The price of pure *malvi* last year was from Rs. 60 to Rs. 65 per *mani* of six maunds (494 lbs.) i.e., about Rs. 10 per maund of *kapas*. I cannot say what the price was, at the same time, of the ordinary *deshi* mixture. *Malvi* would not do well as an irrigated crop in my opinion. I cannot give any reason why it is so. I have not seen any case in which it was a failure where it has been irrigated. I am not speaking from my experience but I have been told so. I have got no practical experience nor do I come from the cultivating class but my opinion is based on my observation and experience as a Collector of a district and an officer of long standing who has served in those districts. My evidence is based on observation and enquiry rather than on practical experience.

2704. The total area of this district is 10½ lakhs of *bighas* of which 221,000 *bighas* are under cotton. So that the proportion under cotton is a little more than one-fifth. Two rupees a *bigha* is the highest assessment on dry land. In the case of irrigated land, the State only charges the irrigated rate, i.e., Rs. 1½ over and above the rate for unirrigated land. The assessment is not based on the particular crop grown. The only difference is between the dry and the wet assessment. There are wells as well as tanks in my districts. Irrigation has been decreasing for several years. Wells were constructed for the cultivation of poppy since the stoppage of poppy they have gone out of use. *Malvi* cotton is not irrigated but *bani* cotton is largely grown on well irrigated land. Cotton is not irrigated but it is sown on irrigated land. One watering is given to *bani* from wells in September or October. In the days of poppy cultivation we had no separate water rate but the consolidated assessment then ranged from about Rs. 8 to Rs. 20 per *bigha*. It varied so much on account of the quality of the soil. The highest rate at present is Rs. 8 per *bigha* for land irrigated from wells. Formerly there was no separate Irrigation Department or a separate water rate and there were no big irrigation works. Most of the irrigation was done from the wells and in those days the value of the water was included in the rates of assessment. Latterly that has been done away with in the case of the big works and now there is a separate rate for irrigation from channels but not from wells. In my district, there are about two dozen tanks with channels from one to three miles long. The figures of the area commanded by wells, irrigation works and tanks are given below:—

	Acres.
Irrigation from wells	7,089
From tanks	1,881
From other irrigation	73
From channels	79

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They are very important from the point of view of growing long staple cotton under irrigation. The height from which water is lifted in wells is on an average thirty feet. Since the poppy cultivation has been stopped, the wells have been falling into disrepair as they are not used for irrigation. Opium paid handsomely but there is no other crop now which can give an equally satisfactory return.

2705. (President.) I think that within recent years the short staple cotton *bani* has increased at the expense of *malvi*.

2706. (Mr. Roberts.) The cultivators look on wheat and cotton as equally profitable because they belong to two different seasons, one is a *kharij* and the other is a *rabi* crop. There are two Pergannas which are suitable for long staple cotton and five districts Sonkutch, Ujjain, Khachrod, Neemuch, and Pandhera.

2707. (Mr. Wadia.) I have stated in my written evidence that the short staple cotton seed has not been mixed with *malvi* to such an extent that a pure variety is impossible. This is based on my observations in the district. If a State Regulation were issued, I could arrange to have the seed of pure *malvi* seed separately ginned and kept separate from the short staple cotton at the factories by compulsion on the owners of ginning factories. I know that pure *malvi* cotton is mixed by the dealers for their profit. I know that the ginners mix *malvi* and *bani* seeds. They are also mixed in the presses. Short staple cotton is mixed with Ujjain in order to get more profit as Ujjain cotton fetches a higher price in the Bombay market. Seals have been prescribed by the State and each press keeps two seals, one for pure *malvi* which is put upon pure Ujjain cotton in order to distinguish it from the inferior mixed *malvi* cotton for which the other seal is used. A notification was recently issued by the State prescribing rules for the use of these two seals.

Rao Bahadur R. J. BHIDE, Naib Dewan Mal, Gwalior State.

EXAMINED AT UJJAIN, NOVEMBER 23RD, 1917.

No written statement was submitted by the witness.

2708. (President.) I am the Revenue Minister of the Gwalior State, with the designation "Naib Dewan Mal." I am the chief revenue executive authority in all land revenue matters, i.e., land revenue, agriculture, settlement, land records, survey and forests.

2709. The crops of the State can be roughly divided into two divisions from the point of view of cotton, the north-eastern portion, i.e., Gwalior, being suitable for short staple and the south-western, i.e., Malwa, for long staple. I put in a statement showing the area and outturn of cotton in the different districts. (Annexure I.) The Gwalior division is unimportant as compared with Malwa. The Malwa division consists of four districts—Ujjain, Shajapur, Amjhera, and Mandsaur. As regards Amjhera, the Vindhya range divides the district into two portions. In the southern portion, the prevailing type is *Nimari* which is short staple cotton. The northern portion is more hilly and *malvi* cotton is grown there, but the cotton of both the tracts comes to Ujjain for pressing to pass for Ujjain cotton, for every bale pressed at Ujjain is stamped with the 'Ujjain' seal. In the Mandsaur district, the Mandsaur portion is the *malvi* portion whereas the Neemuch portion is *Mewari*. The factory at Mandsaur gins *malvi* cotton and at Neemuch the factory gins *Mewari* cotton. Thus the northernmost and the southernmost portions of this division grow the short staple and the rest grows *malvi*. There may be some climatic reason for that. The climate of Nimar and Neemuch is very dry. They are also precarious tracts. The other portions have a steady rainfall. Malwa is known for this steadiness of the rainfall and there is broadly speaking never any scarcity or famine. The average rainfall is thirty inches and it is well distributed. Bhind and Tawarghar are the two northernmost districts in the whole State. Here climatic conditions are good and the land is also very good. These districts border on districts in British territory such as Etawah, Aligarh and Agra which are cotton growing districts, and like the people of the adjoining British territory, the people of our districts too are intelligent and prosperous.

2710. In this State, the Revenue Department is naturally interested in the development of any paying crop, both extensively and intensively. As regards extensive cultivation our present cultivated area for the whole State including the *Jagir* area is fifty lakhs of acres of which thirty lakhs are *kharij* and twenty lakhs are *rabi*. Cotton is a *kharij* crop and it occupies one-sixth of the *kharij* area, i.e., about five lakhs of acres, and therefore I have an idea that if the Committee advises and our Agricultural Department also advises, there is scope for the extension of the area, especially in the five northern districts, where at present cotton is practically conspicuous by its absence. There is not much scope for extension in the Malwa division itself because already the ratio of land under cotton is very high and having regard to rotations, etc., we cannot go very much further.

2711. Now as regards intensive development: we must consider this under two heads. One is the improvement of the staple and the other is the improvement of the yield. As regards the improvement of the staple up to the present, only one remedy has been suggested by Mr. Coventry and that is purity of the seed. He might have told you that before the Committee was appointed, he put up a note to the Darbar. On receipt of that note, His Highness appointed a Committee of his own in our State which consisted of the Subas of all the districts, the Director of Land Records, Mr. Coventry, myself and a few of the important *zamindars*, about thirty or forty of us. The Committee met at Sipri, and went into the question. In that enquiry, it was elicited that, up to the present, no exotic variety had been tried in the State with any degree of success that would justify our advising the cultivators to take to it. The cultivators want something that will give certain results, and cannot experiment. The experiments must be carried out by the State and when we are sure that they have been successful, then we can advise the *zamindars*. In the past some attempts have been made to get the cultivators to sow Egyptian or Cambodia and so on but they have not succeeded, and want of success only shakes the confidence of the cultivators in the advice that may be offered. Consequently one of the conclusions arrived at by our Committee was that, for Malwa, the *malvi* seed is the best provided it is kept pure. To ensure this purity, it is enough to introduce a few simple measures and we have got sufficient hold both on the cultivators and on the ginners under the terms of the licenses or leases which have been given, to be able to take such steps as may be desirable. I produce a copy of the license which is given to ginning factories and the presses (Annexure II). It consists of 23 clauses, one of which runs thus: "Statistics and other papers when required for any information will be furnished when so required and any rules, regulations and orders relating to royalty or to factory management in general in force or which may come into force will be observed without demur." Under that we can always ask the ginners to follow any procedure that we may lay down for them. That gives a great handle if we want pure seed. The penalty

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[Continued.]

for a breach of the agreement is stated in general terms. There is no specific penalty but there is a general understanding. Though there are no specific provisions for the withdrawal of the license if its conditions are not complied with, yet it would be a very easy thing to do without resort to legislation or rule having the force of law. The rules are not infringed; and there is no difficulty in enforcing them. Licensing goes on very satisfactorily from the point of view of the State and from the point of view of the licensee.

2712. As has already appeared in the evidence, two of our pergannas, Sonekutch and Khachrode, have retained the purity of their seed fairly well. There is a mixture of five per cent. only in Sonekutch. There are also ginning factories at Sonekutch which gin all the Sonekutch cotton and consequently it would be possible to secure purity of seed by arranging that Sonekutch seed should be supplied to the rest of Malwa. There are fifty thousand acres under cotton in Sonekutch and the seed from that would cultivate ten times that area. Four seers is the amount required for one *bigha* and we get forty seers of seed from a *bigha*. As regards the transport of seed, the State might undertake to bear the expense in the first year, if it were thought worth-while and would benefit the cultivators. If the whole district be once supplied with pure *malvi* seed, in the future, we could induce the *zamindars* to get just sufficient seed for their own sowing purposes by hand-ginning it and the rest would be sent to the ginning factory. The State could take these measures and the cultivators would fall in with them readily provided, of course, that they see that they will profit by it. That means that the buyers should offer a better price for pure *malvi*.

2713. The other branch of the question is the increase of the yield. For that we depend upon the advice of our Agricultural Department which has been started only lately. The Department has just commenced work and we hope that in a few years' time we may be able to make some progress even as regards yield per acre. The Director is Mr. Samuel Higginbottom and he is assisted by an expert in agricultural machinery. Mr. Higginbottom's headquarters are at Gwalior. Under the terms of his agreement he and his assistant between themselves have to spend five months in the year at Gwalior. He has besides two Deputies for the two divisions, northern and southern. They have not yet been appointed. The Agricultural Engineer has already been appointed. He is not a full time man. There are eleven *zilladars* or agricultural demonstrators, as they are called, one for each district. These have already been appointed. The lines of work that have been laid down by His Highness are that the *zilladar* or agricultural demonstrator has to be given a whole village on ordinary tenure as if he were a *zamindar* and that with the margin of the profit that he makes, he has to introduce improvements and demonstrate to the *zamindars* what can be achieved within the means at the disposal of an ordinary *zamindar*. If we had any demonstration on regular agricultural farms run at State expense and we succeeded in making improvements, it might be thought that they might not be within the reach of an ordinary *zamindar* because he has not unlimited funds at his disposal like the State. Consequently the Maharaja wanted to proceed in the matter in the most practical way.

2714. As regards statistics I put in a separate note for consideration. (Annexure III.) Yesterday one of the witnesses spoke about seals which have been introduced and which it has been made compulsory to stamp on the bales in Ujjain. I produce a copy of the circular on the subject. (Annexure IV.) It applies only to Ujjain and not to the rest of the State and therefore at Mandsaur there is no system of stamping with seals. So far as I know the system has been effective at Ujjain.

2715. We have no internal duties within the State itself, i.e., on any commodity going from one district of the State to another. We have export and import duties with reference to foreign territory. Any commodity coming to Gwalior from outside—the whole territory is treated as one unit—is charged import duty and any commodity leaving Gwalior is charged export duty. That is the general principle. In the case of cotton we have no import duty at all. As we want to encourage ginning and pressing in our State, we do not levy an import duty on cotton. The export duty is as follows:—

Bales pressed in hand presses—two annas per maund of 82 lbs.

Bales pressed in steam presses—three annas per standard maund, i.e., 15 annas per bale.

Loose cotton, (i.e., lint)—six annas per maund.

Kapas—three annas per maund.

Cotton seed—one anna per maund.

That is the present tariff. We have 69 ginning factories and 14 steam presses in the State. Hand presses are very few. The hand-pressed cotton is only about two thousand bales out of a total of 125,000 bales. We collect the customs duty at the time of export at the customs posts. Clause 6 in the terms of agreement is practically a dead letter now. It was drawn up according to the system that was in vogue some years ago. We used to charge royalty and not a customs duty then. Recently the royalty was abolished and a customs duty substituted for it.

2716. (President.) There are some large irrigation schemes under consideration for the northern division of the State. In the Malwa division, big irrigation works have never been undertaken and it is the opinion of expert authorities that Malwa is not suited for canal irrigation. There is a possible field for irrigation in the northern districts. Our biggest irrigation work is the Sankha Assan Canal. The canal runs through the Bhind district. This is not a scheme under consideration. It was completed some time ago. It is a series of tanks; one has burst but we can carry on irrigation quite well from the rest. No irrigated cotton is grown in that tract. The area that we have under cotton in Bhind is about 100,000 acres. It is not irrigated. If it were decided to take up American cotton, it would be under irrigation. The State is fairly well populated. All the cotton tracts are well populated, but not too densely except in Bhind. The culturable waste in the State is roughly as much as the cultivated area. There are various schemes for opening up this waste. The scheme of modern *zamindari* estates is only one part of our schemes. The experimental side is quite different. No experimental farm under the Department has yet been started except at Gwalior but it is in contemplation to start them. We have included both demonstration and experimental farms in our scheme.

2717. (Mr. Wadia.) If as a result of the deliberations of the Committee, any measures were suggested for the prevention of mixing and damping, the Darbar would be willing to consider the question of adopting them and their adoption would be quite within the meaning of the present ginning agreements. The Darbar would also consider any steps that the Committee might suggest for doing away with the pools. I may add that information about pools reached the Darbar sometime ago and to counteract them, the Darbar has recently given a license to a pressing factory on the condition that the owner will not join the combine. The Darbar might be ready to grant licenses to other presses in order to break up the combine.

2718. (Mr. Ashton.) I am afraid that the canals as a whole would not have enough water to permit of early sowings before the rains except in Bhind where there is water available all the year round. At present there is no difference between the sowing and picking seasons of the different cottons in the State. It is practically the same for all.

Gwalior.]

Rao Bahadur R. J. BHIDE.

[Continued.]

ANNEXURE I.

Statement showing the area and outturn of cotton in the different districts of the Gwalior State.

Year A.D.	Sanwat.	AREA IN ACRES.			YIELD IN BALES.			REMARKS.
		Malwa Division.	Gwalior Division.	TOTAL.	Malwa Division.	Gwalior Division.	TOTAL.	
1	2	3	4	5	6	7	8	9
1902	1959	125,368	126,202	251,570	34,248	21,036	55,284	
1903	1960	195,217	153,723	348,940	40,120	28,238	68,358	
1904	1961	216,420	129,133	345,553	49,132	11,908	61,040	
1905	1962	262,814	116,996	379,810	49,148	3,223	52,371	
1906	1963	318,069	134,659	462,728	71,615	42,399	114,014	
1907	1964	292,376	163,425	455,801	25,140	4,573	29,713	
1908	1965	268,079	117,435	385,534	45,966	9,016	54,962	
1909	1966	295,384	120,100	415,484	62,121	18,086	80,207	
1910	1967	379,546	123,049	502,595	60,652	23,412	84,064	
1911	1968	403,473	37,731	441,207	71,443	4,793	76,236	
1912	1969	386,142	107,231	493,373	58,111	17,893	66,004	
1913	1970	411,608	89,141	500,749	69,165	3,075	72,240	
1914	1971	410,748	109,820	520,568	66,110	23,471	89,581	
1915	1972	289,390	69,265	358,655	44,835	4,443	49,278	
1916	1973	415,624	95,236	510,860	65,498	15,326	80,824	

NOTE.—(1) Malwa Division consists of four districts, (1) Ujjain, (2) Shajapur, (3) Mandsaur and (4) Amjhera. Gwalior Division consists of 7 districts, (1) Bhind, (2) Tawarghar, (3) Gird, (4) Sheopur, (5) Narwar, (6) Bhelsa and (7) Isagad.

(2) Broadly speaking, I would call Malwa Division the long staple division and Gwalior the short staple division.

(3) The relative importance of the districts from the point of view of cotton will appear from the district figures of cotton area for any one year. Taking 1916 A.D., they stand thus:—

Malwa Division.

	Acres.
1. Ujjain	155,417
2. Shajapur	164,166
3. Mandsaur	67,376
4. Amjhera	28,665
TOTAL	415,624

Gwalior Division.

	Acres.
1. Bhind	49,803
2. Tawarghar	17,873
3. Gird	13,734
4. Sheopur	3,322
5. Narwar	4,922
6. Bhelsa	2,259
7. Isagad	3,263
TOTAL	95,236

(4) The *Jagir* area is about one-fifth of the whole.

(5) Irrigated cotton is practically nil.

(6) The total *kharif* area in the Malwa Division is 13½ lakhs of acres, out of which the cotton area is 4 lakhs which is a little less than one-third.

(7) Thirty lakhs of acres is the *kharif* area for the whole State. It is distributed among the different crops as under:—

	Lakhs acres.
Cotton	5
Oil seeds	3
Juar and Bajra	17
Pulses and Miscellaneous	5
TOTAL	30

Gwalior.]

Rao Bahadur R. J. BHIDE.

[Continued.]

ANNEXURE II.

Copy of license issued to ginneries and presses in the Gwalior State.

IN THE COURT OF THE INSPECTOR-GENERAL OF COMMERCE AND INDUSTRY, GWALIOR GOVERNMENT.

Qubuliat.

I.....son of casteresident of Mouza.....
Pergana..... District ofaccording to the reso-
 lution passed in the meeting of the Commerce Board, dated the.....start a factory (cotton ginning
 or cotton press with single or double spindles) at.....Pergana.....and do hereby declare
 by subscribing to certain conditions and behave in every way like a subject of the Gwalior State.

1. The factory will be known as (name) Cotton Ginning Factory and will continue to work
 under this name.

2. Land measuring.....*bighas* for building the Factory should be granted by the Darbar in.....
 This land according to the Resolution No.....shall remain in my possession so long as my conduct con-
 tinues satisfactory or so long as the Darbar deem it fit to allow me to retain its possession. The rent of the
 land fixed by the Government after its survey shall be paid by me yearly to such Authority as the Darbar
 may be pleased to appoint in this behalf.

3. If the work of the Factory is found satisfactory and the Darbar are satisfied with it, extra land for the
 Factory, if desired, shall be granted.

4. The rent of the land shall, according to the stipulation, be regularly paid to the Government so long
 as the Factory stands on it but if the machinery is, for some reason or other, removed, the land shall be cleared
 and handed over to the Darbar and thereafter the rent of such land shall cease to accrue.

5. The Factory will commence work within nine months of the date of granting the land after survey.
 If the Factory does not start work within the period stipulated for, the Darbar may treat the security of
 Rs. 500 deposited by me as forfeit to the Government and if the Factory commences work within the time
 stipulated, the security in deposit shall be paid back to me.

6. The Darbar are at liberty to collect customs dues according to Customs Tariff Schedule on all cotton
 seed ginned in the Factory whether such cotton is brought into the factory from the Darbar or foreign terri-
 tory and whether such seed is exported, bought or sold locally, we shall have no claim to it whatever.

7. Daily return of all cotton ginned in the Factory or baled in the press shall, in the prescribed form, be
 submitted to whomsoever the Darbar may be pleased to direct and a royalty of annas five per five maunds
 of ginned or baled cotton shall, on the fixed date, as settled, be paid out of the earnings of the Factory to whom-
 soever the Darbar may be pleased to direct. A true and regular account of all income and expenditure of
 the Factory will be kept. If in course of inspection any fraud or irregularity is discovered, we will hold our-
 selves responsible for it and shall submit to whatever orders the Darbar may be pleased to pass in this respect.

8. The Darbar are at liberty to enhance or reduce the amount of royalty at any time.

9. The amount of royalty due will be paid without fail on the date fixed. If for some reason or other
 it is not paid on the date fixed, interest at two per cent. per mensem on the amount due will be paid from
 the date of default. In case it is not paid at all the Darbar will have full authority to recover it from the
 property, movable and immovable of me, the Karkhandar.

10. From dealers who do business in cotton, I shall charge wages according to the rates settled between
 ourselves. I shall neither harass such dealers nor oppress them; nor shall I seek undue help from the Govern-
 ment. The dealers shall be free to take their cotton wherever they like.

11. All articles such as wood, lime, stone, hides, iron, imported for use in the Factory will be liable
 to payment of customs duty according to Customs Tariff Schedule and the Customs Department will have
 authority to recover it.

12. Coolies working in the Factory will be exempt from *Begar* but in cases of exceptional Government
 work they will be liable.

13. All necessary help for extending the Factory shall, as a matter of grace, be given by the Darbar when-
 ever so applied for. The Factory shall reimburse all Government expenses incurred in rendering such assist-
 ance.

14. Though originally a resident of the foreign territory, I shall behave like a subject of the State and in
 all my dealings in the State I shall never raise the plea of being the subject of a Foreign State. On the other
 hand, I shall abide by the laws of the State.

15. My assets running to thousands of rupees, which in connection with the Factory shall be within the
 limits of the State, should be deemed as assets of my reliability and trustworthiness.

16. Boys and girls under twelve years of age will not be employed in the Factory (Ginning or Press)
 neither shall they be employed in such dangerous works in which there is danger to their life or limb either
 from the nature of the work or from their ignorance of it.

17. Ordinarily operatives will not have to work more than eight hours a day in the Factory; a recess
 of half an hour will be given during this period. Also a person will not have to work in two factories during
 the course of a day.

18. Only men qualified in engineering and able to take the responsibility of working machines will be
 employed to work machines.

19. Without previous sanction of the Darbar, I shall not have power to mortgage, sell or will away the
 Factory in charity or effect any other change in it and if any such transaction takes place without the sanction
 of the Darbar, it shall be considered invalid.

20. Due attention shall be paid to the health of the operatives working in the Factory.

21. Timely information of all happenings in the Factory which deserve to be brought to the notice of
 the Government such as fire, dislocation of the machinery, accident to life or limb, will be furnished.

22. Statistics and other papers when required for any information will be furnished when so required
 and rules, regulations and orders relating to royalty or factories, in force or which may come into force, will be
 observed without demur.

23. Due precaution for the safety of the public will be taken when water for use in the Factory is taken
 in or foul water or other such material is discharged.

Gwalior.]

Rao Bahadur R. J. BHIDE.

[Continued.]

The conditions laid down above will be duly observed. The Qubuliat is executed in pursuance hereof
 so that it may serve as Sanad.

Witness.

Signature of Karkhandar.

1.....

2.....

Signature of the Officer in whose presence the Qubuliat is executed.

NOTE.—The Qubuliat will be made out on an eight-anna stamp.

ANNEXURE III.

Note on Cotton Forecasts.

With regard to the cotton question it is difficult to understand why four forecasts on 1st August, 1st
 October, 1st December and 1st February, are required. The reason perhaps is that the sowing and reaping
 times of cotton all over India are not the same and consequently the number and dates of the forecast returns
 are intended to cover the whole range between the earliest and latest dates for the country as a whole. If
 this is the true explanation of requisitioning four forecasts, would it not do to call for only one return from
 each Province or smaller Division, or State, on a date appropriate to it?

As a matter of fact, so far as Central India is concerned, out of the four forecasts supplied, the first three
 are mere make-believes, and are worse than useless. A return with any approach to reliability could only be
 prepared after the *Kharif Girdawari* (field-to-field inspection and entry in crop register) by the *Patwari*.

According to the Land Records Manual of the Gwalior State, the dates of filling the *Kharif* crop-state-
 ment by the *Patwari* are as follows:—

1. With <i>Girdawar Kanoongo</i>	1st November.
2. „ <i>Tehsil</i>	10th „
3. „ <i>Soobat</i>	15th December.
4. „ Head Office (D. L. R.)	31st „

If the Statistical Department of the Government of India could wait till, say, a week after 31st December
 or at least till 15th November nothing could be better. Any returns prior to that date are a farce. The lower
 subordinates send up practically the same figures as the previous year's, with a certain speculative manipula-
 tion to conceal the real fact. If the Statistical Department of the Government of India cannot do without
 some sort of figures on each of the dates of forecasts at present in force, they might themselves use the pre-
 vious years' figures tentatively. After all, between two consecutive years, there can be no considerable
 variation in the acreage. Considerable variations are seen only when we take sufficiently long periods for
 comparison.

Of course, violent fluctuations are possible from year to year in the yield, due to seasonal conditions, but
 these cannot be anticipated on the dates of the earlier forecasts.

On the whole, therefore, it is worthy of consideration whether a reliable return based on the result of
 actual *Girdawari* is not preferable to a number of forecasts based on guess-work. It may be noted that even
 this one return will be in good time before the year's production is actually on the market and its publication
 will be a sufficiently timely notice to the trade and other interests.

The above remarks apply to *kharif* cotton. Irrigated cotton in our State is practically *nil*. Should it,
 however, attain appreciable proportions in future, a similar 'post-facto' return resulting from the *rabi*
Girdawari (15th April), should answer quite well.

In our State, these statistical returns are published in the Official Weekly Journal—the '*Jayaji Pratap*',
 and the Resident extracts the information from the copy of the Journal supplied to him, for his report to the
 Government Statistical Department. If the above suggestion about doing away with forecasts and sub-
 stituting one *pu'ka* return instead is accepted, it will be similarly published in the appointed week, in the
 State Journal through which it will be available to the Resident or to the Statistical Department of the Gov-
 ernment of India, direct.

ANNEXURE IV.

Copy of circular regarding the stamping of bales at Ujjain.

GWALIOR STATE.

Circular No. 2.

FINANCE DEPARTMENT.

Dated the 14th September 1917.

Whereas it has come to notice that inferior cotton from the Mandies (markets) of Indore and other
 places is brought to Ujjain to be exported to Bombay, with the object of passing it for Ujjain cotton of
 superior quality and for securing higher price fetched by the bales of cotton godown in the Ujjain District
 and other parts of Gwalior Territory and whereas it is feared that the good name of the Ujjain cotton will
 suffer and the price fetched by it will go down if the practice is allowed to go unchecked.

It is hereby enjoined on the owners of cotton presses at Ujjain that in each Press two seals should be
 maintained as follows:—

- (1) "Ujjain Pure"—with name of the Press,
- (2) "Ujjain mixed"—with name of the Press,

and that as soon as a bale is ready it should be stamped with the seal corresponding to the one or the other
 quality mentioned above.

Indore.]

Rai Bahadur HIRA CHAND KOTHARI.

Each owner of Cotton Press will be held responsible for the correct use of the seals, in default of acting on these directions, or using the seal in the improper way, or in the event of his not putting any seal at all on bales, the owner will be liable to be punished under Gwalior Penal Code, Offence No. 66, i.e., disobedience of lawful order.

This circular shall come into force from the date of its publication.

XIV.—Indore.

Rai Bahadur HIRA CHAND KOTHARI, Deputy Revenue Minister, Indore State.

EXAMINED AT INDORE, NOVEMBER 24TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

2719. (1) **Experience.**—Aminship (*Tehsildari*) and Subait:—I was in the Rampura-Bhanpura District for fourteen years and in the Mehidpur District for five months, during which period I was in touch with the cotton cultivators.

2720. (2) **Varieties.**—Generally, the *bana* seed is sown. *Bani* is also sown.

2721. (3) **Size of holdings.**—The size of the cotton holdings is not fixed. It depends upon the resources of the holder and upon the assistance which he may be able to get for agricultural pursuits.

2722. (4) **Yields and profits.**—The yield depends upon the quality of the soil and upon the labour and outlay. But the average yield, from dry land, which is neither manured nor watered, may be put at four maunds per acre. And that from dry land, which is manured but not watered, at five maunds per acre. The profits on average come up easily to four, six or eight rupees per acre. Those from land which is both manured and watered and sown before the *Mrug Nakshtra*, may be put at one *mani* per acre. The profits vary according to the market rates, though it may be stated that they are never less than Rs. four per acre.

2723. (5) **Rotations and manures.**—In dry fields of cotton, wheat, *juar*, *gram*, *til*, etc., are grown by rotation. In wet fields, *makki*, *urud*, *san*, *chawali*, wheat, *jab*, etc., are sown by rotation. Manure is put in very few cases of dry land. In wet lands, the manure mostly consists of cow-dung, rubbish and goat-dung and sometimes of *san*. Camels and goats are also scared in the cotton fields to secure their dung and urine for manure.

2724. (6) **Comparative returns.**—The cultivators generally do not prefer to sow other seeds than the *deshi*. Sowing of other seeds does not give due return unless the weather conditions are suitable, and it would not be safe to fix an estimate of the return from such sowings which are only for the sake of samples. In the absence of sufficient cotton-sown area and sufficient quantity of produce, the proportion of yield cannot be rightly known.

2725. (7) **Conditions affecting increase in area.**—If the market rates of cotton rise high and if the rainfall is timely, the cultivators sow a larger area with cotton seeds in the hope of larger profits. But cotton sowings are reduced if the rates of cotton fall down and those of other articles rise and rainfall is not timely, if labourers are not sufficiently available and if cost of labour rises. Extensive sowings can be carried on when there are hopes of good income and when labourers can be procured in sufficient number and at small wages, and when the population and the resources of cultivators increase.

2726. (8) **Uses of seed and seed selection.**—The seed of cotton is used as a feeding material for cattle and is preserved for sowing purposes. Occasionally it is made use of in medicines and is also exported for extraction of oil. The selection of seed is made by good cultivators, the best cotton fruit out of the first gathering being preserved for this purpose. Such selection of seed produces a better crop. Inferior seed not only fails to give a good outturn but has to be sown in greater quantity, and necessitates sometimes resowing. The cultivators who preserve the best kind of cotton from first gathering for sowing operations have the cotton ginned by hand mills. This procedure saves the seed from being crushed and less quantity of seed is consequently required for the same area than is otherwise required. The seed is unmixed and productive. The seed obtained by ginning is crushed and is not of one quality and being generally kept into the open air is mixed with dust and is saturated with moisture if exposed to rains. A greater quantity of such seed has to be sown and often one or even two sowings prove abortive. And if before the third sowing is undertaken, the season is gone, the cultivators are put to considerable loss on account of the cost of the seed, and have to sow another crop instead.

(b) "Deshi" long-staple cotton.

2727. (16) **Suitability of existing varieties.**—The tenants generally prefer the kind of seed that involves less cost and labour. If superior kind of seed necessitates increase in cost and labour and does not give adequate outturn, people will not be willing to purchase it.

2728. (17) **Prevention of mixing of different varieties.**—If cotton of different qualities be ginned separately in factories and the seed kept separately, there is no chance of the seed being mixed. Or if selection of cotton be made at the first gathering and the ginning made in hand mills, the seed will be unmixed.

(c) Exotic cotton.

2729. (28) **Importation of seed.**—The Agricultural Department is making experiments in the State as to what kind of cotton is grown best in the different soils in the State. It would be advisable to import those varieties of cotton seed which would be found best on experiment.

Indore.]

Mr. S. L. TAMBE.

Rai Bahadur HIRACHAND KOTHARI called and examined.

2730. (*President.*) I am the Deputy Revenue Minister. There is no separate Revenue Minister and I am the head revenue authority. The whole area under cultivation in the State is nineteen lakhs of acres of which three lakhs of acres are under cotton. There are three kinds of cotton, *malvi*, *Mewari* and *Nimari*. The largest area is under *nimari*. There are five districts in the Indore State. Cotton is grown in all of them. Nimar is the district in which most cotton is grown followed by Nimawar, then Mehdiapur, then Rampurbhaddura and then Indore. Kanod is in the Nimawar District. In Nimar, most of the cotton is of the Berar quality.

2731. There is an export duty on cotton. Six annas per maund of *kapas* is the export duty on a *pukka* maund of 82 lbs. On lint it is four annas and the same on fully pressed bales. There is an excise duty on cloth manufactured in the mills of 3½ per cent. It is levied whether the cloth is exported or not. There is no extra duty on goods exported to England.

2732. We have an Agricultural Department in the State. We have a Director and two Assistant Directors. We have only one experimental farm of 160 acres. I cannot say how much of it is under cotton.

2733. (*Mr. Henderson.*) We tried some American types of cotton but they were not successful.

Mr. S. L. TAMBE, Officiating Director of Agriculture and Registrar, Co-operative Societies, Indore.

EXAMINED AT INDORE, NOVEMBER 24TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

2734. (1) **Experience.**—I have been in charge of the Agricultural Department of the Holkar State for over a year and a half. Experiments in different varieties of cotton, indigenous as well as foreign, are being conducted on the Indore experimental farm. I have had opportunities to get information from the cultivators of the Indore District with regard to the cultivation of cotton and we have very recently started an experimental station for cotton in the District of Nimar.

2735. (2) **Varieties.**—In the District of Indore which is situated on the Malwa plateau, a variety of cotton known as the "*malvi*" is grown. This variety when pure is a fine long staple cotton, much valued by mill owners. During the last decade, however, the cultivators being unable to get pure unmixed hand-ginned seed, get mixed seed from the neighbouring gins and presses and the result has been that the pure *malvi* seed has vitiated and the present *malvi* cotton is of a mixed kind and does not command the same value as it did ten years ago. Similarly the pure variety grown in Nimar District has also been vitiated by mixture with foreign varieties imported from outside and recommended for trials by persons who knew nothing about cotton but who brought with them from outside some variety of cotton which had been known to be very remunerative in the country from which they came. This was a very regrettable circumstance, and it is very difficult now to bring the *malvi* and the *Nimar* varieties to their former purity. The *Nimar* variety is short stapled and is largely mixed with *roseum*.

2736. **Cultivation of cotton.**—It is not possible to give the average size of holdings in which cotton is grown as generally all cultivators in Malwa grow cotton for rotation. Light soil is very suitable for it and slopes and shallow soils are utilised for cotton. It is grown on dry land and very rarely, if ever, grown in irrigated lands nor is any manure used. Of the whole crops area from one-sixteenth to one-tenth is under cotton. The yield of *malvi* cotton varies with the class and depth of the soil and on an average one acre yields 240 lbs. of cotton. According to the estimates based on the information obtained from the cultivators the net profit per acre comes to nearly three to five rupees.

2737. **Experiments with cotton on the Indore experimental farm.**—Experiments in cotton are being conducted on the Indore experimental farm for the last two years and unfortunately both these years have been very wet years and cotton suffered and our experiments have not been productive of any reliable data to enable us to give any definite opinion as to the advisability of growing any particular variety. Among other varieties we tried Cambodia on the farm in dry and wet lands. Our experience was that it was not suitable for the dry land and the data for the wet land are very meagre. This year we experimented in *bani* and *deshi* Lahore (the Sindewahi cross), K-22 and Tinnevely of the exotic varieties. We tried Cambodia and Cawnpore American. We were very hopeful of K-22. We thought that this variety would suit the Malwa soil quite well. We, however, find that that is the variety that has suffered most. This year there have been unusually heavy rains and this year's results cannot be taken as conclusive. The *deshi* variety is found to be best at present this year. As we have not been able to get a favourable year for cotton experiments, we have not arrived at the stage where we could pass any definite opinion. Even after repeated experiments under varying conditions, when we find any particular exotic variety thriving well in irrigated lands, we shall have to see whether we can recommend it to cultivators with due regard to his earnings from the same irrigated land by means of vegetables and other crops which can be grown in that land during the long period for which the exotic cotton remains in the fields.

2738. (7) **Conditions affecting increase in area.**—The chief factors that affect the increase of cotton cultivation are its price, rains and labour. If prices continue to be high, the cultivators are naturally tempted to put his land under cotton. The heavy rains of the last two years will have a very deterrent effect next year and the scarcity of labour experienced now-a-days is also a discouraging element.

2739. (17) **Prevention of mixing of different varieties.**—It is admitted on all hands that the seed is mixed, but up to now no scientific enquiry has been made about this and it is not possible to recommend any definite measure to prevent mixing.

2740. (18) **Uses of seed and seed selection.**—The only use to which cotton seed is put is food of cattle and that used for cotton sowing.

Indore.]

Mr. K. R. JOSHI.

Mr. S. L. TAMBE called and examined.

2741. (President.) I am the Officiating Director of Agriculture. My permanent appointment is that of Registrar of Co-operative Societies. A separate Director of Agriculture will be shortly appointed. I have had no training in agriculture, but I have been in touch with cultivators and I have had some experience during the last year and a half.

2742. We tried Broach and other cottons the year before last and we sent samples to Mr. Gammie who replied that the *malvi* was the best and suggested the selection of plants from it. Mr. Coventry subsequently advised us to try some exotic cottons and other varieties and this has been done. Trials with exotics and selection work in *malvi* are therefore in progress in the farm. Last year was a very bad year. At present Cambodia is much more promising than the others. It is better this year than last year. My Assistant, Mr. Joshi, is doing selection work. I am a native of Indore. Every body admits that *malvi* is deteriorating. That is also my opinion. If I continue as Director of Agriculture, I shall continue the trials with exotics and the selection work on *malvi* provided, of course, that I find that it proves paying to the cultivators.

2743. We have two farms. There is one farm at Indore and we have also a small farm at Nimar, on which Cambodia and some *nimari* cotton are being tried.

2744. The Agricultural Department has a staff of seven in all including myself. The staff consists of a Director, an Assistant Director, a Superintendent of Farms, two Assistant Superintendents, a Demonstrator and an Agricultural Assistant in charge of the small farm at Nimar.

2745. (Mr. Henderson.) The average yield of cotton per acre on *barani* (unirrigated) tract is 240 lbs. of seed cotton. My figures are based on the information obtained from cultivators.

2746. I have not seen any of the broad leaf American type of cotton in the districts. The *Nimari* cotton is a mixture of *roseum* and yellow flowered cotton. It has rather broader leaves than *malvi*. *Malvi* and *Nimari* are the two classes of cotton that I know.

2747. (Mr. Roberts.) I do not know very much about K-22. We tried it this year but it was a complete failure. We cannot say anything definite about it at present, but we are not hopeful about it. We have not given out any pure seed to cultivators yet but when we have got pure seed to give out, we intend to start co-operative seed unions on the lines followed in the Central Provinces. I intend to go to the Central Provinces shortly. I have been in the United Provinces. Co-operative work in Indore has been in progress for the last two years.

Mr. K. R. JOSHI, Acting Senior Assistant to the Director of Agriculture, Indore.

EXAMINED AT INDORE, NOVEMBER 24TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

2748. (10) Experience.—I have been stationed in the District of Indore for the last four years and have been in touch with the cotton growers of this district.

2749. (11) Varieties.—The cotton grown in the district is a mixture of various varieties and is known as *malvi*. Botanically, the mixture mainly consists of white and yellow flowered *neglectum* varieties of which the latter invariably predominates. Amongst other varieties found in the mixture, *huri* (lately introduced by a Police officer) is the most prominent and constitutes about a tenth of the mixture known as *malvi*. The *neglectum* varieties found in the mixture may further be divided into short and long stapled varieties. The proportion of these in the mixture varies in different samples, but as a rule the proportion of short stapled cottons is very small and may range from ten to twenty per cent. in the mixture.

2750. (12) Size of holdings.—Holdings of all sizes grow cotton provided they include an area suitable for the crop. Cotton does not grow well in deep black soils of this district. Lighter soils with a porous substratum is usually preferred. But when cotton has to be grown in deep black soils, the requisite considered essential is that the field must be either level or sloping so as to facilitate surface drainage at least. If then a holding does not include a field which is neither light nor well-drained, the cultivation of cotton in that holding is not attempted. The proportion of the area, which the cotton occupies in the holding at present is about ten per cent. only.

2751. (13) Yields and profits and comparative returns.—The average yield of *malvi* cotton is about 200 lbs. per acre, and the cost of cultivation may be put down at Rs. 12. The net profit which the cultivator gets from this crop entirely depends on the value of cotton in the market.

(2) For some time past only a few of the cultivators have started importing *roseum* seed from Akola and it has been claimed by these, that the *roseum* brings to them not only a larger yield but increased profits also. As an Assistant in charge of the Indore Farm, I also have grown this cotton for three years, and fully concur with what the above cultivators claim.

(3) It is only in years of moderate rainfall that cotton can compare favourably with other crops like wheat, *juar*, etc., but when taken over a number of years, I am of opinion that the *rabi* crops would prove more remunerative for the simple reason that due to the great retentive capacity of these soils, the *rabi* crops are more certain than the cotton which is adversely affected by the same phenomenon.

(4) Exotic cottons of which Cambodia and certain Sind-American and Cawnpore-American types are being tried at the farm require to be started with irrigation in May, or preferably in April, to get the best results. The total irrigated area of the district is very small and the means of lifting water are primitive and costly. The use of water is therefore naturally made for crops which are assuredly profitable and certain of success. Last year we grew Cambodia on the farm and perhaps owing to the excess of rain it did not yield well; this year again the same has happened and I am not in a position to say whether or not the application of water for exotic cottons warrants the use made of it. Again, granting that it gives returns comparable with other irrigated crops, the other barrier that still stands in the way is that the cotton would occupy the land for about ten months leaving it feasible to take only one crop in the year, whereas it is usual to take two, or sometimes even three crops during the same period; thus affording opportunity to make the best use of land and capital available.

Indore.]

Sirdar S. R. VINCHURKAR.

2752. (14) Rotations and manures.—Cotton is preferably taken in a land which is previously cropped with *juar* or *tur* but it may also come after wheat. After cotton, the land is usually put under some *rabi* crop and then either *juar* or cotton is taken in the following year. No manure is ever applied to a dry-land crop.

2753. (15) Conditions affecting increase in area.—As regards this district, the only special condition which is likely to affect an increase in the area under cotton, is the consideration of rainfall. The majority of lands found in the district are deep black and consequently greatly retentive of moisture. The cotton therefore does well only in years of either scanty or moderate rainfall. Continuous rains or the excess of same spoil the crop entirely. The fact has been clearly demonstrated in the previous as well as in the present year, and as a natural effect of this, the area under cotton which had been steadily increasing till 1914-15 has started going down, and unless the character of rain suffers a change for the better, any increase in the area under cotton does not seem possible.

2754. (16) Suitability of existing varieties.—The District of Indore grows *malvi* cotton only all throughout. Experiments to ascertain the most suitable variety of indigenous long stapled cotton from outside Malwa are being conducted at the farm, and it is but premature to say anything of them at this stage.

2755. (17) Prevention of mixing of different varieties.—As already said, the local *malvi* cotton is a mixture of various varieties. An attempt to grow pure strains of *malvi* is being made at the farm. A suitable and practicable measure for preventing the mixing of seeds can only be recommended when the degree of aptness of cultivators to co-operate with the effort of the Department in this direction are fully ascertained. I am therefore unable to submit my views on the point until the above is done.

2756. (18) Uses of seed and seed selection.—Cotton seed is utilised for feeding draught and milch-cattle; oil pressing concerns are wanting in this district and the surplus of seed is exported. Seed selection is not practised and the hand ginning of cotton for seed is not done.

Mr. K. R. JOSHI called and examined.

2757. (President.) I am the Agricultural Assistant and Superintendent of the Indore Farm. I was trained at Nagpur and took a degree there. I came to the Indore State in 1913.

2758. The types of cotton at present grown in our farm are the Sindewahi cross (*bani deshi* Lahore), K-22, *malvi*, which is a mixture, Akola, *malvense*, Cambodia, Sind-American, Cawnpore-American and Tinnevely. All these varieties are being grown experimentally. We shall test all these varieties and see which of them is best suited to local conditions. We have begun our selection work, and it is in its third year. Both last year and this year have been very bad so that not much has been done so far. As to the methods of selection, Mr. Gammie came here in 1916 and selected one plant of *malvi* to be multiplied. That is being done. We have also cottons from other parts of Central India. We have samples from Rutlam, Dewas, Dhar, Alot and Bagod. These have been sown this year on the farm. Most of them are single plants. We got them from the Agricultural Adviser in Central India. They have not done well this year. The samples from Rutlam are the best. The others have suffered very badly from rain. We have tried *roseum*. It yields more than the local variety and some of the cultivators prefer growing it because it fetches a higher return. We have grown some of the exotics, viz., Cambodia, Sind-American and Cawnpore-American under irrigation. We are also irrigating some of the indigenous plants to see how they will do. Most of my time I spend on the farm. Occasionally I go out in the district but not often. I have not come across any fields of American cotton in the district. The ordinary average yield of *deshi* cotton is about 200 lbs. per acre.

Sirdar S. R. VINCHURKAR, B.A., Subah of Nemawar.

EXAMINED AT INDORE, NOVEMBER 24TH, 1917.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

2759. (10) Experience.—I have been stationed in the Nemawar District for the last two years. I have been in touch with cotton cultivators.

2760. (11) Varieties.—One-fourth of the cultivated area of the Nemawar District is under cotton. The chief crops are of long staple fine quality, and well known in the Bombay and other markets. The length of the staple ranges from one to 1½ inches. This is the only sort of *deshi* cotton produced in this district. Recently Berar short staple cotton has found its way in this district and the cultivators are beginning to take a liking for it on account of its greater yield and ginning percentage. Its staple is short and weak. If it mixes in the long staple *deshi* local cotton, it is likely to spoil the quality of the local long staple cotton. There is no other variety in this district. During the last two years the cultivation of Cambodia cotton was tried in small areas, but did not meet with good results. It was found that the *deshi* long staple cotton has a more and a finer yield than the Cambodia cotton.

2761. (13) Yields and profits and comparative returns.—The average yield per acre of long staple local cotton is on the average, in a normal season, fourteen to fifteen rupees, and profit four to five rupees. With short staple Berar cotton the yield is fifteen to seventeen rupees and profit five to six rupees an acre.

2762. (14) Rotations and manures.—In the same field cotton crop is grown every alternate year. In the intervening year *juar* or wheat is grown. The cotton fields are not generally manured except in insignificantly few cases. All available manure is applied to wheat. For cotton, the cultivators depend only on the fertility of the soil.

Indore.]

Sirdar S. R. VINCHURKAR.

[Continued.]

2763. (15) **Conditions affecting increase in area.**—It is possible to increase the area under *deshi* long staple cotton and to improve the quality of cotton of this district—

- (1) by an establishment of seed-farms and godowns with a view to distribute the seed to cultivators;
 - (2) by the co-operation of the Agricultural and Co-operative Departments;
 - (3) by the formation of some form of buying agency which would arrange to purchase small quantities of cotton from the cultivators direct and gin and market it;
 - (4) by securing summary remedy in cases of the absconding labourers;
 - (5) by affording special facilities for fuel from the forest.
- (2) Since the recent rise in the prices and demand of cotton for the last few years, cotton cultivation got a new impetus.
- (3) There is practically no irrigation in this district and so irrigation rates cannot have any effect on the area under cotton. The area of cotton is practically determined by the two factors—(1) current prices and (2) the character of the season.
- (4) The cultivators of this district, with a few exceptions, are not really good cultivators. They are an illiterate lazy class of people. They do not try to select their seed, properly manure their fields, pick the cotton in proper time or improve the quality of their cotton. The shortness of the season and, at times, the lateness of rains add to their difficulties.

2764. (16) **Suitability of existing varieties.**—The present quality of cotton, i.e., the long staple *deshi* cotton, is best suited for the hot and dry climate of this district. The introduction of American, Egyptian or other foreign seed is bound to be a failure as there is no humidity in the climate which is essential for these sorts of cottons. Besides, there is no irrigation in this district. The quality of the local cotton is a good one and I see no necessity of any other quality being introduced. As I have already stated, Berar short staple cotton is finding favour with the cultivators and in time to come, by a mixture of these, the quality of the present cotton is likely to deteriorate. No premium is offered by the buyers to encourage the growth of good quality cotton and I am afraid that this might lead to the preference of short staple Berar cotton to the detriment of the long staple local cotton. To guard against this, the buyers shall have to be induced to pay some premium on the long staple cotton and to gin the Berar and *deshi* long staple cotton separately. In some gins, they separately gin these two varieties.

2765. (18) **Uses of seed and seed selection.**—The cotton seed is used only as fodder and for sowing. No seed is hand-ginned and no selection is practised.

II.—COMMERCIAL ASPECT.

2766. (30) **Local trade customs.**—Cotton of this district is sold at Indore, Harda, and the gins at Kanod and Khategaon. The cultivators in general go directly to the various buyers and sell their cotton to the one who gives the highest price. There is no regular market in this district. An attempt has been made last two years to open a market at Kanod and it is hoped that it will induce cultivators to bring their produce to the market. Last year it was found that many cultivators instead of going to the usual buyers came to the Kanod market from distances. If it is properly managed, Kanod, in time, is bound to be the central market for this district.

Mr. S. R. VINCHURKAR called and examined.

2767. (President.) I took my B. A. Degree in Philosophy. My duties are practically those of a Collector of a district in British India. I therefore see a good deal of the cultivators when touring, but my experience is limited to the last two years. I take an interest in agriculture. The cultivators of my district are lazy and do not take much interest in agriculture. The cotton grown in my district is said by the millowners to be next to Broach cotton. The best cotton comes from the south of the district, from Khatapot and Khategaon near the Narbada. Kanod is in my district. The cotton of the whole district is called Kanod as Kanod is the head-quarters of the district. It would be a good thing to open a market at Kanod with proper market rules. In my written evidence, I have suggested the possibility of increasing the area under cotton by the establishment of seed farms and godowns by co-operation between the Agricultural and Co-operative Departments, by the formation of some form of buying agency which would arrange to purchase the small quantities of cotton produced by the cultivators direct and gin it and market it, by securing a summary remedy in case of absconding labourers and by affording special facilities for obtaining fuel from the forest. There is great difficulty in regard to labour in my district. Cow-dung is used for fuel. If fuel could be obtained from the forests the cow-dung could be used as manure.

2768. (Mr. Henderson.) There is practically no irrigation in my district; only three hundred acres are under irrigation. There is no old poppy land. There are no wells except those which are used for drinking purposes. The total cultivated area of my district is 225,000 acres. Of this 56,000 acres are under cotton. At present there are no irrigation schemes under consideration. It has been proposed to bore tube-wells but it has not been tried so far.

2769. The cotton from my district is brought to Indore, a distance of sixty miles. It takes from two and a half to five days for the bullock carts to come into Indore. There is no nearer market except Indore and Harda. We have been trying to establish a market at Kanod experimentally for the last two years and, I hope it will succeed. A small market has already been established but it is not on a large enough scale to be profitable. The cotton is brought in by cultivators in their own bullock carts generally, as if they were to hire bullock carts, it would not pay them.

2770. (Mr. Roberts.) Berar short staple cotton is spreading to a great extent because a proper premium is not being paid for long staple cotton. My enquiries from the dealers in cotton show that they do not pay a premium for the long-staple but, on the contrary, they pay rather more for the Berar cotton on account of its higher ginning percentage. At times, the cultivators mix the two cottons to secure better price. The *kupas* of the Berar cotton fetches a higher price because of its higher ginning percentage and larger outturn. I think that the real reason for the spread of short staple cotton is that the buyers are not properly organised to pay a higher price for the long staple. They must be induced to pay a higher price for it so that the cultivator can grow it with profit. They would only sow that cotton that would fetch them most.

Indore.]

Mr. BERNARD COVENTRY, C.I.E.

Mr. BERNARD COVENTRY, C.I.E., Agricultural Adviser to States in Central India.

EXAMINED AT INDORE, NOVEMBER 26TH, 1917.

Written statement.

2771. **Preamble.**—Before taking up my present appointment as Agricultural Adviser to States in Central India I was for twelve years Director of the Agricultural Research Institute, Pusa, the last six years of which period I was also Officiating Inspector-General of Agriculture and Agricultural Adviser to the Government of India. In consequence of the appointments which I held, I came into touch in a general way with most of the cottons in India and with the problems confronting them.

2772. **Cotton problems in Central India.**—My views on the cotton in Central India can best be submitted by giving the following extracts of a note which I lately prepared and circulated to the Darbars:—

“(1) The principal cotton tracts of Central India are the Malwa plateau and Nimar in the valley of the Narbada, producing nearly 300,000 bales worth 5½ crores of rupees. The quality of the cotton, however, produced in these two tracts is very dissimilar. *Malvi* cotton, which is that grown on the Malwa plateau, is a fine long-staple cotton spinning 20s weft but giving a ginning percentage of only 27. *Nimar* cotton on the contrary is a coarse short staple, giving a ginning percentage of 33 and spinning from 10s to 12s reeling. In both tracts, however, owing to mixing, both qualities are very commonly grown together, and a further mixing takes place in the gineries, so that in many places it will not be found possible to find either pure *malvi* or pure *Nimar*. Nor it is certain that *Nimar*, though at present it grows mostly coarse short cotton, is not able to produce long staple. From what I have seen my belief is that it can produce almost as good if not quite as good staple as *Malwa*. But what is certain is that *Malwa* can and does produce cotton of a high quality. Though this fact is well known, its importance does not appear to have been fully appreciated. The bulk of Indian cotton is short and rough, and there are at present only three tracts in India which produce long indigenous staple, on any considerable scale, viz., Broach, Tinnevely and the third is *Malwa*. I say indigenous staple because I am not referring here to American varieties of cotton which can be grown in many parts of India, such as Sind, Punjab, Madras and United Provinces and may possibly be established in Central India. But it has not been realised that *Malwa* can be classified with Broach and Tinnevely as a producer of long-staple cotton and I wish particularly to emphasise this fact. But I will go further and express the opinion that *Nimar* and Ajmer-Merwara too are capable of producing long staple. Now if we examine the cultivation and trade in cotton in Central India what do we find? If we go to remote centres away from the railway we find the cultivators and the gineries dealing in almost pure *malvi*. On the other hand, if we examine centres situated near the line of rail we find both in the field and in the gineries cotton containing all shades of quality from the coarsest to the finest. How is this explained? In the following way: on the southern boundary of the Malwa plateau we have the *Nimar* tract producing coarse cotton. On the western boundary we have Ajmer-Merwara and Rajputana also producing coarse cotton known as *Mewar* cotton, and *Malwa*, the producer of fine cotton, is sandwiched between these two tracts. The markets of *Malwa* owing to their once fine quality of cotton have a high reputation and command higher values than those of the other tracts. The growers of *Nimar* and *Mewar* cotton are naturally attracted to these markets and rail or cart to them as much cotton as they possibly can in order to obtain a price which their own cotton would never fetch in its own country, and they rail it to Bombay and other large cotton markets under the name of *malvi* cotton. They are assisted in this vicious practice by the railways and the excellent *pukka* roads which in recent years have linked up these tracts with *Malwa*, and they are also encouraged by the owners of gineries who, basing their profits on the ginning returns rather than on staple, value a coarse high-ginning cotton more than a fine low-ginning variety. The effect of these practices is of two kinds—first to gradually destroy the once high reputation of the *Malwa* cotton markets and pull down the values to the level of these inferior kinds, and, secondly, to mix the cotton in the gineries. The effect too of this mixing is twofold. The cultivator who takes his seed from the ginery instead of sowing the once famous *malvi* seed now sows a mixture of *malvi*, *Nimar* and the *Mewar* cottons, and as the plants freely cross-fertilize in the field there is being produced an ever-increasing mixture of every grade of cotton. The spinner too is handicapped by having to deal with a cotton of many lengths of staple. The evils I have described are daily on the increase. I believe the imports of *Nimar* and *Mewar* cotton into *Malwa* have been greater this year than any other year. Transport facilities are yearly increasing and gineries are being quickly multiplied. In the old days *malvi* cotton was protected by the fact that there were no railways, few roads and no gineries and the cultivators kept their crop pure by hand-ginning. These safeguards have now entirely disappeared, and it is perfectly clear that unless measures are adopted to effectively check the evils I have described, the total destruction of the *malvi* cotton and the *Malwa* markets as centres of fine cotton is inevitable and merely a matter of time. What then is our remedy? It consists in controlling the gineries and in introducing improved methods of cultivation. I will deal with these two points separately.

“(2) **Control of gineries and baling presses.**—I will include under this head baling presses and will give briefly the remedies I recommend. I would suggest that gineries and baling presses unless belonging to the States should only be erected under license, and rules should be framed the breach of which should render the license void. These rules should also be observed by State-owned factories. I cannot pretend at this stage to draw up a complete list of rules, but I suggest that the observance of the following should be insisted on:—

- (i) We cannot easily forbid at present the importation of *Nimar* and *Mewar* cotton, and the cultivator in *Malwa* cannot help at present growing mixed and inferior kinds of cotton with which his crop has already been contaminated, but the State might insist on a coarse cotton being no longer mixed with fine cotton, and on all cottons being classified in to I, II, or III classes before they are ginned and the different classes baled and sold separately.
- (ii) Then as regards the seed resulting from the ginning, the ginners should be forbidden to sell or give away for sowing purposes any seed that does not belong to class I (pure *malvi* cotton and such improved cotton that has been introduced and recommended to cultivators by the State Agricultural Department).

[Indore.]

Mr. BERNARD COVENTRY, C.I.E.

[Continued.]

(iii) Then as regards baling. *Kachcha* bales should be discouraged because with a *kachcha* bale, the cultivator is entirely in the hands of the local dealer, while with a *pukka* bale he can sell if he likes in Bombay or other large and independent market. It is specially necessary that fine cotton of class I should be pressed into *pukka* bales. I suggest that baling should be done under license as in the case of ginning and that only *pukka* baling should be licensed.

(iv) I also suggest that the State should require the ginners to furnish returns as is done in America and other important cotton countries.

"(3) *Cultivation*.—Under this head I suggest that the States should do all they can for the improvement of the cotton plant, the introduction of better methods of cultivation, and teach the cultivator the best means of harvesting and preparing his produce for market.

"As regards cultivation, it is advisable to encourage manuring as it has been proved that a moderate application of manure pays and gives a considerably increased yield. It is also advisable to encourage the cultivators to grow more cotton on their irrigated lands for in most parts of Central India this is scarcely done at all. The better preparation of land, the interculture of the crop, drainage and the checking of erosion are also matters requiring attention. By the introduction of methods I have mentioned, a very large increase in the yield per acre would result. Then as regards the improvement of the plant the Agricultural Departments of the States in Central India have this in hand. (I may say here, parenthetically, that I have been fortunate in enlisting the aid of Mr. H. M. Leake, the Economic Botanist at Cawnpore, who for many years has made a special study of the cotton plant and has promised to help us.) The problem is twofold: First it may be possible to re-establish pure *malvi* cotton as it existed before the evils already described were introduced. There are however many difficulties in the way: One is that it is very difficult to find a pure strain of *malvi* cotton owing to the blood of the other types having become mixed with it by cross-fertilisation in the field, and the work required to purify the crop and re-establish a pure culture is a matter of much time and labour. Another difficulty is that pure *malvi* cotton has a low ginning percentage, only 27, and this makes it unpopular with the ginners and explains the reason why they have encouraged the importation of the *Nimar* and *Mewar* kinds. This low ginning outturn is the cause of all our difficulties and is very difficult to overcome. But controlling the ginners, classifying the cotton and helping the cultivator to get full value for his cotton would go a very long way to improve matters.

"Another line in the improvement of the plant lies in the introduction of a new plant which, while possessing the qualities in fibre of the best *malvi* cotton, has also a high ginning percentage. I consider this the easiest and most promising course if we can get the plant. I am glad to say I have been fortunate in finding such a plant in Mr. Leake's K-22, which is now under trial on a considerable scale in all the States I am advising. Messrs. Tata & Sons of Bombay, in valuing samples grown last season in Central India, priced this cotton at Rs. 350 per *khandi* when the best Ujjain was selling at Rs. 365 per *khandi*, that is only Rs. 15 per *khandi* less, and with spinning quality of 20s weft, the same as the best Ujjain, and the same as Fine Broach. It should however be observed that not all the cotton in Central India is of Ujjain quality because of the mixing I have already mentioned. K-22 would therefore represent a quality of cotton much in advance of the bulk of Central India cotton. But a further point about K-22 is that it gives a yield from 33 to 37 per cent of lint against Ujjain 27 per cent. This is most important, for we thus have a plant giving the quality of the best *malvi* and a ginning percentage higher than the inferior *Mewar* and *Nimar* cottons. Such a cotton would be bound to be popular amongst both the ginners and spinners, and, if it can be successfully grown in the field, should also satisfy the cultivators. If therefore we succeed in establishing this plant, we shall solve all the difficulties under which the Central India cotton trade is now labouring. But it is too soon to reckon on this plant, as it has to be tried for some time to see whether the climate and conditions of Central India agree with it and it will yield as well as the present plant. All I can say at present is that the quality of its cotton is what the Central India and the Lancashire markets want and that its ginning percentage will more than satisfy the local ginners, as it gives a higher outturn than either *Nimar* or *Mewar* cottons. What we have to do is to give the plant a thorough trial in irrigated and non-irrigated lands and try to establish it in place of the existing varieties.

"If India could add another thirty pounds per acre by improved methods of cultivation, this alone would supply another 1½ million bales without increasing the area which would be sufficient to relieve the present tension. But India too could without difficulty greatly increase its area under cotton, but this would have to depend upon the price not only of cotton, but on the price of food-crops. There is no objection to substituting cotton for food-crops (in spite of objections often made to the contrary) because India produces more of the latter than it can consume, and therefore it is only a matter of comparative values. At present prices, cotton pays handsomely and, being grown in the monsoon, is an easier and more certain crop to mature in semi-arid tracts like Central India than a *rabi* crop. The price of cotton with a shortage in the world supplies is not likely to decline, but on the contrary it is likely to rise. Therefore, so far as can be seen, no harm, but on the contrary an immense amount of good, is likely to accrue to India by increasing its production of cotton. The total cultivated area of Central India is over fourteen million acres, of which only 1½ million acres are under cotton. There is therefore immense scope for increasing the area in Central India. The best way to effect an increase is by improving the methods of cultivation in order to heighten the yield and increase the profits of the cultivator; to pay attention to the plant so as to produce fine cotton with high ginning percentage; to help the cultivator to improve the harvesting and marketing of his produce; to control ginners and baling presses in order to check the evils in the trade.

"(4) In order to give effect to a policy for the improvement of cotton growing organisation is essential. I desire therefore to submit for the consideration of the Darbars the desirability of setting up in Central India some machinery for carrying out the remedies which have been or may be from time to time suggested. The best way in my belief to do this is to create in Central India a Chamber of Commerce or a Cotton Association whose business would be to see to the carrying out of reform and to protect and foster the interests of cotton. Such association might be composed of representatives of each State, of the owners of ginners and baling presses, of cotton mills, of the buyers and sellers of cotton and of cultivators. The association might appoint committees for different localities. Such an association, aided by the Darbars and supported by the laws and regulations of the various States, would see to the effective carrying out of a cotton policy. It would be a great advantage if such an association could be formed at once before the meeting of the Government Commission, for it would, in a measure, be anticipating its objects and be an earnest on the part of the States of Central India to co-operate in the policy of Government. Without some such organisation as I have suggested,

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it seems to me it would be impossible to make remedial measures effective. Concerted action on the part of all sections of the trade is essential, and this can only be brought about by some such association as I have mentioned."

2773. *Conclusions of a Conference held by the Gwalior Darbar*.—For the purpose of considering the proposals embodied in my note, the Gwalior Darbar held a conference on the subject last August which elicited the following opinions:—

(i) That all varieties of cotton grown in Central India are not short in staple and dirty in condition. (In other words that long-staple *deshi* cotton is grown in Central India and that some cotton is not dirty though, in point of fact, the clean cotton is invariably of short staple. This is due to the fact that the boll of the fine cotton has a lax habit and is not picked often enough.)

(ii) It was admitted that cotton grown in Malwa is not a pure class but made up of mixed varieties.

(iii) It was also admitted that the mixture comprises *malvi*, *Nimar* and *Mewar* varieties.

(iv) The opinion was expressed by the Conference that the ginners and balers do not deliberately mix for their own gain the good and bad classes of cotton and that the mixture was due to the system of collection by purchase from various fields and therefore unavoidable.

(I should like to say that though this is undoubtedly one of the explanations of the mixing which exists, I have received repeated evidence of the fact that mixing is often done deliberately which cannot be doubted.)

(v) The Conference admitted that cotton-growers in Ajmer-Merwara, Rajputana and Nimar bring their inferior cotton to Central India to be classed as *malvi* cotton to get a better price and that therefore railways and roads help to produce a mixed class of cotton, resulting in the price of *malvi* cotton being dragged down.

(vi) I was pointed out that dirtiness in Malwa cotton was due to shortage of labour rendering timely picking impossible.

(vii) It was considered that the Agricultural Department could do useful work in the matter of improving the cultivation of cotton. It could give advice so framed that while the cultivator would be able to judge for himself that an increased cultivation of cotton would be profitable for him, the State should not incur any responsibility as regards actually persuading him to frame his plans. The Conference gave it as its opinion that the Agricultural Department could render a service by distribution of seed from the cotton grown in districts where it was distinctly good.

(viii) The *zamindars* (cultivators) who attended the Conference were intelligent people and seemed to understand their interests well. They recognised the evil of mixed seed and were anxious to obtain pure *malvi* seed. They were distinctly of the opinion that their interests would not be adversely affected by the establishment of pure *malvi* cotton. The other members of the conference also came to the same conclusion.

(I consider this of the utmost importance to note because it is usually held that the interests of the cultivators are bound up in the growth of short staple.)

(ix) The majority of the members was of opinion that no legislation should be attempted, but thought co-operation in the trade and a cotton association could best bring about the desired results. They pointed out that the remedy lay in the distribution of pure seed. On the other hand, certain members whose opinion carries weight, viz., the Naib Dewan Mal, the Inspector-General of Commerce and Industry and the Suba of Ujjain did not see any grave objection to legislation and pointed out that it already exists by virtue of the clauses in the ginner agreements binding gin-owners to abide by any rules that the Darbar might at any time enact. (It would seem therefore it is more a question of regulation than legislation and that these regulations would be sufficient to stop the evils which are admitted.)

(x) The Conference found difficulty in agreeing to a combined cotton association of the whole of Central India, but recommended the formation of an association to be called the Malwa Cotton Association with head-quarters at Ujjain.

(xi) The Conference considered that the Agricultural Department should carry out experiments with a view to determining—

(a) which cotton plant is most suitable.

(b) how the yield per *bigha* can be increased.

(c) how the cultivator can be shown on a considerable commercial scale the best way to grow cotton.

(xii) The Report of the Conference gives the following further information:

As regards the question of extending the area under cotton cultivation so far as to reduce the area under food-crops the following figures taken from the Administration Reports of the Gwalior Darbar show that:

(a) In the four Southern Districts of the State the area under cotton is already very large, thus:—

	Bighas.
Ujjain	2,21,000
Sajapur	2,84,000
Mandsour	1,39,000
Amjhera	53,000

In the Northern Districts, however, the area under cotton is relatively small, thus:—

	Bighas.
Gird	27,700
Bhind	13,600
Tawarghar	6,400
Sheopur	7,300
Narwar	6,800
Esagarh	3,300
Bhilsa	4,700

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(b) that it is already on the increase, thus :—

Year.	Areas in Bighas.
1912-13	6,82,000
1913-14	7,21,900
1914-15	7,64,600

It is felt that the seven northern districts are not suitable by soil and climate generally for cotton cultivation. In the Malwa districts, it is apparent that already the cotton area is on the increase, and that the increase has come about automatically, the cultivator knowing when to grow cotton and when to abstain from doing so. Consequently (the President concludes) it is not necessary for the State to intervene for purposes of bringing about an increase in the actual cropped area.

(xiii) The President of the Conference consulted in Bombay the Hon'ble Mr. Mohammad Bhai, senior partner of the firm of Haji Bhai Lallji & Co., on the subject of classification. Mr. Mohammad Bhai was of opinion that there could be no reasonable objection to classification, and that, generally speaking, the seed is not sold by the ginner but is taken away by the man who brings the cotton. But the man who owns a gin and also trades in cotton for himself is the man who mixes the cotton and the seed and sells such mixed seed.

2774. *Exotic cottons.*—These are not grown pure in Central India, but a few plants of a cotton resembling *bari* called *Marwari* cotton are grown in the fields along with the local mixture. This cotton was introduced some years ago by Marwaris in order to improve the quality of the mixture. In a few places in Central India such as at Ratlam, this cotton is grown in a much larger proportion in the mixture in the old poppy lands. This custom is on the increase. I have also been growing Cambodia on the same kind of lands with, in some instances, tolerable success. Other exotics that I have tried do not do well. But I think there is considerable promise of being able to establish pure cultivation of either Cambodia or *Marwari* cotton on the irrigated areas (such as the old poppy lands).

2775. *Classification of Central India cotton.*—Central India cotton is classed in the trade as *Oomras* which is a much inferior grade of cotton to that which Malwa can and does actually produce. The tendency of such classification must be to drag down the price of good *malvi* cotton. I would like to recommend a separate classification being made for Central India cottons. It seems necessary that it should cease to be classified as *Oomras*.

2776. *Attitude of the cotton trade to long staple cotton.*—I should also like to add my opinion that I do not consider the trade in India pays a price commensurate with the intrinsic merits of long staple and that this is the chief bar to its increase. One of the reasons why a sufficient price is not paid is because it is seldom pure. Mixing detracts more, I think, from the intrinsic value of long staple than it adds to the value of the short. Another reason is I think that the Indian trade as a whole not being accustomed to deal in pure long staple hesitates to give full value for it when it gets it. I think it is absolutely necessary for the trade to give a much higher premium for long staple than it does at present, if any large increase is to be made.

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2777. (President.) I think the tract in which *Nimari* cotton grows can also grow *malvi* as I have seen it growing there very well indeed. My policy as far as indigenous cotton is concerned would be the extension of *malvi* all over the Central India States and, having regard to the evidence already given before the Committee and the investigations which I have made, everything points to confirm this being the right policy, provided that the cultivator can get the right price. But he is not getting the right price at present, I am convinced of that. The ginning percentage of *malvi* is 27. I do not think it could be brought up by selection. I am not an authority but I think that a low ginning percentage is inherent in the plant. 27 or 28 is the maximum. I favour the introduction of Mr. Leake's K series, not all of them but K-22 and the subsequent ones such as K-28 because they approximate to *malvi* in length of staple and they give a ginning percentage from 33 to 37. K-22 is a little below *malvi* in quality and staple but it seems to be equal in spinning, according to Messrs. Tata's report.

2778. I am in charge of the following States as Agricultural Adviser, Gwalior, Indore, Bhopal, Dhar, Datia, Rutlam, Jaora, Sitamau, Dewas (Senior), Sailana and the Estate of Bagli. These States represent about half the area of the Central India Agency. The cultivation of cotton is important in all these States equally except in Datia where it is not so important. The policy that I should recommend would be to go on with *malvi* and get it back to its old purity and also to experiment on the farms with K-22 and K-28 and with a number of exotics. Some exotics such as Cambodia are very promising on irrigated areas. They would not stand the conditions of *barani* (unirrigated) tracts at present. The proportion of the irrigated area varies in the different States but you may take it as about 1-25th of the whole cultivated area. It goes up to as much as fifteen per cent in some States. The total cultivable area of Central India is 24 million acres. The cultivated area is thirteen millions. I am talking of the whole of the Central India and not the eleven States in my charge.

2779. I am strongly in favour of the proposal to regulate gins and presses by license. The policy would possibly be more easy to adopt in Native States than in British India. I do not think that much legislation is necessary. I think the operation of all these remedies should be carried out under the auspices of a Cotton Trade Association. That is, the trade ought to work out its own salvation, legislation merely coming in where it is absolutely necessary. I should say it is very necessary that some policy should be worked out by a cotton association on which the various interests of the trade should be properly represented. Of course, you would require suitable local committees connected with it. These general principles would be applicable to Native States *mutatis mutandis*. As you will see, I have suggested in my note that the Darbars should have a Cotton Association for Central India. It would really be a good thing to have a similar association for the whole of India. It would be far better to have it for the whole of India. If you have a central association with head-quarters at Bombay, each State could have a branch or local committee of the association. Ujjain might have one, Indore might have one and Mandsaur might have one. It would be largely a trade organisation but should consider the interests of the grower. We find that, whatever improvement we make on the agricultural side, we are met not by deliberate opposition but

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by obstacles owing to what I may call the malpractices of the trade which only the trade itself can put straight. I have worked out the composition of the central body roughly in my written evidence. I should like to add to this the proposal that such an association should set up buying agencies. I have not specifically mentioned that point in my written evidence as I did not go into detail. To this association, I would not attach members of the Agricultural Department except in so far as the State wished its Director of Agriculture to represent the interests of the cultivators. If the cultivators could put in their own intelligent representatives like a *patel* (head man of a village) or some one of that kind that would probably be the best way. I am in favour of a central organisation with ramification in the provinces with power to control and co-ordinate the trade in cotton. Such an organisation is absolutely necessary to deal with the cheating and other abuses of the cotton trade.

2780. I think the appointment of Imperial Cotton Specialist has to a great extent failed in its objects. What is required is a first class Economic Botanist for research. He should undertake selection and the creation and introduction of new varieties. He should be a Central Research Officer for the whole of India with free access to the provinces. I think the one man would be enough until further development.

2781. I have already said that the States have suffered owing to the lack of buying agencies. Anything that could be done would be an improvement as things are so bad in some parts of Central India that the cultivator is entirely in the hands of the *mahajan* (money lenders). That is one of the great evils in the cotton industry in India as far as the cultivator is concerned. There are no dealers, i.e., selling brokers in Central India and much of the cotton is bought on advances which is a very bad practice. An honest buying agency would tend to get rid of that evil and to get the cultivator a better price for his good cotton.

2782. The lines of development of agriculture in the Central India States follow more or less the lines in British India, i.e., a central research farm supplemented by seed and demonstration farms. But this varies in different States. Development is limited by the means of the State. Gwalior, for instance, is developing upon its own lines. The policy I adopt in other States follows Mr. Evans' policy in the Central Provinces, viz., small agricultural demonstration plots in charge of a practical agriculturist. The demonstration plots are to be shifted after a period of years when they have done what they can in a particular tract, say a radius of eight miles.

2783. (Mr. Wadia.) The owners of gins and presses would be brought into the proposed Trade Association through their representatives and therefore control would be more effective than it has been in the past. This would mean the appointment of a large organisation throughout the country. Legislation to a certain extent would help matters but it should be only so far as it was necessary to support the trade in doing what the association wished. My view is that the association could do a great deal by the refusal of its members to deal in mixed cotton. If legislation were introduced and the ginneries were brought under control, in the case of any breach of the rules the license should be suspended or cancelled. I think that is quite enough. Fraudulent damping should be penalized. I do not see how you can interfere with the liberty of the subject by refusing to allow ginneries to sell seed to cultivators. The mixing and adulteration of cotton is in itself harmful but there is no harm in selling seeds. The remedy for the sale of mixed seed lies with the Agricultural Department and the district officers who should control it. We must set up separate gins or get the cotton handginned. The cultivators have been let in; the trade has let itself in without knowing what harm it has been doing owing to the rapid increase of communication which has rendered mixing possible. It was not possible before the railways came for the cotton to come from Nimar and Mewar in such large quantities as it comes now. The people did not know what they were doing, they did not understand what cross fertilization was; they did not know that one cotton was different from another; it has been done in ignorance from the very beginning. The Cotton Association should be able to stop the export of cotton from one district to another and prevent the exploitation of the superior cotton markets by places growing inferior cotton. I would not advocate that railways should refuse to carry anything but pressed bales from one place to another. I do not see how they can be asked to do this. I would advocate the markets not selling as Ujjain cotton stuff which comes from quite a different part of the country. Ujjain is not so contaminated as Indore. Indore, for instance, sells *Nimari* cotton as Indore cotton and Mandsaur sells *Mewari* cotton as *Malvi*. I think the Cotton Association ought to be able to stop such practices as that. It should be able to exercise control by bringing into the association representatives of all sections of the trade. There must be an advantage in honest dealing. The men who wish to deal honestly will join this association. The law ought to come down on men who deal dishonestly. The men who sell *Mewari* cotton as *malvi* should be prosecuted for cheating.

2784. As to the recommendations made by me in my note to the Darbars (para. 2772 (2) above) No. (i) is of general application in British India as regards classification, but it would be best to apply the remedy through the Association. No. (ii) has a local reference only. No. (iii) regarding *kachcha* bales is of general application. When a man gets his cotton in a *kachcha* bale, he is absolutely at the mercy of the local dealer whereas if he has got a *pukka* bale, if he cannot sell it to the local man, he can send it to Bombay and get an independent market. I am advising the Darbars to accept this principle. *Kachcha* bales are transferable from one station to another by railway so that they can be opened out and used for mixing whereas once the cotton is pressed in a *pukka* bale this cannot be done. That is another reason why we should go for *pukka* bales. Supposing, for instance, there were *pukka* baling going on at Kanod, they could not mix bad cotton with Kanod cotton so easily as they are doing now. If presses are licensed, the conditions of the license should be that the bales should be *pukka*. It would be a good thing if the railways were to charge a higher rate for loose or half pressed cotton bales but the true remedy is to license presses only to press full pressed bales.

2785. I know that there is a Cotton Trade Association in Bombay but it is not I think of the nature that I am contemplating. There is a total lack of organisation when you go outside Bombay. You must set up such machinery to deal with evils in the *mosussil*. Buying agencies would be of some assistance but the moral influence of an association acting all over would be very great indeed, especially if it were assisted by such legislation as may be found necessary. I do not mean that you are going to get an absolute heaven on earth by such an association. But it should improve matters and I know of no better means. Education will help to improve matters. The low level of education is partly the cause of the evils. Co-operation is only one means of cure. Co-operative societies would have an educative value but in addition to the efforts which the Registrar of Co-operative Credit Societies and the Agricultural Departments may make, the trade must meet them half way and try to keep their black sheep straight. There is no effort whatever made on the part of the trade in the *mosussil* to put these matters straight. There strictures on the trade are not made with reference to Bombay and other big centres.

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2786. I have already stated in my written evidence that it seems necessary that *malvi* cotton should cease to be classified as *Oomras*. The recommendation was made as the result of conversation with people in the trade. The reason for the classification has been the ignorance which has existed with regard to the real value of *malvi* cotton. That struck me when I came here and I find that the local traders speculate on this and make a lot of money out of it. In the classification of *Oomras* which is made by the Bombay Cotton Trade Association, certain stations are specified from which *Oomras* can be railed down to Bombay and Ujjain and Indore are among them. If Indore and Ujjain were to get a separate classification to themselves, it would tend to develop a better and distinct type of cotton from that which is coming from Amraoti and other districts. Assuming that *malvi* were kept separate and were baled separate, then it would be quite a different type of cotton altogether from what is generally classed as *Oomras*. I quite realise that there may be difficulties in getting a separate classification but I think that the trade ought to distinguish between good and bad cotton in their classification. If any effort is to be made to establish good cotton either in the Punjab or here in Ujjain in conjunction with any effort that is being made for the creation of a cotton trade association, the question of classification ought to be considered. The Agricultural Department here would not be prepared to give a certificate of purity of *malvi* cotton in order to get a separate classification for it. The trade ought to take a matter of that kind into its own hands. There is a certain quantity of good cotton still remaining here and the trade itself must alter its classification if it wants to develop and increase *malvi* cotton. There is far too much tendency to rely on the Agricultural Department in these matters. This local trade does nothing, not only that but places tremendous obstacles in the way. It should remove these and along with that classify according to common sense. A veil has been thrown in the past over *malvi* cotton. Few people knew that the *malvi* cotton was up to Tinnevely or Broach. By organisation and honest dealing, we can certainly stop mixing. If no attempt is made to establish honest dealing, the efforts of the Agricultural Department are of no use. The increase of long staple cotton in Central India would only give the speculator more long staple cotton to pay tricks with.

2787. (Mr. Hodgkinson.) It is absolutely necessary for the trade to give a much higher premium for long staple cotton than it does at present. I do not think that the Cotton Trade Association should fix the amount but it could bring about fair dealing. The point is that obviously the cultivator is being cheated now and that if you could give him a fair price it would be a great improvement. He is not getting a price based on intrinsic value. On the cotton association that I have suggested you should have a representative of the cultivators. You have not got the ingredients for a fair market here so far as the cultivator is concerned; not according to the laws of political economy.

2788. (Mr. Henderson.) I am not acquainted with the American Bureau of Cotton Industry. I do not know whether the system would fit in with the ideas I have in my head. I take it that the trouble here is that we are not in touch with the leading men in Bombay. We have to grope our way in order to get into touch. The middlemen and speculators come in between. If we had a local cotton trade association, I would not entrust them with the distribution of the seed. That can best be done under the auspices of the Agricultural Department or of co-operative societies. I would have local associations in certain localities and which would be in touch with the central association in Bombay. I have not gone into the question of the constitution of the central trade association in Bombay. I would not have any special people to advise on the board as I have found no difficulty whatever in getting advice on cotton problem from members of the trade. I get my tests done by Messrs. Tata and Sons, Bombay. Mr. Leake does the botanical and agricultural work on cotton. That is more or less an informal arrangement pending the engagement by the Darbars of their own scientific officers. If Mr. Leake were on leave, I should have to carry on somehow until he came back. That shows the practical necessity of having permanent men. Gwalior is going to appoint its own biologist. I do not think that there would be any necessity for a scientific man on the Central Board. Government supply all the scientific work at present. The arrangement with Mr. Leake is purely a friendly one. He gets no extra remuneration.

2789. The agricultural policy varies in the different States. Taking the most advanced State like Gwalior, it includes an agricultural research institute to which a college will hereafter be added, two experimental farms, one in the north and one in the south each under an Assistant Director and sub-director with one Director for the whole; one large farm of two thousand acres in each *zila* or district, part of which will be used for experimental and demonstration work and the remainder of which will be worked commercially on modern methods. In Indore, there is only one central farm. Another is in contemplation in Nimar on not quite so elaborate a scale as well as demonstration farms for each district. The policy in view is that each district should have its own demonstration farm. Whether it is a large farm or merely a demonstration plot will vary in the different States according to the staff that they are able to supply.

2790. There is a general movement all over Central India to substitute short for long staple. The tendency here is towards the destruction of the *malvi* and the introduction of a coarse cotton. I put that down to the heavy yielding power and the high ginning percentage of the coarser varieties and the want of a fair price for the longer staple. The reason why the movement is only of recent date is that better communication in recent years has facilitated the process. In the old days, the cultivator in Malwa had no short staple to compete with the long staple. I have got the evidence of the Gwalior Conference held on the subject and the cultivators were very closely examined on their preference between fine and coarse cotton. They prefer to grow *malvi* if they can get it pure and a fair price. The *zamindars* (cultivators) who attended the Gwalior Conference were very intelligent and seemed to understand their interests well. They recognised the evil of mixed seed and were anxious to obtain pure *malvi* seed. That is contradictory in a sense but it is the position of affairs. The cultivator where he grows short staple, does so because he says he gets more money by it. On the other hand you will find some cultivators who say that they prefer to go on growing *malvi* cotton if they can get the price and that this plant suits the locality best. As to increasing the outturn per acre, I am practically following Mr. Clouston's lines in the Central Provinces. He recommends nitrate of soda in combination with cattle manure. I think that is a very good manure. I am introducing some leguminous crops where I can; I am trying to spread groundnut. Leguminous crops are grown in some parts of Central India especially in irrigated lands but I have not had time to take the matter up. It is a promising field. Groundnut is promising as there are two varieties which can be grown on *barani* tracts.

2791. (Mr. Roberts.) It is very easy to get a good price for short staple cotton as the ginners pay on ginning percentage. That is one of the difficulties in pushing long staple cotton. As to the associations

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that I have proposed and their possibilities in Central India, in the first place there would be the licenses for ginning and pressing which would only be issued to the members who conformed to the rules of the association. The State would be a member of the Association. Big buyers like Messrs. Rallis and Volkarts would doubtless join the association. They would probably be the first people to join because it would be beneficial to them. I would not have anything on the lines of the Belgian or Dutch market produce association. I do not recommend anything so advanced or complicated as that. It would imply the inclusion of scientific men.

2792. I cannot put out pure *malvi* seed at all. As far as I know, it is impossible to get it pure. I mean botanically pure. I cannot say at present whether it is possible to guarantee a certain percentage of purity. I would go straight for a place like Kanod and make large State purchase of seed and distribute it to the cultivators on a large scale. These types have not been compared in the field yet as we have had two bad years for cotton. Of course, that is essential before we start operations. The yield per acre is a most important matter. If the yield per acre from the short staple proved the better and gave the cultivator better profits, then I would not recommend long staple. I think the trade can afford to pay more for long staple than it does at present and that it is therefore our duty to make an effort to push long staple. If no reformation takes place in the trade then there is no hope. I am talking of Central India. When Cambodia was in its first stages in Madras, the Liverpool merchants took it up but different rates were paid in different districts and this was by European firms. A buying agency is therefore absolutely necessary to ensure fair prices. It should be instituted and controlled by the Cotton Associations whether local or for the whole of India. The cotton buying agency must be absolutely honest. Where these buying agencies have failed, it has been due to personal and private considerations coming in. That was the cause of the failure of the Gujarat Buying Agency. The buying agency should buy locally and sell anywhere they like. My impression is that the Gujarat Buying Agency failed because having in the first year dealt fairly with the cultivators, in the second they did not. I would not advocate that the Agricultural Department should put itself between the trade and the cultivator. It may be necessary at the beginning of things but it should be dropped as soon as possible. I cannot think of any better system of seed distribution than the one in the Central Provinces. I would keep to that absolutely. In centres like Kanod there is no reason why this should not be started at once provided we can get the trade to give a better price. That is why it is so necessary that the trade should meet us half way.

2793. (Mr. Wadia.) My impression is that the ultimate cause of the failure of the Gujarat Agency was that the cultivator was not fairly dealt with. I have forgotten the details, it is some years ago. I have heard it stated that the cause of failure was that the cotton was mixed. That may have been one of the reasons for failure. But my point is this that until you have a proper trade organisation to deal with various evils you cannot really proceed very far.

2794. (President.) As to the general policy of expansion of the Agricultural Department throughout India, I consider that Deputy Directors should be appointed to every district. That should be the ultimate development but it will be many years before that stage will be reached.

2795. (Mr. Ashton.) It is very difficult to say whether there is any chance of increasing cotton on existing canals in Central India. I do not think there is much as the canals are not in the cotton tracts and canals would not apply to the cotton tracts of Malwa owing to the configuration of the country. Any increase of cotton under irrigation would be under wells not under canals and I consider there is considerable scope for increasing the irrigation of cotton from wells.

XV.—Baroda.

Mr. RAOJIBHAI B. PATEL, M.R.A.C., Naib Suba, Baroda.

EXAMINED AT NAUSARI, FEBRUARY 13TH, 1918.

Written statement.

2796. Experience.—I have been twenty-five years in service in the Baroda State and have worked in all parts of the State as Revenue Officer and as Director of Agriculture. In both capacities, I have been in actual touch with cotton cultivators in all parts of the State.

2797. Area and general cotton position.—The total area of the State is 8,182 square miles. It is divided into four distinct blocks out off from one another intervening British and other State territories. The following statement shows the general cotton position. To allow for the abnormal conditions created by the war, I have adopted 1913-14, i.e., the season before the war, as normal.

Name of Block or District.	Area in Sq. miles.	Population census of 1911.	Average rainfall decennial inches.	Occupied area in acres.	Average size of holdings in acres.	Area under cotton percent. on cropped area.	Variety of cotton chiefly grown.
1	2	3	4	5	6	7	8
Navsari . . .	1,914	3,35,467	47.20	6,59,836	12.8	31	<i>G. herbaceum</i> — Navsari
Baroda . . .	1,898	6,86,900	31.93	10,59,303	10.9	37	Broach
Kadi . . .	3,023	8,32,162	25.88	15,36,347	11.0	12	Wagad
Amreli . . .	1,347	1,78,269	19.34	6,17,853	38.3	40	<i>G. neglectum</i> <i>mathio</i> .
TOTAL STATE .	8,182	20,32,798	31.09	37,73,339	12.02	25	

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2798. *Dependence of variety on climate.*—The adoption of particular varieties of cotton by different districts has been due, primarily, to climatic and soil conditions, and secondly, to the monetary yield of the crop. The long stapled varieties require a long period of growth, and cannot be depended on to give a good harvest, where the rainfall is short or uncertain, or where there is a fear of frost in January.

2799. *Relation of season to cotton.*—The monsoon season in Gujrat may be divided into three sections of about seventy days each.

(1) Spring rains :—From 30th March to 6th June.

(2) South-west monsoon :—From 7th June to 14th August.

(3) Late or harvest rains :—From 15th August to 23rd October.

No rain is wanted till the 10th May as it checks heating of the soil and retards the advent of the regular monsoon. Luckily, this rain is of rare occurrence. Early rains, after the 10th May, offer ideal conditions for the preparation of land, and create atmospheric conditions well suited for a good precipitation in the monsoon following. This does not happen every year, but when it does, the cultivators start work with a light heart and expectations of a plentiful harvest. The south-west monsoon generally does not fail and gives a good start to the crop. The early varieties grow fast during the period and late varieties slowly. It is, however, the late or harvest rains that decide whether a district shall adopt long or short stapled cotton. If the rains continue until late September or early October, long stapled cotton continues to grow slowly during the period and, when the rains cease, they get an excellent time for growth till the cold weather sets in, when they put out fruiting branches. The soil supplies all the moisture necessary for a good harvest. The short stapled early varieties are also benefited by September rains, but they put out fruiting branches if it fails, and the soil moisture is enough to ripen a fairly good harvest. On retentive soils, the long stapled *deshi* varieties also give a middling harvest, if the late rains have failed after a good south-west monsoon, but the quality of lint is inferior and the staple short. Any rain in late October or early November is fatal to all cotton. The growth of late varieties is stopped and cannot be recovered, while the early varieties, which have already started fruiting, put out new vegetative branches, and the harvest is ruined.

2800. *Conditions in Navsari district.*—In the Navsari district, the soils are generally retentive and suited to long stapled cotton. May rains are not usual but occur more often than in any other part of the State. The south-west monsoon never fails so far as to affect cotton. The late rains fail less often than in other parts, and the total rainfall is enough, but not too much, for cotton. There is also a sea breeze all through the cotton period, which tends to improve the length and feel of the staple and checks frosts. The *deshi* cotton grown seems to have been extended to this district southwards from Broach, but the climatic conditions have much improved the staple. Both the average rainfall and sea breezes improve as we go southwards from the Narbada River to the Ambika, which is the southern limit of the district, and the quality of cotton is correspondingly higher. The rise in cotton prices has given a great impetus to the extension of cotton cultivation. It is still extending towards the east and, as cotton entails the least expense and labour and gives the highest money yield per acre of all dry crops, no special efforts for its extension seem necessary.

(2) The following statement gives the cotton position of the *talukas* from north to south :—

Taluka.	Average holding in acres.	Cotton percent.	Average yield per acre seed cotton.	Other crops over 10 per cent.
			Lbs.	
Velach'ha	15	64	280	Grass, <i>juar</i> .
Kamrej	11.2	60	450	<i>Juar</i> , grass.
Palsana	11.2	49	560	<i>Juar</i> grass.
Navsari	7	33	450	<i>Juar</i> , rice.
Gandevi	6.2	20	600	Grass, rice, <i>juar</i> .
Mahuva (east of Gandevi)	15.6	40	460	Grass, <i>juar</i> , rice.

2801. *Conditions in Baroda district.*—According to soil conditions, the Baroda district is divided into four sections :—

- Kanam* or black soil district, contiguous to Broach, which has always been growing cotton.
- Chourasi*, the east and north-east portion with inferior black soil mixed with gravel, devoted formerly to rice and grass. Cotton has extended with great strides in this portion, since the famine of 1900.
- Vakal*, the north-west portion of the Mahi River. It has a mixed loamy soil. It was formerly the home of the Gujrat *rozi* cotton, but Broach cotton has taken its place and *rozi* is rarely seen.
- Charottar*, north-west portion above the Mahi River, contiguous to Kaira district. Broach cotton has been tried since the famine and found successful on well manured soils, but tobacco, which is the chief crop, requires attention at the same time as this cotton, and takes up all the manure available; and Broach cotton had to be given up. The little cotton that is grown now, five to ten per cent. is *rozi* which can be ratooned for five or six years, and allows a cereal crop being taken along with it. May rains are less frequent than in Navsari and September rains more uncertain, but the retentive soil carries on sufficient moisture to give a good yield of Broach cotton. There is no sea breeze however, and the staple is rougher and shorter than Navsari.

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(2) The following statement gives the position in the cotton *talukas* :—

Taluka.	Average holding in acres.	Cotton area percent.	Average yield per acre.	Other chief crops over 10 per cent.	REMARKS.
			Lbs.		
Sinor	9.5	65	560	Rice.	<i>Kanam</i> .
Karjan	12.9	57	600	<i>Juar</i> , rice.	Do.
Padra	8.2	49	450	.....	<i>Kanam</i> and <i>Vakal</i> .
Baroda	8.5	46	500	.....	Do.
Savli	13	36	400	Grass, rice.	<i>Chourasi</i> .
Vaghodia	13	43	350	Rice.	Do.
Dabhoi	10.8	48	500	Rice.	<i>Kanam</i> and <i>Chourasi</i> .
Sankhed	13.4	45	400	Rice, <i>juar</i> .	Do.
Tolakeada	15.5	44	350	Rice, <i>Juar</i> .	Do.

(3) Some extension of Broach cotton is still possible, but with good prices and favourable seasons, no special efforts will be necessary for this. All grass lands in Vaghodia have already been brought under cotton cultivation and breaking of new soils is going on at a great rate in the Savli *taluka*. Rice lands are also being converted into cotton fields wherever practicable.

2802. *Conditions in Kadi district.*—Rainfall is smaller and the soil light and sandy in this district, but the general drainage from north-east to south-west has converted the south-east area into rice and cotton lands. During the cycle of good rainfall before the famine, the southern part of the cotton belt, which is contiguous to Sanand, used to grow *lalia* cotton and the northern part had adopted *wagad* from the west. During the years of uncertain rainfall and occasional frosts following the famine, *wagad*, which proved more successful under the prevailing conditions, slowly took the place of *lalia*, and all but a little of the south-east part of the belt, now grows *wagad* only. The other parts of the district also grow a little cotton, but no extension is advisable except under irrigation.

2803. *Conditions in Amreli district.*—In the Amreli district, there are deep retentive soils, in valleys, and thin soils resting on a hard sub-soil and rock. The rainfall is small but well distributed, and there is a good sea breeze. Cotton was grown formerly on the deep soils only, the prevailing variety being *lalia*. In the early nineties, another variety, locally called *Cawnpuri*, was introduced for its superior ginning percentage. As prices improved, *mathio* began to be grown on the thin soils. In the famine year, both *lalia* and *Cawnpuri* failed. The next two seasons were bad for cotton, and in 1903, a good season all round, the harvest of *lalia* and *Cawnpuri* was lost entirely through a new disease, which filled the ripe bolls with some sticky exudence. This happened again next monsoon and the deep soil cultivators also adopted *mathio*, which had always given a harvest. By that time *mathio* had obtained a recognised place in the Bombay market, and the economical position of the cultivators of deep and shallow soils was reversed. The good soils gave an average yield of 150 lbs. *mathio* per acre, instead of 320 lbs. of *lalia*, and the thin soils gave 300 lbs. where either no cotton was formerly produced, or which gave a very poor yield of *lalia* or *Cawnpuri*. Efforts to introduce *kanam* seed have failed on account of the disease, but by the adoption of thin soil rotation crop of *bajra* and *til* followed by *mathio*, instead of old rotation of *juar* and cotton, the good soils also now give an average of 400 lbs. per acre. Manuring also gives good results and the practice of manuring the cotton crop is on the increase. Since 1911-12, only *mathio* is grown in the whole district. When first started, it gave a very low ginning percentage (under 30), and the staple was very short and rough. It has steadily improved, however, in all three qualities. The ginning percentage is now 33 while the staple is longer and the feel almost as good as *lalia*.

2804. *Limitation to extension of cotton cultivation.*—If prices are maintained, and I think they will be, at a little over pre-war rates even after war, cotton cultivation is likely to extend to its utmost limits all over the State. The only limitations to such extension will be—

- (1) Requirements of rotation.
- (2) Fodder requirements.
- (3) Regulation of employment for men and cattle.
- (4) Unsuitability of soil.

2805. *Rotation and fodder requirements.*—The usual rotation was *juar* and cotton or fallow and cotton. The *mathio* region has adopted *bajra* and *til* and cotton and, where field rice has been replaced by cotton, rice and cotton are also rotated. In no case, however, is a cotton field allowed to bear any other crop more than once in two years. The general desire is to grow cotton year after year in the same fields, if practicable. The system of sowing cotton in wide (four to six feet) manured rows and changing the position of the rows year after year, introduced by me at Varnama in the Baroda *kanam*, gave such good results that it is being extended, although some people forget the manuring part. Wherever adopted, with manure, this system is giving a heavy yield, averaging 1,200 lbs. per acre, with a higher ginning percentage, and the people net a further profit by selling the seeds. Some such system may be pushed, but cereal and pulse crops are necessary to supply fodder, which, being too bulky, cannot be imported from non-cotton districts at remunerative rates; and I think about a third of the cotton area will always have to bear a rotation crop.

2806. *Regulation of labour.*—Cotton and its rotation crops do not give employment all the year round and some *rabi* crops and also irrigated crops, where irrigation is available, have to be grown. The cotton cultivator has, however, been making too much money recently to go in for any thing requiring extra care and labour, and well irrigation has practically ceased wherever the wells are deep.

2807. *Unsuitability of soil.*—In every village with retentive soil, there will always be a certain amount of low lying land, which has been prepared as rice land. All field rice lands have more or less been converted into cotton lands, but the prepared *kyari* cannot be made dry enough for cotton, unless filled in at great expense.

Prices and profits.—As already mentioned, of all the dry crops, cotton is the most paying, and really an irrigated field crop can compete with it. The prices of cotton, however, fluctuate

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much, not only from year to year, but also within the same season, that no estimate of profits would be worth the trouble of making it.

2809. *Exotic cotton*.—American Upland and New Orleans were tried years ago at Baroda, but without success. Egyptian cotton, both *abassi* and *mitaffi* under irrigation, gave excellent crops, but the experiments were dropped as, at then ruling prices, it could not compete successfully with other irrigated crops, especially as the area would be small and proper prices for small lots were not likely to be obtained. With the now improved cotton prices and the recently created general desire of consumers to encourage the raising of long stapled cotton, the chances have improved and fresh trials may succeed.

2810. *G. Hirsutum*.—So far as my information goes, the season in the American cotton belt is as follows :—

Preparation of soil.—No rain required on account of thaw.

Seed time.—Light spring rain with an average temperature of 75°.

Growing time.—Rainfall averaging forty to sixty inches and temperature 75° to 90°.

Fruiting time.—Practically no rains, and the temperature from 60° to 80°.

Harvest.—Generally ready before frosts begin.

Excepting the uncertainty of spring rains for preparation, the conditions in the Navsari District are similar, while the longer growing season, between the close of the rains and the beginning of cold weather, may be expected to atone for the deficiency. On account of sea breeze, the staple may also be maintained. The variety selected for introduction, however, should be distinctly superior to the best Navsari cotton, with a margin to allow for some deterioration due to change of abode and inferior culture.

2811. *Egyptian cotton*.—The Egyptian cotton is grown in its home under irrigation, and if sown as a monsoon field crop, is not able to stand the rains in the early stages of growth, even on sandy soils. But, if it is started under irrigation in April, it gets a good stand before the monsoon and grows well during the rains. If September rain fails, one watering is necessary. The fruiting takes place in October-November and the harvest is over before January frosts. If the winter cold is not severe, one or two waterings give a second harvest in March-April and then it can be ratooned for another season. Like all irrigated crops, good manuring and assured irrigation, when the crop requires water, would be absolutely necessary; but granted these conditions, an average crop of 1,500 to 2,000 lbs. to the acre may be expected. The conditions in the Vākal and Charotar portions of the Baroda district and in the non-cotton area of the Kadi District, are suitable for the growth of Egyptian cotton if irrigation can be assured. The Mahi River irrigation project, already investigated, would enable the Kaira District and Baroda *charotar* to grow this cotton on an extensive scale. There is also a scheme for a canal from the River Sabarmati, which would irrigate the Kadi District, if constructed. It may be noted here that, to my mind, the Egyptian cotton did not get a fair chance in Sind, when tried. It had no assured watering when wanted.

2812. *Seed of exotics*.—Every cotton may show some changes in the first year or two in a new abode, but in three or four years it will get acclimatised to the new conditions. Importing fresh seed every year would, therefore, mean constant chances of ill success, besides the inconveniences of annual importations of large quantities of seed, whose purity, from year to year, cannot be controlled. The best course would be to carefully select the seed first imported for trial on a fairly large scale, give the crop as much of the original soil and water conditions as practicable, and use selected seed from the harvest for the next year's sowing. I believe, in four or five years, a type that can thrive under the conditions provided will get fixed.

2813. *Extension of exotics*.—The cultivation of an exotic should not be pushed till the type is fixed and the most suitable methods of culture should, from the first, be insisted on. The progress will certainly be slow, but any hurry will hasten conditions resulting in deterioration, and the work will be given up in disgust, as it has so often been done before.

2814. *Manuring of cotton*.—Good culture and seed selection would be the best methods of improving the *deshi* cotton and getting large crops. There used to be a belief among cotton cultivators in black cotton soils, that manuring rather harms than helps the cotton crop. It is true that on freshly broken lands and on very rich old soils, manuring may induce an extra growth of vegetating branches at the expense of fruiting branches, but all rich old lands have been fairly exhausted, and light manuring does give much higher crops than unmanured fields. The small stock of cattle that can be maintained in cotton tracts, however, do not produce manure enough even for the other crops. The only remedy is the introduction of artificial manures. It is said that the Indian cultivator is too conservative and too poor to take to artificial manure, but I think, if he were convinced by local example that the use of such manures paid well, and the manures were made available at rates, not higher than those at which the English farmer can get them, the higher class of Gujarat cultivators would take to them at once. The creation of a regular trade in artificial manures will be a condition precedent to any extension of exotic cottons under irrigation.

2815. *Seed selection*.—Before the extension of ginneries, seed selection for home use was practised to some extent, but it is of rare occurrence now. There is no chance of reviving the practice. Seed selection and distribution, both for preserving the purity of a variety and for its improvement, should be regulated under control. I would recommend the following system.

(i) *Central seed farm*.—To be opened departmentally for each variety, in the most suitable locality for its growth, and worked under scientific control. As soon as a variety is established on the farm, plant to plant selection to be made for seed to be used on the farm every year. In selecting plants, the amount of fruitage rather than the vigour of growth should be the guiding principle. The whole of the main picking of the farm to be ginned separately for seed, and the seed given free to registered cultivators, who would bind themselves

(1) to use no other seed for the whole of their cotton crop.

(2) to get all their seed-cotton ginned at—

(a) specified ginneries and sell their seed to the ginnery at five per cent. over current market rate for cotton-seed, or

(b) to sell their seed-cotton to specified ginneries.

(ii) *Selected ginneries*.—To gin the cotton from the registered cultivators by itself and keep the seed whether their own or purchased as above, in a separate store and to sell it for seed at ten per cent. over current market rates for cotton-seed.

(iii) *Advertising*.—All cultivators in the tract growing the particular variety of cotton to be informed, through the local revenue agency and through a wide distribution of printed notices, at which ginneries the best seed would be available.

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(iv) *Control*.—Central farm under scientific control. Inspectors (agricultural graduates with special training in cotton varieties and culture) to see that registered cultivators carry on their parts of the contract. Ginning inspectors—one to be stationed at each contracting ginnery—to see that their part of the contract is properly carried out.

2816. *An example*.—If this system be worked, I expect that within ten years, every variety will be pure in whole tracts, and both the quality and quantity of harvest will go on improving. When the Savli taluka of the Baroda District started cotton growing on new lands after the famine, I induced a ginner in Itola to gin the best cotton from Varnama and the neighbourhood separately and keep the seed separate, and informed the Savli cultivators where they could obtain the best seed. It is now a very profitable business to the ginner and the Savli cotton gets almost as good prices as Palej. Itola seed is now bought, not only by the Savli people, but also by *kanam* cultivators, and even by some men south of the Narbada on account of its high ginning percentage.

2817. *Staff required*.—The extent of the central seed farm and the staff required will depend on the cotton area in the tract to be served. For the Broach cotton tract, both in the British and the Baroda Districts, the following may be taken as a fair approximation :—

A central seed farm of 500 acres, with 250 to 300 acres always under cotton, with the necessary establishment required by the Agricultural Department.

Two seed cultivation inspectors attached to the farm.

Four ginnery and district inspectors, who will work in selected ginneries during the season, and advise cultivators in the off season.

(2) The central farm will supply seed to 10,000 acres, and these in their turn to about 350,000 acres, or about half the cotton area. The distant and inferior class of cultivators, making up the other half, will always depend on seed purchased haphazard for cattle food, but they, too, will get pure seed if measures to check mixing of cottons be adopted.

2818. *Private seed farms*.—After about twenty years, the central farm may, if found advisable, be handed over to a co-operative society formed by the registered cultivators or to suitable private hands. If, however, it is desired to encourage private efforts from the first, some suitable new lands may be given to a scientifically trained gentleman, on such conditions as may secure the proper seed supply on one hand and afford a fair living on the other.

2819. *Mixing of cotton*.—The mixing of the cottons is prevalent all over the country. It is not the cultivator who does this, but the middleman, who buys seed-cotton and sells cotton. These in their turn have learnt mixing from the large exporters. The mixing by them first began in presses. Some years ago, when a press owner objected to mixing inferior cotton with Broach, on the ground that the good name of the locality will be lost in the final market, a large exporter bought up a press for his own purposes. At present, all large exporters either own their presses or have presses owned or worked by their local agents. Some ginneries are also worked for them. The small middleman began his mixing in ginneries, but can now get his mixing done in presses too. To stop mixing, therefore, the only remedy is licensing of ginneries and presses under an Act, and posting one inspector in each such factory area during the season to see that the conditions are observed; all working under cotton inspectors, one for each province in the Presidency. The expenses may be met by charging a small rate, not exceeding four annas per bale, on all cotton exported from the country.

2820. *Marketing*.—The system of marketing in the Baroda State is similar to that prevailing in the neighbouring British districts. The one great defect of the system is a difference in the weight of the *bhar*, which is the unit for which price of seed-cotton is fixed. Between the Mahi and the Ambika there are six different weights for the *bhar*, and the middleman, with information of rates in different parts, has the best chance of underpaying the cultivator. A uniform weight based on the railway *maund* should be made compulsory and provided in the Act proposed above. The currency rupee is 180 grains in weight, and eighty such rupees make a railway seer, forty seers to the maund. If twelve railway maunds be fixed to the *bhar*, it will be near enough to the present varying *bhar*, and every cultivator will know how much he has to sell for the money he is to receive. The cart weighing scales now used by ginneries are graded to cwt., but Avery's or any other scale maker can supply scales graded to maunds, such as are supplied to the Railways. Most cultivators weigh their cotton before carting to the ginneries, but they do not understand the hocus-pocus of 8 cwt. 1 qr. 12 lbs. known as 8-1-12 or 8-2-0 some thing or other as the weight of the *bhar*, and believing themselves to have been cheated, return home grumbling, whether the buyer has been honest or otherwise. With a uniform *bhar* based on the maund all this will cease. The time has also come for daily publication of prices in New York, Liverpool and Bombay in the cotton districts of Gujarat. No special arrangements for marketing seed-cotton would be necessary, except when an exotic is introduced, and then only till the new crop is well established and gets a recognised demand in the market.

Mr. RAOJIBHAI B. PATEL called and examined.

2821. (President.) I am an Assistant Collector in this State, in charge of half a Collector's Division. I was formerly Director of Agriculture. I have 25 years' service in the State.

2822. I think that there has probably been a slight deterioration in Navsari cotton recently on account of mixing with *goghari*. The people bring in *goghari* to mix with Navsari in order to get the price of the latter and then the seed gets mixed in the field. I do not think there has been any deterioration in Broach cotton. I think that there has been an increase in the ginning percentage, and in the roughness of this cotton. I have had plenty of evidence of mixing of Broach cotton. It was started by large exporters and the middlemen followed suit. The licensing of gins and presses which I have suggested might improve matters. There should be a Government Inspector during the season, something like the arrangement at a central distillery.

2823. I want a central farm in each tract in which a particular variety is grown at which selected seed can be grown and distributed. Such farms must have an adequate staff. Since I sent in my written evidence, I heard of a village in my district the cotton from which is considered the best in the district. So I made enquiries about the reason and I found that almost all the cultivators used to pick out the best bolls for seed and have them hand-ginned and keep the seed. What happened, however, was that when a merchant went to buy cotton from that village, he simply fixed one rate for the whole village and then started buying. The man who has got a good sample from selected seed asked for one anna higher price for it. This was refused and so the man had afterwards to carry his cotton to the ginning factory and lost more. So the practice is gradually being given up. My view is that the trade gives no assistance to the cultivators; the trade in fact creates conditions which defeat the cultivators' efforts.

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[Continued.]

2824. There are no large area of unoccupied land in this State, suitable for cotton cultivation. All the grass lands in Saoli which used to be under grass have been taken up for cotton cultivation. The State has about reached the limit of cotton cultivation.

2825. I think the correct policy would be to try and get back Navsari to its original standard by seed farms and careful seed selection. This is my idea; to have pure Navsari in the Navsari tract and pure Broach in the Broach tract. The trade will have to help but there is no chance of the trade by itself being able to do anything of that sort.

2826. The Agricultural Department in this State has been gradually expanding since my time. The policy of His Highness' Government is towards expansion. The system of marketing here is not completely organized. The bulk of the marketing is not done in well-known centres like Navsari. It is done in every local centre where there is a ginnery. One uniform weight for the *bhar* is very necessary. I believe in the standardization of weights. In fact, there was a local Act standardizing the weight of maund at half the railway maund but then we had to make an exception in the case of cotton because of the intermingling of Baroda State territory with British territory. There must be a uniform policy on both sides, otherwise it is difficult to do anything.

2827. (Mr. Wadia.) The total area under Broach cotton in the whole tract is 700,000 acres. In the whole of the Broach cotton area, I want selected seed used by everybody, both in British territory and Baroda territory, so that we can maintain the quality of the cotton and increase its yield. You cannot separate the two territories in any kind of way. The total area in the Baroda State under cotton is about 950,000 acres.

2828. My idea is that there should be a central seed farm of about 500 acres which would supply enough seed for ten thousand acres of branch farms and these branch farms should supply seed to the whole of the Broach cotton area. If the mixing is stopped in the ginneries, the cultivators will get pure seed even for feeding cattle. I would have the whole of the seed distribution controlled for a certain number of years, say twenty, and then it could be given up to private agency. But if Government do not want to do it, I would start private agencies and encourage them from the first. Some suitable lands might be given to scientifically trained gentlemen, on such conditions as would secure a proper seed supply on the one hand and afford a fair living on the other. The cultivators want good seed and will buy it when they are assured that it is good. They will pay as much as twenty per cent. higher price for it. Only advertisement is required. If this system is followed, the seed from the ginneries would then be exported to oil mills and for cattle food. I would license a certain number of ginneries say three or four in the whole district and make a contract with them that they should gin the *kapas* of the ten thousand acres of branch farms and keep the seed separate. These selected ginneries would gin the cotton from the registered growers by itself and keep the seed in a separate store and sell it for seed at ten per cent over the current market rates for cotton seed. The cultivators would take it readily. The other seed would be used for cattle food and for export. As soon as the people know that they are going to get good seed, nobody will buy seed from the other ginneries for sowing. In order to save the cultivators from using mixed seed and as a preventive of mixing, there should be a law to stop any gin from mixing cottons of different types.

2829. I do not understand what is called *goghari*, what *kanvi* and what Broach. The last two are identical. The real thing is the suitability of different varieties for different climates. In Amreli, *mathio* is now grown, whereas *lathio* used to be grown. I have given the history of the change in my written evidence. I do not think that *mathio* would grow in the Broach district. There is *goghari* in Broach; it may have come in one account of certain effects of climate; it may have a higher ginning percentage and so the ginneries may give a higher price for it because the ultimate buyers do not know the difference. That is the crux of the whole matter. If the buyers knew the difference between the different varieties and paid accordingly, then there would be a reaction. My idea is that so far as Gujarat and Kathiawar are concerned, not the Baroda State only, but British territory as well, cottons at present grown are probably the best suited to the localities in which they are grown and I would propose that we should work all we can with them. If arrangements for selection of seed, for seed distribution, for the supply of manures, and for teaching the people better cultivation are made it will be found that there is an improvement in the staple of the cotton, at any rate in Amreli and Navsari. In other places, the cotton may not improve in staple, but it will improve in yield. The climate has a lot to do with the staple.

2830. We must try and keep the cotton pure in the different tracts. I propose that mixing should be stopped by licensing ginneries and presses. Those are the places where the mixing was first started, especially in the presses. I cannot say what the Baroda State would do in the event of the Committee recommending the licensing of ginneries and presses, but I think it quite possible that they would anticipate any action taken in British India.

2831. There is really speaking no damping of cotton in this State. Such damping as there is, in the ginneries results from exposure to dew as the cotton is kept outside the factories and plenty of dew falls in the ginning season. My idea is that there is no damping of the real cotton of the district in the presses. There may be some damping of brittle cotton. *Kadi Viramgam* in the Bombay market is *wagad* cotton. It has a little better staple than ordinary Broach but the bolls do not open on the plant. It has a very good staple but it is brittle. If anybody wanted to mix *wagad* with Navsari or fine Broach, they could not do so because it is dirty; but if anybody wanted to mix it with *lathio* which is not brittle, then they would damp it. I would make it a condition of licensing that such practices should be entirely prohibited.

2832. There are weighbridges everywhere, but nobody ever checks them. Tripod scales are not used for weighing seed cotton. In the Kadi district, where *wagad* is grown, cotton is weighed by the maund and there the weighbridges are marked in maunds.

2833. (Mr. Hodgkinson.) I am in favour of giving Egyptian cottons another trial but not American. The general conditions in Navsari are similar to those of the American cotton belt except in regard to the uncertainty of the spring rains for the preparation of the soil. If you want to experiment with American cotton, you must have a variety distinctly superior to anything at present grown so as to allow for deterioration. I am in favour of growing Egyptian cotton under irrigation. There are tracts which are suitable for Egyptian cotton and there are irrigation projects under which it could be grown which have been hanging fire since the Irrigation Commission. The Mahi river scheme was now investigated by the Irrigation Department, Bombay. They are under the impression that all the irrigation in Gujarat means rice. They therefore found out how much rice could be grown and said that the project would not pay. I do not know what the present stage of the project is. The Sabermati scheme will provide water for the Kadi district of Baroda and the Viramgam district. The Mahi river scheme would provide water for a part of the Baroda district and for the Kaira District of Bombay. These schemes are with the Bombay Government. By the Mahi

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river scheme we may or may not get water at the tail-end. The Sabermati scheme would benefit us the most. I do not know in what stage these schemes are. The Jankhari project is being investigated by Mr. R. E. Purves, lately Chief Engineer in the Punjab and now Irrigation Adviser to the Baroda State. That would give water to most of the Navsari district and to part of the Surat district as well. It is a Baroda scheme. The Baroda State is prepared to carry out the Sabermati scheme. I cannot say whether there would be any difficulty in getting the sanction of the British Government to it. Egyptian cotton has been tried in experimental plots at Kheralu in the Kadi district. I tried both *abbassi* and *mitaffifi*. The latter gave a better yield than *abbassi* but both succeeded. I certainly think that it would pay the cultivators to grow this cotton. It is a heavy yielder and fetches a good price. Arrangements would have to be made for marketing until the cotton gets established.

2834. (Mr. Roberts.) I want to draw your attention to one point and that is in regard to the manure supply. In Gujarat, on account of the heavy cotton cultivation, very few cattle are kept and the manure produced is not enough for the ordinary crops. I want artificial manures introduced. I have tried them and found they are of use. The only difficulty was that I could not get them at a reasonable price. Our cultivators in Gujarat are more advanced than cultivators in other parts of the country and if they understand that by putting Rs. 5 into the land they are going to make Rs. 10, they will do it. If Government could do something to get the cultivators artificial manures at the same rates as the British farmers get them, I should be satisfied. That can be done by the trade when the demand is large but, until there is a large demand, the man who imports manures and wants to sell them out at reasonable rates will lose. If Government were to give a subsidy, it would be a great help. At present Messrs. Shaw, Wallace and Company are the only firm which supplies manures. I got samples from a syndicate called the Permanent Nitrate Syndicate in England. They told me that if I gave an order for fifty tons, they would land it at Bombay at £12 per ton. If the order was for a thousand tons, they would charge at the rate of £8 per ton. That makes all the difference. If the merchant gets sodium nitrate in Bombay at £8 a ton, the cultivator will get it ultimately at about £12 but if he only gets a small quantity at £12 or £13, he is bound to sell it at £16 or £17 and no cultivator can then afford it. I think my experiments have proved that nitrate at £12 per ton will pay the cultivator. I have tried ordinary farm-yard manure which costs about Rs. 2-8 per cart load in my own village. I took about Rs. 50 worth of farm-yard manure, Rs. 50 worth of artificial manures, and Rs. 50 worth of cotton seed meal plus a top dressing of artificial manures. I tried these on different plots in my own fields and my own tenants did the work. The Baroda Agricultural Department gave me manures. The plots treated with artificial manures gave the best yields, in quality, in quantity and in every respect. The experiments lasted for two years; in the third year the Agricultural Department could not get the manure in time and they had to be dropped. That was for tobacco.

2835. We have grown *tur* (*Cajanus indicus*) as a rotation with cotton but not commonly. Ground-nut has only recently been introduced but it is now spreading. *Tur* (*Cajanus indicus*) is a common crop and always has been. We have also tried green manure, i.e., *sann hemp* (*Crotalaria juncea*). In the beginning of my service, they used to grow *urad* (*Phaseolus mungo var radiatus*) in rows with cotton in the Surat District and then plough it in. That practice has now disappeared. In Navsari, the growing of *sann hemp* as a green manure is a speciality. The cultivation is perhaps a little better in Navsari than it is in Surat.

2836. As regards sowing in lines, to my mind the best system is to sow the seed in single rows about four to five feet apart and to put ordinary farm manure in the rows before sowing, and to harrow the central portion between the rows throughout the season. That would give you a fallow. The next year the rows should be only twelve to fifteen inches apart, from the first year rows and so on. Nothing particularly is being done to popularise the best methods. There has been no regular campaign. Broadly speaking, example is the best thing. The example of a private farm is better than that of a Government farm, as the people have an idea that Government money is unlimited and therefore Government farms can make a good show. If private gentlemen scientifically trained were helped to start a big farm, that might help a lot.

2837. Cotton is the most profitable of the dry crops here because the expenses are very small. Cotton cultivation is very easy compared with other crops. There is no other crop which competes with cotton.

2838. There are two systems of marketing. One is that under which the middlemen, ginners or others who want to buy and sell cotton, buy on the *jalap* system. This is a system of forward sales. The buyers give a little money in advance and fix the rate at which they will take the cotton in the season. This system used to be very common here when the cultivators were not so well off as they are now. Now on account of good seasons, many cultivators do not want advances and they know that prices fluctuate so much that if they hold on they may get a better price. There is still about fifteen to twenty per cent. of the cotton sold under that system. Under the other system of marketing, those cultivators who have not sold their cotton in advance take it in their own carts to the gins and there it is bought at the day's rate and paid for. The gins are really the only markets for seed cotton. At present every ginnery is a market. Where there are more ginneries than one, as at Ankleswar, there is a good market. The cultivator takes his *kapas* to his usual factory unless he finds that he does not get his money promptly or has been cheated. If a central market could be established, it might be a good thing. Here along the railway for a few miles on each side, every tenth cultivator is also a cotton buyer. He buys seed cotton and sells it either ready or forward. That is one thing against a system of markets. The man who buys cotton is cleverer than the cultivator. That is why I advocate standard weights. Usually before the small cultivator takes his cotton to the gin, he weighs it at home. It is weighed again in the ginnery. The clerk says it is so much and the man has to accept the weight but if the difference is large, say more than half a maund, he quarrels with the factory owner and next year he goes to another ginnery. This would not happen if there were a central market. Standard weights could be introduced to-morrow by Government order. Central markets would be difficult to work in Baroda, owing to the great fluctuations in price in the course of a single day.

Mr. KHASHERAO B. JADHAVA, Survey and Settlement Commissioner, Baroda State.

EXAMINED AT NAVSARI, FEBRUARY 13TH AND 14TH, 1918.

No written statement was submitted by the witness.

2839. (President.) I am the Survey and Settlement Commissioner of the Baroda State. I take interest in agriculture; I was in charge of the Agricultural Department in 1890. I was educated in agriculture at Cirencester College and then I went to Germany to learn chemistry.

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2840. I have noticed a great deal of variation in cotton between 1890 and 1918. Navsari cotton is considered the best in Gujarat but the cotton from Bilimora is a little better than Navsari and the cotton from the Mahoova Taluka of the Navsari district is the best of all. That is the cotton which is grown farthest south of all. The reason is that the land is very well drained and the tract gets more than forty inches of rain. That cotton was brought particularly to the notice of the late Mr. J. N. Tata who used to make large purchases there. That cotton has begun to deteriorate on account of adulteration. I first noticed it when I was in charge of the district in 1896. There were some people who used to get short staple cotton to mix with it. That is also happening at Navsari. A general deterioration is noticeable on account of the mixture of seed. I think it is the dealers in cotton who are responsible because they want to get the advantage of the cheaper price of short staple cotton and to get a bigger price by mixing it with long staple and selling it as Navsari. They do not take any trouble over the seed they give back. I think this mixing ought to be stopped. People should not be allowed to transport *kapas* outside their own district by rail. There are ginning factories all over Gujarat and there is therefore no difficulty in getting cotton ginned so that if this preventive measure were resorted to, it would involve no hardship on the cultivators.

2841. I would first go for mass selection. I did that in the year 1890 in a village near Itola in the Baroda Taluka. There the cultivators are coolies and easily amenable to advice. They were encouraged to collect the best cotton bolls and then gin the *kapas* in hand gins. In that way, we improved the variety in the whole village and in two or three adjoining villages. I think that the improvement has been maintained up till the present. The difficulty that we have here is due to the existence of the cotton, *goghari*, which is extremely popular with the cultivator on account of its high ginning percentage. We are advised that it is extremely like Broach and that until the latest stage of its development it is impossible to detect the difference. I think a certain amount of botanical experimental work should be done on that. There are some villages where *goghari* is not cultivated so that if mass selection were undertaken in that tract, it would be helpful. It extends from the south of Warnama of Baroda Taluka and in the Dabhoi and Sankheda Talukas of the Baroda district away from the railway line, i.e., the main line (Bombay, Baroda and Central India Railway). It will be found that the mixture of Broach and *goghari* is greatest along the railway line, that is, the Bombay, Baroda and Central India. If selection were made therefore in these fairly pure type areas, I think that much of the difficulty would disappear and then that seed could be distributed elsewhere. There would be no difficulty about ginning the cotton as there are gins in those tracts already. Ginning factories get seed from outside the district and mix it with the local seed. I consider that there should be some restriction on ginneries. My idea is that they should be licensed and that if they retail seed, they should not be allowed to get cotton except from certain districts within a twenty miles radius. There should be penalties for mixing, damping and adulteration.

2842. (Mr. Hodgkinson.) We have a Factory Act which is on the same lines as that in force in British territory.

2843. My view is that no exotics should be introduced into the State. I have tried experiments with them for the last 25 years. I tried Sea Island cotton for six years and found that it deteriorated. I imported fresh seed with the same result. The only thing which succeeded was a selection from the local cottons. By careful selection year after year, the local cotton seems to improve. It improves also under irrigation. There was an idea before the famine of 1899-1900, that cotton did not require irrigation. I was against that theory and I showed the Royal Irrigation Commission when I was a witness before it in 1901 in Gujarat that cotton required irrigation. As the result of one or two waterings not only does the yield of *narma* and other varieties of indigenous cotton increase but the staple improves. So any improvement which has to take place in cotton must first be the improvement of the local varieties. Improvement must come from within both in plants and in animals and there must be no cross breeding, not even in cotton. We have a number of very satisfactory indigenous cottons. In fact all our Gujrat cottons are very good. Navsari is supposed to be the best; then comes Surat, then Broach, then Myagan. These are all the same varieties, and the variation in them is due to the amount of moisture that the plants get. I went in for pot culture; I had special pots prepared and irrigated the cotton not by giving water in the surface but by giving it at the sides, i.e., by providing ways into the pots, so that water was given only to the roots and not to the surface. Under that cultivation, I found that there was hardly any difference between Surat cotton and the Broach cotton grown in Baroda. I arrived at the conclusion that the variation between them in ordinary circumstances was due to the rainfall conditions. The average rainfall in Navsari is 40 inches whereas in Baroda it is 32.

2844. In my opinion, irrigation is most important. Irrigation would not only increase the outturn of cotton but would also improve its quality. By pot culture as the result of giving water to the roots, I got practically the same staple for Baroda cotton as for Navsari. The length of the staple of Navsari cotton is about an inch a little over an inch. The length of the staple of Mahoova cotton is the same but it has a little better fibre, which is due to the better drainage conditions. I found that fermented night soil manure gives very good results but I have not tried it on a very large scale; only in pots. I had a patent with regard to this sewage disposal and I used it with Chunam *kankar*. I found that with *kankar*, I got extraordinary good yields. The people of Gujarat are prejudiced against night soil and no one uses it. By manuring with night soil in the Kadi district, where *wagad* is grown and by watering a cultivator got a yield last year and the year before of forty maunds per *bigha*. 1½ *bighas* make one acre and a maund is forty pounds. That was a tremendous yield. The ginning percentage was about 33 to 34 per cent. It went up to 36.

2845. Every bit of land in Baroda is under cultivation. It has been found that exotic cotton with a small amount of rainfall does not grow at all, i.e., with a rainfall of less than six inches. Neither American nor Cambodia nor Egyptian cotton would grow with such a rainfall as that but indigenous cotton grows under very poor conditions. I have got figures in support of this in one of my Settlement Reports. I give an extract of my diary of the year 1900, that is the famine year, when there was only four inches of rain in the Karjan Taluka of Baroda district.

"What the condition of cotton crop would have been in the last great famine year, had not people allowed it to be destroyed would be seen from what the condition of that crop was where it was carefully preserved. I quote from my diary, dated 12th April 1900, from which I made a quotation once before. Went to Sim to see the condition of fields, came to the Ganpati Wago, part of the village land, known by that name which extends over 700 *bighas*. Here cotton is found growing luxuriantly. The *patel* of Kandari has been asking me since some time to inspect this Wago, and I find I did well in seeing it. I have examined some cotton plants. They were found to bear a very large number of *pumdars* (bolls). Also each twig bore some *pumdars*. These *pumdars* were quite healthy as in ordinary good years. This year there has not been more than four

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inches of rain in this village and yet cotton crop is found growing well. It shows the richness of land and wonderful tenacity of cotton plant to obtain plant food from scanty moisture in the land." Then again in the light soil of Kadi district to the north of Ahmedabad of which I had to make revision settlement report, I found that indigenous cotton manages to grow well even in the years of very low rainfall. I collected figures of cotton from the year 1903 A.D. (1959 *Samvat*) to 1917 A.D. (1972 *Samvat*) i.e., for about fourteen years showing the area under cotton and the total rainfall in the year. I think they are of interest.

Year.	Area under Cotton.	Total rainfall.
1959	14,643	31.84
1960	24,376	20.84
1961	54,503	9.72
1962	30,500	33.31
1963	54,293	26.29
1964	46,655	30.44
1965	47,724	34
1966	55,896	38.19
1967	49,279	21.19
1968	56,054	6.44
1969	54,789	41.94
1970	84,480	33.42
1971	74,833	28.27
1972	67,113	15.31

Here I find that in one year there was only 6.44 inches of rainfall and yet in that year the area under cotton was very good. In that one *taluka*, the area was 56,054 acres while in the previous year when the rainfall was 21.19 the area under it was 49,279 acres. In this statement the range of rain is from 31.84 inches to 6.44 inches. It will be found generally that in a year of smaller rainfall or late rainfall, the area under cotton had been on the increase. This is a point for investigation. The soil of the tract for which I am giving figures is mixed—that is light land and black land mixed. It is very suitable for cotton. I like this land as well as any in Gujarat for cotton growing, especially if there was irrigation available. I made a note on this subject to the following effect sometime ago.

"In connection with the improvement of the staple of cotton of this *taluka*, it may be interesting to note that not only is the land of *Khakharia* Tappa very suitable for it but its yield is fairly large and the staple good. I had a talk with the late Sir Chinobhai of Ahmedabad on more than one occasion and once in the presence of His Highness the Maharaja Sahab at Pattan and he too admitted that the cotton of Kadi and Kalol was distinctly superior to the Broach variety. I think it is possible to improve this variety still more by proper selection of seed. The type has well established itself. What now required is the prevention of adulteration of inferior seed and encouragement to cultivators to select their seed more carefully."

2846. (President.) As regards irrigation, the point which I tried to put before the Irrigation Commission in 1901 was that there is a great deal of water going to waste in the various rivers. I prepared various schemes of irrigation for Baroda. I proposed and submitted a scheme to make use of the Sabarmati river for Kadi district and brought it to the notice of the Irrigation Commission. If that scheme were undertaken, not only would Ahmedabad be saved from floods but over the whole of northern Gujarat, we should be able to grow very fine cotton. Instead of there being deterioration, we should practically double the yield. The present average yield is eight maunds, under irrigation it would be about sixteen to twenty maunds. That is a tremendous difference. I submitted the scheme to my Government which has been in correspondence with the Bombay Government since that date. First of all, the Bombay Government wanted to undertake it and so we did not get permission to do so. Then as it was found that most of the water was to pass through our territory, the Bombay Government did not think it advisable to undertake the work and so nothing was done. I believe that recently we got permission to survey the project. I believe that Mr. Purves from the Punjab is in charge of the investigation of the work. That is a work which would be carried out either by Bombay or Baroda. If Gujarat cotton is to be improved, the Governments of Bombay and Baroda must join hands. The territories are so mixed up that one cannot do anything without the other. I think it would be to the interest both of the British Government and the Baroda State to undertake these works. If we were to go on with the Sabarmati project and if we had irrigation schemes from the Tapti and the Narmada, then the whole of Gujarat would be irrigated. I cannot give the estimated cost of the Sabarmati project but even if it costs five millions, it would not be much because it would pay. If I were given the contract for it, I would make it pay. There is a fall on the Tapti river near the village Arkati or rather a little way up from that village. A weir or a big reservoir could be made there. If that work were undertaken, the whole of the Surat and Navsari districts could be irrigated. The Baroda Government worked out a preliminary project for a weir eight miles down stream from Arkati. That is now a project which is under consideration and would pay but my scheme would pay better because the cost of foundations would be less. I mean to bring this to the notice of Mr. Purves when I go back to Baroda. I am dealing now with the scheme in our own territory for irrigation from the Tapti. There is also the Jankheri scheme which is a big scheme. The Narmada project for irrigating Broach is worth investigation. There is also a fall near Shoolpani—some miles from Tilakwada. Then there is the river Mahi. If these projects were undertaken, practically the whole of Gujarat could be irrigated and the yield could be increased by quite a hundred per cent. If you take the last twenty years' figures, the yield only comes to about three maunds per acre which is very little, whereas it ought to be ten maunds.

2847. (Mr. Roberts.) The average assessment per *bigha* is Rs. 2-12 and the rent is about three or four times that for dry lands. We have introduced the system of sub-soil water taxation which is in force in the Bombay Presidency, which means an addition of one or two annas a *bigha*.

2848. The efforts of the Agricultural Department should be directed to keep the purity of the present types.

2849. I do not think it would be a bad thing to have central markets as in Berar. I do not think that it would be difficult to get the cultivators to bring in their cotton to such markets. If they were given the necessary facilities, they would come. At the beginning such markets should be in places where there

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are several ginneries. It is absolutely necessary that weights should be standardized. Much difficulty is experienced for want of standard weights.

2850. I should have mentioned the experiments I made with tree cotton at Baroda. I allowed the trees to grow to the height of 4½ feet and stopped their growth at that stage. The branches had to be trimmed every year just at the end of May. I planted the trees at a distance of ten to twelve feet apart and there were altogether twelve trees. I do not know the variety. I got the seed from the Deccan. I used to spray them with Bordeaux mixture to prevent attacks by insect pests. On an average, I got something like 3½ pounds from each tree. One could plant about 400 trees per acre which would mean an outturn of 1,400 pounds per acre. The trees did not suffer from insect pests; the staple was more than an inch in length and the fibre was strong. The cotton was valued as good as Navsari and perhaps better. I had not to water the trees but I used to have the ground dug up at the end of May when the trees were pruned. The sub-soil water level was about twelve feet from the surface. When the plants were dug up, the roots were found to go fourteen feet deep. In order to find out how deep the roots of ordinary cotton went, I had forty to fifty plants dug up and the longest root was one foot nine inches. The tree cotton plants lasted for nine years. They gave some outturn every year but in some years it was more than in others. I sometimes manured the trees with sewage (night soil) and sometimes with farm-yard manure and ashes. Once I tried bacterial nitrification. It did not produce any effect on the tree cotton plant but on ordinary cotton plants it produced a very good effect. In regard to ordinary cotton what I did was to use dilute sulphuric acid. The outer husk disappeared and the seed became red in colour. Then I applied bacterial nitrification and sowed the seed the next day. Germination was very rapid. It usually took four to four and a half days and never more than five days. The percentage of germination was also more than 95 per cent. The plants always started well and they ended well. I think I got a better yield as compared with ordinary methods of cultivation but the plots being small, it is rather difficult to say definitely. It is not an expensive method: I think it might be cheap in the long run. I tried the sulphuric acid process on a large scale and I gave the seed to cultivators. The seed I gave them did very well.

2851. The reason why *goghari* is spreading along the Bombay, Baroda and Central India Railway line is that on the eastern side of the railway line, the land contains more calcareous nodules than on the western side. Since 1893 the rainfall has been getting less; in 1896 the rainfall was very much smaller than usual, and it was a famine year. In 1899 the rainfall was the smallest on record during the last hundred years. Since then it has fluctuated. This varying rainfall helped to establish *goghari* as it requires less rain. Within certain limits of rainfall, the shorter staple variety flourishes. With a rainfall up to thirty inches, *goghari* gets on well. A higher rainfall than this is good for the old Broach variety. With forty inches and more of rain, the Surat variety flourishes. On account of the unusually heavy rain this year, the staple of the ordinary variety is better this year round Broach and Baroda. The Navsari variety improves with irrigation. I have tried this myself on a plot near Navsari and gave three or four waterings with the result that the average yield was fifteen maunds per *bigha*, i.e., 28 maunds per acre. With manuring it was 22 maunds per *bigha*. The manure was farm-yard manure and purdrette. The plots were one acre plots. The field was kept very clean and intercultured and tilled after irrigation with the American hoe.

2852. I have already stated that exotic cotton will not grow in Gujarat. The reason is that the roots of exotic cottons are more tender and that they suffer from water-logging. In the black Gujarat land, it would not be possible to give more than one watering to cotton and exotic cotton will not grow with only one watering. If more than one watering were given the land would be water-logged. In the Dabhoi Taluka, there is a regular black cotton soil. There I gave watering on two occasions to cotton. In the first year, the rainfall being small the plants which were of the ordinary variety did not come up well. By giving a heavy watering the people got eight maunds of cotton. I did not verify this myself, as I was transferred and so had no opportunity. The second time also by watering the plants the cultivators were benefited. Except in a year like this, when watering may not be required, Gujarat cotton would be very much benefited if one watering were given at the end of September. So that if we want to get rid of *goghari* cotton from Gujarat, the only thing to do is to have irrigation works. The point is, as I have already said, that it is the same variety which grows from Bilimora up to Baroda. The variation that we see is due to the amount of water supply available. On account of there being more rain and the land being better drained near Navsari and Bilimora, the same variety gives a better cotton. Further up when we get to Baroda, the rainfall is thirty to thirty-two inches and the staple is shorter. When I was in Kathiawar in 1894, *goghari* cotton was growing everywhere. After 1893, the rainfall was less for eight years and the result was that *goghari* disappeared from Kathiawar and that *mathio* which is even shorter in staple took its place especially in the Amreli district. If water were available, then the better staple varieties would be benefited and *goghari* would not find a place there. All these varieties have only a potentiality for improvement up to a certain point. If water were available, *goghari* would become so markedly inferior that no one would grow it.

2853. There ought to be a stricter law against cattle straying. They roam about all over the fields and the cultivators lose on an average about a maund and a half. That is a great loss.

2854. In Northern Gujarat, some attempt should be made to protect the cotton crop against frost. What I did was to keep straw on the eastern side of the field and cover it with earth so that it might not burn too quickly and then set fire to it at about 3 A.M. which is the coldest part of the night. The smoke protected the crops and in some cases they were saved by this means. Systematic attempts of this kind should be made.

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Mr. KHASHERAU B. JADHAVA.

[Continued.]

ANNEXURE I.
Area and outturn of cotton in the districts of Baroda State.

No.	Year.	TOTAL AVERAGE OF COTTON.					TOTAL OUTTURN OF SEED COTTON IN lbs.					LINT IN BALES.					Average price per bale for the last 10 years.	Total yield of the produce in money value.	REMARKS.
		Baroda District.	Kadi District.	Navsari District.	Amreli District.	TOTAL.	Baroda District.	Kadi District.	Navsari District.	Amreli District.	TOTAL.	Baroda District.	Kadi District.	Navsari District.	Amreli District.	TOTAL.			
1	1905-06	2,54,565	79,585	1,47,371	1,43,195	6,24,716	8,24,08,885	1,93,36,860	3,73,22,390	6,26,40,740	20,17,08,845	68,674	16,114	31,101	52,200	1,68,080	19	2,10,11,125	
2	1906-07	2,30,163	98,151	1,39,279	1,30,444	6,48,037	7,46,71,190	2,28,99,005	4,21,92,420	3,03,11,100	17,00,73,715	62,372	18,915	35,180	25,259	1,41,726	19	1,77,15,750	
3	1907-08	2,32,797	63,456	1,29,377	1,53,917	5,79,547	7,70,18,055	1,68,72,955	4,01,05,690	2,66,27,170	16,06,23,850	64,181	14,060	33,421	22,169	1,33,651	19	1,67,31,375	
4	1908-09	2,24,101	55,178	1,42,729	1,57,177	5,79,185	7,41,73,360	1,40,07,640	3,81,93,120	2,67,34,975	15,40,09,095	61,811	12,453	31,825	22,275	1,28,334	19	1,60,41,750	
5	1909-10	2,57,706	65,915	1,80,742	1,69,649	6,73,912	8,87,13,100	1,71,52,905	4,50,04,410	2,96,41,280	18,05,16,695	73,931	14,294	37,503	24,171	1,49,890	250	1,87,37,375	
6	1910-11	3,71,898	89,923	2,13,949	2,05,711	8,81,481	1,01,42,605	2,28,15,225	5,08,47,340	3,78,49,960	21,29,40,180	84,523	10,012	42,372	31,541	1,77,448	250	2,21,81,000	
7	1911-12	3,35,330	32,277	2,17,699	1,32,383	7,18,189	12,48,52,055	67,21,440	5,94,67,620	2,44,49,310	21,54,90,425	1,04,043	5,601	49,556	20,374	1,79,574	250	2,24,46,750	
8	1912-13	3,77,415	71,275	2,29,194	1,28,737	8,06,691	14,46,99,620	1,98,79,515	4,76,83,850	6,25,17,226	27,47,80,191	1,20,383	16,566	39,736	52,097	2,28,962	250	2,86,23,750	
9	1913-14	3,92,746	1,15,700	1,74,917	1,76,857	8,59,520	14,58,12,880	3,24,97,980	4,67,54,330	3,37,40,770	25,88,14,910	1,21,510	27,081	38,962	28,124	2,15,077	250	2,69,59,625	
10	1914-15	3,92,693	1,22,451	2,06,824	1,6,857	8,90,547	14,40,97,590	2,80,14,510	4,92,58,480	3,31,47,930	25,54,18,490	1,20,831	23,345	41,048	27,839	2,13,063	250	2,66,32,875	

N.B.—1 Khandi=2 bales or 800 pounds.

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Mr. M. M. SITOLE.

ANNEXURE II.

Comparative statement showing the area and outturn of the cotton crop in the Bombay Presidency and the Baroda State.

No.	Year.	ACREAGE.				OUTTURN IN BALES.				REMARKS.
		Total acreage of Bombay Presidency including all the Indian States and Sind.	Minus acreage of Baroda.	Balance.	Percentage of Baroda State to Bombay Presidency including all the Indian States and Sind.	Total outturn of Bombay Presidency including all the Indian States and Sind.	Minus outturn of Baroda State.	Balance.	Percentage of Baroda State to Bombay Presidency including all the Indian States and Sind.	
1	1905-06	63,73,000	6,24,716	57,48,284	9.8	11,95,756	1,68,089	10,27,667	14	
2	1910-11	67,70,500	8,81,481	58,89,019	13	17,53,100	1,77,531	15,75,569	10.1	
3	1911-12	56,40,200	7,18,189	49,22,011	12.7	7,69,300	1,79,574	5,89,726	23.3	
4	1912-13	69,36,000	8,06,821	59,42,758	11.6	16,07,500	2,28,982	13,78,518	14.2	
5	1913-14	69,67,700	8,59,520	61,08,180	12.3	16,85,200	2,15,677	14,69,523	12.7	
6	1914-15	78,59,000	8,90,547	69,68,453	11.3	18,37,800	2,13,063	16,24,737	11.5	

Mr. M. M. SITOLE, B.A., M.R.A.C., Naib Suba, Kodinar Division, Baroda.

EXAMINED AT NAVSARI, FEBRUARY 14TH, 1918.

Written statement.

2855. *Preamble.*—I was the head of the Baroda Agricultural Department for nearly nine years from 1907 to 1916. Baroda Raj is divided into four prants or districts. I shall, for the sake of convenience, deal with each of them separately.

2856. *Cotton in the Baroda District.*—Baroda Prant consist of two distinct tracts. The one is called *kanam* or the black soil tract; the other is called *wakal* or the sandy loam alluvial tract.

(2) In *kanam*, *kanvi* and *goghari* varieties of cotton are grown generally as mixtures. The average size of holdings in this tract is about 25 bighas. Fifty per cent. of each holding is sown with cotton. The general rotation is (1) cotton and *juar*, (2) cotton and bare fallow, (3) cotton and cotton. No manure of any sort is applied, but sometimes sheep are folded. If any manure is at all applied, it is applied to *juar* and not to cotton. In the absence of manure, well-to-do cultivators follow the second rotation, viz., cotton and bare fallow. The average yield per bigha is 240 lbs. and in fallow land 480 lbs. of *kapas*. The average net profit is about Rs. 10 per bigha. Cotton is the chief crop of this tract. No other crop competes with it. *Juar* is grown to feed men and the beasts. Cotton is never grown singly but as a mixture with coarse paddy in the same rows with cotton. As the cotton is the principal crop of the tract, its cultivation never fluctuates.

(3) In *wakal* or the alluvial sandy loam tract, *rozi* cotton is grown. *Rozi* is a perennial cotton. This crop is sown ten to twelve feet apart from rows to rows and the intervening space is sown with cereals, such as *kodra*, *bajra*, *til*, *tur*, etc. Cotton crop is allowed to remain in the soil for five to six years. The average holding is about ten bighas and ten per cent. of each holding is laid down under cotton. The average yield is about 100 lbs. of *kapas* per bigha from the second year of its cultivation.

(4) In *wakal*, *kanvi* and *goghari* varieties are also grown to a small extent and whenever they are grown, they are grown without mixture of paddy. The yield of *kapas* is generally about 600 lbs. per bigha. The competing crops are tobacco, ginger, *jiru*, potatoes, wheat and vegetables. The net profit per *bigha* when mixture of *kanvi* and *goghari* cotton is grown alone is about Rs. 25 per *bigha*.

(5) The *kapas* is sold and therefore the seed goes with the *kapas*. Cotton seed is brought by the cultivators for feeding their buffaloes; the rest is exported by ginners. Seed is not selected. It is bought from the ginners.

2857. *Cotton in the Kadi District.*—In Kadi the common variety of cotton grown is *wagad*. The average size of holding is about twenty *bighas*. About 25 per cent. of each holding is sown with cotton in the southern *talukas* and about five per cent. in the northern *talukas* of the district. The average yield per *bigha* is about 300 lbs. of *kapas* yielding a net profit of Rs. 12.

(2) Sometimes the cotton is sown in the month of May and irrigated till the first fall of monsoon. Manure (farm-yard manure) is applied at the rate of 25 carts per *bigha*. The average yield per *bigha* is about 800 lbs. to 1,000 lbs.

(3) The soil of Kadi Prant is light sandy loam with facilities for well irrigation. Cotton started by irrigation and, if necessary, given one or two waterings in October will, if the present prices of staple keep up, seriously affect the cultivation of other competing crops, viz., wheat and rapeseed. No regular rotation is followed in Kadi Prant. The seed is disposed off as in Baroda Prant. Seed selection is not practised.

2858. *Cotton in the Amreli District.*—Since the famine of 1900, *mathio* cotton is grown; before that *lallo* was grown. In Kodinar Taluka and also in the adjoining territory of Junagad State, *kadhya* cotton is grown as a mixed crop with *mathio*. This *kadhya* is a pure Georgian cotton of America. It has been thoroughly acclimatized and suits the tract wonderfully well. In Amreli, the average size of holding is about forty *bighas* and one-third of each holding is set aside for cotton. The average yield of *kapas* is 200 lbs., giving a net profit of about Rs. 7 per *bigha*. The common rotation is *juar*, *bajra* and cotton. The cotton crop fluctuates considerably with the condition of the monsoon. This prant is liable to drought and, whenever a scarcity of rains is perceived, more cereals are grown at the cost of cotton. No seed is selected and it is consumed by cattle.

2859. *Cotton in the Navsari District.*—In Navsari Prant, Broach and Navsari varieties of cotton are grown. The average size of holdings is about twenty *bighas*. Fifty per cent. of each holding is generally under cotton

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[Continued.]

in Rasti Mahals. The common rotation is *juar* and cotton. The average yield varies from 100 lbs. to 240 lbs. in *jirayati* land. In *karry*, i.e., rice land, the average yield is about 400 lbs. of *kapas*. The net profit also varies from twenty to thirty rupees per bigha. Manure is rarely applied except to *karry* lands and, if at all applied, it is applied to *juar* and not to cotton.

(2) In the Rani Mahals of the district, the average holding is from thirty to forty bighas and five per cent. of each holding is generally sown with cotton, giving an average yield of about 160 lbs. of *kapas* and leaving a net profit of about Rs. 5. Seed is exported to Europe or sent to other parts of India. No seed selection is practised.

2860. *Conditions affecting increase in area under cotton in Baroda.*—The area under cotton in Baroda Raj has increased by about 33 per cent. during the last ten years. The chief factor in this increase is due to the steady increasing price of lint. Baroda Raj contributes one-eighth of the total produce of cotton of the Bombay Presidency. If a better variety of cotton, such as Cambodia, is introduced in the alluvial sandy loam tract, where there are facilities for irrigation, the area under cotton as well as the total contribution from the Raj may be increased from one-eighth to one-sixth or thereabout. Cambodia is specially adapted for the soil and climatic conditions of Northern Gujarat.

2861. *Prospects of Cambodia cotton in Baroda.*—Amongst the exotic cottons tried by me, Cambodia has given wonderful results. Cambodia is a surface feeder plant and requires the very best of treatment. This cotton responds to manure, good culture and irrigation promptly. I have obtained wonderful results with Cambodia on the Baroda and Jagudan model farms and also on the cultivators' fields getting as much as 1,200 lbs. of *kapas* per acre.

(2) In my frost escaping experiments, Cambodia stands first. It is the cotton which gives more than fifty per cent. of its yield before the usual period of frosts. In Kadi Prant, frosts are occasional and the local crop suffers the most. The quality of the lint is as good as Navsari and also fetches equally good price. It is the cotton for Kadi Prant and northern *talukas* of Baroda Prant, where sandy loam exists with plenty of irrigational facilities. Cambodia is a wilt-resisting plant and can stand local diseases better than local cotton. To get the best yield of Cambodia, it must be started by irrigation in the month of May, highly manured and treated as a garden crop.

Mr. M. M. SITOLE, B.A., called and examined.

2862. (President.) I am Naib Suba, that is a revenue officer. I was Director of Agriculture for nine years. I am a Graduate of Cirencester as well as a B.A. of Cambridge.

2863. I consider that there has undoubtedly been a deterioration in the cotton in Baroda during the last twenty years. There are other causes besides the mixing of seed. They are bad cultivation and the fact that, in our cotton growing districts, land used formerly to be kept bare fallow but now-a-days, owing to the high prices of cotton, the patches of bare fallow are day by day declining in number. Cotton is also grown on a large scale to the detriment of good cultivation. Formerly in every village, seed cotton was ginned by hand and seed was specially selected by cultivators; now-a-days that practice has entirely disappeared owing to the want of labour and the increase of ginning factories. The cotton crop is sometimes spoilt for want of labourers as it cannot be picked in time. The same thing happens both in regard to sowing and weeding. The scarcity of labour is a great factor. Many labourers emigrate from the State to Africa and elsewhere, both from Kathiawar and Navsari. Plague is also another reason for the scarcity of labour. The famine of 1900 also caused the population to decline. There is also the demand for labour in the cities. I do not think the sub-division of holdings had had any effect.

2864. I think the control of seed is the one great remedy for the prevention of the deterioration of Navsari cotton by admixture. I would advocate seed farms controlled by the Agricultural Department or better still seed farms controlled by private enterprise because the people will have more faith in their own work. I am in favour of putting restrictions on ginners to prevent mixture but I do not see how that could be carried out. It is a difficult problem. Unless Government undertakes penal legislation, mixing cannot be prevented. It is doubtful whether penal legislation would prevent it altogether especially as seed is bought from other parts of India for cattle feeding. Government cannot prevent that and it means that the seed gets mixed with the local seed.

2865. (Mr. Wadia.) The cultivators get the bulk of their seed from the ginners. If the transport of *kapas* by rail were prohibited and the ginners were made to gin the *kapas* of the district itself, the chances would be that they would turn out a fair quality of seed or one might say a second class quality of seed but it would not be as good as selected seed. The first step would be the prevention of carriage by rail. There is not very much transport by carts in these districts and I do not think it necessary to prevent *kapas* being transported by carts. The stopping of foreign seed coming in from other tracts is the only remedy for mixing. The mischief has already been done. If the Government of India takes any steps in this matter, our Darbar is sure to take the same steps. If anything is to be done, it should be done immediately, otherwise *goghari* will spread.

2866. I have mentioned in my written statement the wonderful results I have obtained with Cambodia. They were obtained on the Baroda and Jagudan model farms. The Jagudan farm is thirty miles north of Ahmedabad. It was grown on both irrigated and unirrigated soils. In 1912, there was a severe frost in Gujarat. All the crops were destroyed including cotton but Cambodia being an early crop, I got as much as 500 lbs. per acre before the frost which came at the end of January while no other cotton gave anything. In the first year, Cambodia was sown in the month of June with the other cotton. In later years, we started sowing in May with irrigation both in the case of Cambodia and the local varieties. The result was that for a series of years more than half the yield of Cambodia cotton was obtained before the time at which frosts begin, whilst the other cottons only gave a yield of from two to five per cent. before the frosts came, i.e., before the end of January. The other cottons take a longer time to mature. The local cottons were *lallo*, *kanvi*, Broach and *goghari*. They are usually sown in June. In Northern Gujarat, i.e., to the north of Ahmedabad, we expect frost every third year. The other cottons take about nine months to grow whilst Cambodia takes only seven months. I got a full crop of Cambodia by March—as much as 1,200 lbs. per acre. Of course that was an exceptionally good crop but I have got 1,000 lbs. for a series of years. We distributed the seed of Cambodia to some cultivators round about the Jagudan farm in order to find out whether the same results could be obtained from the cultivators' fields. The land was ploughed as usual, harrowed and irrigated from wells. There are no canals and all irrigation means well irrigation. Altogether 150,000 acres are under well irrigation in Gujarat. I think that if Cambodia were pushed in

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the Kadi district and in the northern talukas of the Baroda District where there are sandy loams and well irrigation, it would do very well. Cambodia should be watered in the month of October but no watering is required after that. The first picking is at the beginning of November.

2867. (Mr. Hodgkinson.) As regards fineness and feel of the lint, Navsari is a better cotton than Cambodia. As regards silkiness and colour, Cambodia is better. Navsari is a longer staple cotton than Cambodia. The staple of Cambodia is only three-quarter of an inch, whilst that of Navsari is nearly an inch. I would only recommend Cambodia for certain tracts in Gujarat and I would not recommend Navsari for those tracts. Navsari will only grow under certain conditions and these conditions in those tracts are not favourable for it. Cambodia is the hardier plant and it would stand the conditions of northern Gujarat under irrigation.

2868. (Mr. Roberts.) There is no Khandesh type in the real Broach tract; it is only found in the Amreli division of the State. There is always a danger from the import of seed for feeding cattle that the *banias* may sell it unintentionally for sowing. I have seen traces of this in the fields and have come to the conclusion that these traces are due to the importation of seed. The war came in the way of spreading Cambodia. The price of cotton went down very considerably when the war broke out. There was another difficulty which was that the merchants not knowing the full value of Cambodia would not give a better price for it than for the local cottons. The third difficulty was ginnings could not gin Cambodia cotton with the ordinary grids. They were not willing to change the grids. The idea was to replace the mixture of *kanvi* and *lalio* in the southern part of the Kadi district by Cambodia. The area under Cambodia went up to about 600 acres.

2869. When I was in charge of the Agricultural Department, my policy was to improve the local cottons. We tried exotic cottons but we did not succeed. We tried the Surat Farm cross and to some extent succeeded in getting better results with it. Whether it was the fault of the people or the fault of the Cotton Syndicate that the farm cotton did not spread, I cannot say, but the Syndicate stopped buying cotton. In order to improve the local cotton, we selected the seed from the farm cotton and distributed it but we had no very definite policy.

2870. Marketing is an important matter. I think there is a possibility of introducing the Berar system of marketing and that the cultivators could be induced to bring their cotton to such markets.

Mr. C. V. SANE, Deputy Director of Agriculture, Baroda.

EXAMINED AT NAVSARI, FEBRUARY 14TH, 1918.

Written statement.

I. AGRICULTURAL EXPERIENCE.

(b) "Deshi" long staple cotton.

2871. (10) Experience.—I have been placed in the Kadi district for about a year now after my return from the United States and I have had the opportunity of moving through the district this season with the exception of Dehgam and Attarsumba. During this time I have been in touch with cotton cultivators and have made numerous inquiries regarding the variety under cultivation, seed selection and allied subjects.

2872. Extent of cotton cultivation in the Kadi District.—The occupied area in the district is about two million *bighas* or a million and a quarter acres (one acre being equal to 1.7 *bighas*). Ten per cent. out of this may be put under cotton, i.e., about hundred to hundred and fifty thousand acres.

(2) The area in 1913-14, the year before the war, has been so far the highest and was then 11.6 per cent. of the occupied area.

(3) Kadi, Kalol, Dehgam and Chansma are the principal cotton-growing talukas in the district and account for from 73 to 87 per cent. of the area under cotton, Kadi alone out of these putting nearly as much area as the other three combined.

(4) The following table gives the fluctuation in the areas during the last five seasons and the percentage of the total area under cotton grown by Kadi, Kalol, Dehgam and Chansma.

Year.	Area under cotton in <i>bighas</i> for the district.	Percentage of the total area under cotton grown by Kadi, Kalol, Dehgam and Chansma.
1912-13	135,663	80
1913-14	231,536	78
1914-15	216,399	73
1915-16	128,306	81
1916-17	184,845	87

(5) On an average, Kadi devotes 30 per cent. of the cropped area to cotton, Dehgam and Kalol about 13 per cent. and Chansma 11 per cent.

2873. (12) Size of holdings.—In the black soil section predominating in Kadi and part of Kalol, an average holding may be placed at about fifteen acres, about half of which will be under cotton. In the light *gorat* section, the average holding may be placed at nine acres, out of which in the cotton-growing section, an acre or two will be placed under cotton.

2874. (11) Varieties.—Dehgam alone out of the chief cotton-growing parts in the district grows *lalio*. The rest chiefly cultivates the variety known as *wagad*, and has quite a list of agricultural nomenclature. It is variously called *waghadio*, *gangadio*, *gengadio* and *wadhiaro*—the distinguishing feature being the imperfect dehiscence of the bolls. *Lalio* goes amongst the farmers as *kanvi* and Broach also. Both types belong to the *herbaceum* group and are somewhat inferior to Broach in staple and quality. *Wagad* fetches a better price in the market than *lalio*.

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[Continued.]

(2) A *wagad* field shows little admixture of other types, in spite of the numerous opportunities for doing so, particularly of *neglectums*; a plant or two is all that comes to view in a field. The earliness of this plant naturally attracts attention but so far no general disposition to grow it is met with amongst the cultivators. I came across only one farmer, who had this year sown two or three *bighas* under the early maturing variety, which he named *ulavlio* (early ripening) and which also goes by the name of *divalio* (ripening by Divali holidays), but referred to *mulhio*, the short staple Kathiawar cotton. Last year, in one village of Kalol, where I had camped, quite a large area was put under *kanvi* cotton, but having failed to satisfy the growers it has been replaced by *wagad* again.

(3) The lint percentage of *wagad* on an average is taken at 33, but 35 and 36 per cent. are often reached, thus affording material for improvement in the strain. It is considered earlier in maturity than the open-boll type by at least two weeks and since the danger from frost is always to be apprehended in the Kadi district, it is obvious that this earliness confirms quite an advantage on this type as compared with *lalio*. With good treatment and one or two irrigations, the quantity and quality both are favourably influenced and it is said that, under these conditions, the staple is better than Broach and even approaches Navsari. There are no experimental records to corroborate this belief and it would be interesting to see how far this is borne out by actual tests.

(4) Mention has already been made about the comparative purity of a *wagad* field from admixture. It cannot be said, however, that there is anything like uniformity within the type and this affords plenty of material for investigation and improvement. Generally speaking, therefore, it may be stated that the type met with in the district for the present is suited to conditions obtained and improvement would have to be within the type.

2875. (13) Yields and profits and cultivation returns.—The crop is rotated principally with *juar* in Kadi Taluka and *bajra* in others. In the black soil section of the former, it often occupies the same field continuously for two or three years. As an irrigated crop, it is taken after wheat, which follows *bajra* grown the same season and in that case does not receive any direct manure but only the residual effect of manure applied to *bajra* or wheat, at the rate of eight to ten cart-loads per acre. When grown after *bajra* whether as a dry crop or one to be irrigated, farm-yard manure is applied at the rate of five to eight cart-loads per acre. No other manure is used.

2876. (14) Rotations and manures.—The yield per acre on the average on black soil may be taken at 300 lb. of seed cotton. The cost of cultivation for the same would be about Rs. 16 per *bigha* or Rs. 2 per acre. Taking seed cotton at Rs. 6 per maund, the return per acre would be Rs. 45 leaving a net profit of Rs. 18 per acre. The outturn in dry crop *gorat* land may be taken at the same figure as taken above, though somewhat larger yields are expected. Taking the return at Rs. 45 per acre and the cost of cultivation Rs. 30, a net profit of Rs. 15 is the result.

(2) As an irrigated crop, the outturn would be double of a dry crop or 600 lb. to the acre, a cash return of Rs. 90. The cost of cultivation in this case would be Rs. 51, leaving a profit of Rs. 39.

2877. (15) Conditions affecting increase in area.—The question naturally arises why a larger area is not placed under cotton, if the crop is so paying. There are no exotic or *deshi* short staple varieties grown in the district and these do not enter into competition with the extension of the *deshi* long staple cotton. Comparing with other crops, as a dry crop there are few that would leave such a big margin of profit as cotton on an average. It is interesting to note in this connexion that if the price of seed cotton were to go below Rs. 4 per maund, it would hardly pay to grow cotton. In suitable soil and climatic conditions as in Kadi and part of Kalol, many villages have more than fifty per cent. of the cropped area and little further extension, if any, is possible. In the light *gorat* section, a large area can be brought under cotton cultivation, but must be at the expense of the area under cereals and this would naturally upset the present basis of rural life, where a large part of the monsoon cultivation is principally grain and fodder. Nothing but a strong impetus of large cash profits would induce the farmer to alter his usual cropping scheme by inclusion of a larger area under cotton as has been the case this year when the final forecast puts the acreage figures under cotton at over 198,000 acres in the Kadi district.

(2) The reason for this is that there are several limiting factors.

(a) Climate.—Climatically considered, the rainfall in these talukas is apt to be rather uncertain, the monsoon commencing somewhat late and of diminished and uncertain strength in the latter part. A grain crop under such conditions holds out a chance of some crop, grain and fodder or at least the latter. Cotton would prove a costly failure under the circumstances and hence is but warily cultivated and under temptations of good prices only. This part is also liable to get the frost oftener than portions placed in more southerly directions and which have also a closer texture of soils. Apart from the rainfall, thus this is another limiting factor that influences the question of increasing the area under cotton.

(b) Labour supply.—This also has an important bearing when a large area is to be placed under cotton. Ordinarily the crop would be ready before the harvesting of wheat commences and thus give the farmer an opportunity to make a profitable use of the labour and time at his disposal in the meanwhile, since the area that one farmer has under cotton is never very large. That a labour scarcity would result if large areas are put to cotton is obvious, making it only seasonal and consequently costly.

(3) As an irrigated crop, the same limitations of climate and labour hold good. If the season is sub-normal, there will be the greater reason for putting larger area under food and fodder crops.

(4) The influence of high prices must come in, even in extending the area under irrigation, for cotton is the single crop of the year as against double cropping under the usual practice of farming, *bajra* followed by wheat, or *juar* by *chino* or sometimes even three crops, *kanj* following wheat. At normal prices, it pays better to take two crops rather than take a single crop of cotton. It need hardly be pointed out that this succession of crops leaves a better scope for distribution of the labour at the disposal of the cultivator, so as to make a productive use of his time. The farmer's profits are again less liable to suffer from the uncertain and more or less speculative character of cotton prices.

(5) What stimulus in the shape of higher prices of cotton is necessary to displace the cereals and the usual crop distribution can be gleaned from this year's quotations, when the total area in the Kadi district under cotton as a final forecast is returned at over 198,000 acres.

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[Continued.]

(c) Exotic cotton.

2878. *Cambodia in the Baroda State.*—There is little exotic cotton grown in the district. In 1914-15, the war year, a considerable distribution of Cambodia cotton was undertaken, covering over 1,000 *bighas* and to 400 growers.

2879. *Cambodia as a dry crop.*—Results showed that as a dry crop, it was not much superior to the local type and seeing the difficulty they had in disposing off the crop, it may be left aside.

2880. *Cambodia under irrigation.*—Under irrigation, to supplement the rainfall by two or three waterings from wells, the crop produced was apparently satisfactory, but in the absence of any organization to deal with this cotton—so different from the local variety—as a commercial commodity and the coincidence of low prices due to war, little enthusiasm exists regarding the cultivation of exotic cottons. The local variety under similar treatment gives equally good results particularly in yield and also in quality though no exact data regarding the measuring of this improvement are available. It would be hard to recognize this improvement in quality, even if investigations show that such is the fact by means of premiums because the area so irrigated would be widely scattered, the type indefinite, the extent fluctuating according to seasons, with temptations to mix it with inferior produce. It is in this point that an exotic type of totally different morphological characters has an advantage over an improved strain of the local variety, for it can be easily kept pure. The area of irrigated cotton, however, is bound to be scattered, uncertain and not large enough to have any commercial importance even if the difficulty of scattered fields under the crop can be overcome by organized sales. The exotic besides deteriorates very rapidly and continuous selection and acclimatization of the seed must be kept up.

2881. *Prospects of cotton under irrigation.*—The irrigation supplied is all from wells, whose supply is not dependable particularly in seasons of scanty rainfall. The total number of wells in the district is about 48,000 and the total area under irrigated crops roughly 150,000 acres, giving an average of about three acres per well. Wheat occupies by far the largest area under irrigation and permits double cropping as against a single crop of the year in the case of cotton. The impetus of high prices for cotton is therefore necessary to bring a larger area under cotton to be irrigated and even then would vary from year to year.

(2) In consideration of the above facts, it may be concluded that (a) the trial or introduction of exotic cottons is incompatible with existing conditions, (b) the improvement in staple or quality as a result of irrigation or cultivation cannot be typified and maintained by higher prices, reliance for better profits having to be placed in higher yields and (c) that attention may be confined to the obtaining of pure *wagad* of a uniform type.

Recommendations for improvement and organization.

2882. *Necessity for work on wagad cotton.*—Mention has already been made about *wagad* being the predominant and suitable type in the Kadi district with the exception of Dehgam and it must naturally form the basis for further improvement. The material to work on is practically unexplored owing to attention being directed to this variety only recently. The type is easily kept free from stray impurities of *mathio* (*neglectum*) and exotic varieties, owing to distinct morphological characters. *Lalio*, not nearly as good in staple as *wagad*, cannot be easily detected in the early stages, but can be weeded out owing to the open bolls of *lalio* and the imperfect dehiscence of the bolls in the other. Once therefore the *wagad* strain is obtained pure, it would not be difficult to keep it so by inspection and control of seed supply. The first thing on the programme of cotton improvement in this section must be the obtaining of a pure strain of *wagad*, as within the type there are numerous variations. This can only be achieved by single plant selections and building up of the strain until enough seed to make a beginning is available. This may, however, take some preparatory period, and in the meantime, effort should be directed to fix the limits of the *wagad* zone and then to bring this part a uniform close-boll type by bulk selection and completely rid of any admixture. This can only be achieved by authorized inspection of the seed supply by the Agricultural Department through the inspectors, who would also see that the crop is separately ginned and reserved for seed purposes and made available to farmers in block so that there will be no room for mixture taking place. While this is being done, restrictions will have to be placed on ginning factories regarding the area they will draw on for material to be ginned in the factory and the disposal of seed would have to be carefully regulated, so that a particular zone does not expose itself to admixture by importation of seed from without.

2883. *Distribution of a pure strain of wagad.*—With regard to the distribution of a pure strain in these parts, a settlement must be reached regarding the standard to work up to in co-operation with the buyers, for in *wagad* as obtained to-day, a ginning percentage of 35 or 36 is often reached. It must be decided by experimental tests whether this higher ginning percentage is associated with corresponding reduction in quality and length and, if so, an agreement must be arrived at with the buyers so as to make up for the deficiency by higher prices for the better stapled strain. It may be that good treatment and cultivation are responsible for the higher lint percentage without detracting at all from the quality of cotton and, in that case, even the first bulk selections may be obtained from well yielding fields. The popularisation of the pure strain would not be a difficult task, the same tactics as employed in obtaining a uniform type being resorted to, but in this case a close co-operation of the buyers would be needed to make it a success and should only be attempted if the same is forthcoming.

(2) Mention must be made in this connexion of the belief in light *gorat* sections that seed produced on black soil gives better results than one that is grown locally. As in many other things, this is only a belief the truth of which must be found out by tests, since there is considerable area under cotton even in the *gorat* section.

(3) It seems rather too early to talk about seed farms and auction sales in this district, but these would, of course, be of great use in popularizing the improved strain when such is decided upon and obtained.

Mr. C. V. SANE called and examined.

2884. (President.) I am Deputy Director of Agriculture in the Baroda State. I was trained in the United States. I am a Graduate of the Poona Agricultural College, and after taking my degree served as Assistant Superintendent on the College Farm. I was then appointed Superintendent of the Baroda Model Farm and after that was sent to the United States for two and a half years. I took my degree in the University of Wisconsin. I have not had any practical experience with cotton except in Baroda. I am in charge

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[Continued.]

of the Kadi Division, north of Ahmedabad. Most of the cotton grown there is of the *wagad* type, the same as that in the Viramgam district. This cotton is what is called the closed boll type.

2885. I think that the safest plan, for us to follow, is to work in co-operation with the British Department of Agriculture as our staff and means are limited. We have not the technical staff to undertake any breeding work ourselves. My idea of the policy which should be followed by our Agricultural Department is to make a survey of the cotton tracts, decide which cotton is the best for each locality and then to push it on the lines adopted in British territory.

2886. My enquiries show that the cultivators in my circle like *wagad* much better than anything else. In one or two villages, they have tried Broach cotton as well as *kanvi* and *lalio*. One of the merchants induced his clients to go in for the *kanvi* cotton but I was told by the people who did so that he was not satisfied with the crop as the ginning percentage was not so good and so this year, they have gone back to *wagad*. The staple of *wagad* is not far behind that of Broach. It is about 5-8ths inch to 3ths inch. It has good quality. There is an impression amongst the cultivators that this cotton improves under irrigation in quality and quantity. The irrigation is mostly from wells.

2887. Unless there are good prices to induce the cultivators to grow longer staple cotton, they will not go in for it, as they can get two crops of other things under irrigation. If they had a permanent irrigation system on which they could depend—wells are not usually a very dependable source of supply—they would go in for an improved type of cotton provided they got better prices for it.

2888. *Goghari* has not appeared in my circle yet. It is only in Vijapur across the Sabarmati, that *kanvi* cotton has extended but I do not think that the people are taking to it in North Gujarat. They prefer *wagad* which they can take home and pick out at leisure. They cannot do that with *kanvi* or *lalio*. We are not going to encourage *goghari*—not by any means. There is no demand for it in the tract in my charge.

2889. There is another danger and that is frost. The Kadi district is very liable to frost than the more southern districts. The danger is still higher in the *gorat* tract where there are light alluvial soils. Another reason why *wagad* is preferred is that it is considered to be earlier than *lalio* by two weeks which is an insurance against frost. I came across one man who tried *mathio* on account of early rainfall. He did not get much of a crop.

2890. (Mr. Wadia.) I was on the Baroda farm when Cambodia was being tried. I have some experience of it, both with and without irrigation. I should say that the distribution of Cambodia was more or less thrust upon us. The cultivators were so taken with the appearance of the bolls that they insisted on trying it. I consider the distribution of Cambodia was more or less premature. Our results were very good on the Baroda farm.

2891. *Wagad* is grown under irrigation in the Kadi District. Two or three waterings are given in October and November if there is not enough rain. If there is more rain than the crop needs, then it is not irrigated. *Wagad* is irrigated in the light soils of the *gorat* section. There are about 48,000 wells in that part of the Kadi district. The percentage of cotton cultivation in the lighter soils is ten per cent. On the black soils in Kadi and in part of Kalol, it is fifty per cent. In the lighter soils, if cotton cultivation is increased, it will be at the expense of cereals because that is the crop that is usually grown now. The only thing that would induce the cultivators to go for cotton on such soils would be the influence of high prices.

2892. I have no experience of exotics except Cambodia. They are not able to acclimatize themselves to the varying conditions of climate. Our *deshi* cotton is able to stand variations of rainfall much better than the exotics. Our rainfall record shows that we cannot hope for such years as the last two years. Even last year which was an exceptionally wet year, the rain did more harm than good. We cannot always count upon heavy rainfall. If it were a grain crop that was spoilt by rain, the cultivators could expect fodder but with cotton they cannot expect anything.

2893. How far the belief that under irrigation *wagad* cotton improves in quality is true, we have no records to show. We must first get a certain standard of *wagad* cotton. In certain places, the ginning percentage goes up to 35 or 36 per cent.; whether that goes with any reduction in the staple of the cotton, is not known. So what we have first to decide is, what the real standard ought to be. If we get a certain standard of staple but are not able to keep it intact, we may have the same difficulties as there were with the Cotton Syndicate, in this tract (i.e., in Surat). The Syndicate was not sure whether the type of cotton was the same that was being distributed from the seed farm. Nine thousand acres in the Baroda State were specially sown with Surat Farm seed and the Baroda State cotton grown under the supervision of a special officer was taken to the selected gins. It was said that the cotton was not of the same type as the Syndicate had expected it would be. I was not in charge of the work and so I hardly know what the facts were. The first point in regard to *wagad* is to settle what type we are going to grow and what the length of staple should be and then to try to improve the yield of the cotton. *Wagad* could easily be kept pure from the *neglectum* type because of the difference in morphological characteristics. To arrive at the ultimate aim, I would go in first for bulk selection because we want to have one type growing in a certain district. Then plant to plant selection would follow. It would take some time before the type could be fixed. As I have stated, *wagad* is not very difficult to keep pure from other types. If we started, for example, with seed of *wagad* cotton from Viramgam where it is grown more or less pure, and distributed it to the cultivators in the Kadi district we must see that it is not getting mixed with *neglectum* or other inferior types. That is what I meant by authorised inspection. The inspectors would go through the fields and weed out *mathio*, the presence of which would seriously interfere with and reduce the value of *wagad*. I cannot tell the difference between *wagad* and *lalio* until the bolls are opened. The mixture of seed would have to be prevented at the ginning factory. What we have to do first of all is, to select a field for seed purposes, get pure seed from Viramgam, put it on the farm of our own and get improved seed which we could distribute to the cultivators. I want the seed distribution controlled entirely in that tract.

2894. (Mr. Hodgkinson.) I was in Athens in Georgia for about six weeks, not sufficiently long to make an extensive study of cotton cultivation. The only method with which I was particularly struck was the close planting method. The plants were so close together that the vegetative branches were controlled. The results showed that an early crop could be got by this means. We might experiment with that method here. I have been here too short a time to try it but I propose to do so. My idea is that the seed farms I suggest will come in time. That is the only way to keep types pure.

2895. (Mr. Roberts.) With the space we have between the rows, the opportunity for interculture is limited. In the close planting system the distance between the rows is 3½ feet. That system is already followed in the case of Broach cotton. It is only in the case of Broach that there is plenty of room between

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the rows. I would increase the number of plants in rows but would keep the total number of plants the same. My point is this: in the space between the rows that we have at present, the opportunity for interculture is limited. I want to keep the same number of plants but at the same time to increase the space between the rows, so naturally there will be more plants in the row. That is for the Broach tract. I do not think you can increase the total number of plants very much in the *wagad* tract. They are very thick.

2896. In parts of the Kadi District, cotton is the most important crop and I am going to devote a good deal of attention to it. The most promising line is the isolation of selected strains of *wagad* cotton. So far as my experience goes, the mixture in this type so far is very small. There is practically no neglectum in it although *mathio* grows so near the *wagad* zone. In fact most of the district gets seed from Viramgam. My present idea is first of all to select a farm, i.e., a field belonging to a cultivator who is growing cotton, to see that it is free from admixture of other types and then to make terms with the cultivator to ensure I is keeping his cotton for seed purposes. Then I would see that the cotton from that farm is separately ginned and would then extend the area from the seed so obtained in one block so that it could be easily inspected. We propose doing this in the cultivator's fields. The Government farm is a very small one. The line that we like to take up is demonstration. We do put up proposals for experimental work but we have to cut our coat according to the cloth. There is no other crop which affords more promise than cotton. I have already begun work on the isolation and improvement of strains by marking out some plants. We shall go in for the same type as the Bombay Agricultural Department. We follow closely the work that they are doing. In the *wagad* tract, however, the Bombay Agricultural Department has no experimental plots. They are just turning their attention to that part. It will be waste of time if the two Departments work at cross purposes. I think it is desirable that a definite line of co-operation between the Bombay and Baroda Agricultural Departments should be decided on as there are so many problems in common to the two Departments.

2897. Cotton is the most profitable crop in the Kadi district and it will remain so unless the price of seed cotton goes down to Rs. 4 a maund. Anything above Rs. 4 is profitable. In that calculation, I am including rent, land revenue and other cultivation expenses.

Mr. AMRITALAL C. DESAI, L.Ag., M.A., Director of Agriculture, Baroda.

EXAMINED AT NAVSARI, FEBRUARY 14TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

2898. *Experience.*—I was Agricultural Expert in the Indore State for a period of three years and have been Director of Agriculture to the Baroda State for about a year. As Agricultural Expert in Indore, I came in direct touch with the cotton cultivators of Malwa and as Director of Agriculture in Baroda, am in direct touch with the cotton cultivators of Gujarat and Kathiawar.

2899. *Area under cotton in Baroda.*—Cotton is an important crop in the Baroda State and occupies on an average about 1,090,000 *bighas* and about 24 per cent. of the total cropped area. Annexure I shows the area under cotton and average proportion of cotton to other crops in different divisions of the State in the last decade ending 1916-17. The figures include both *deshi* long and short staple varieties and also a negligibly small area of exotics.

2900. *Fluctuations in the area under cotton and their causes.*—From the statement, it will appear that the area under cotton has fluctuated considerably in some years, but on the whole there has been no decrease in any of the divisions. On the contrary, there has been in some *talukas* like Savli and Vaghodia of the Baroda District, and Mangrol and Mahuva of Navsari District, a steady increase partly due to opening up of new lands, partly to the increasing practice of successive cropping and partly to rising prices.

(2) The area under cotton, both long and short staple varieties, fluctuates according to the character of the season and market prices. In the years of heavy precipitations, as happened this year, cotton on heavy soils suffers considerably and cultivators uproot the plants and take *rabi til*, *rabi jwar*, gram or wheat. On the contrary, when the first rains fail or when there are indications of drought, a larger area is put under *bajra* or *juar*. In the year 1915-16, the first rains failed over a greater part of the Amreli District and this resulted in a great decline under cotton in almost all the *talukas*. It did not recover in the succeeding year as it was a year of the heaviest precipitations in the decade. Similarly, in the Kadi District, the year 1911-12 was of drought and the area under cotton was the lowest in the decade, but it recovered in 1912-13, which was a year of normal rainfall.

(3) Apart from season to season fluctuations, the general changes in the climatic conditions—particularly of the decrease in rainfall—that took place after the great famine of *Samvat* 1956, have resulted in changes in the type of cultivations in some parts of the State and made it possible for the cultivators to extend the cultivation of cotton. Sections which were essentially *rabi* before the famine, now grow considerably larger areas under *kharij* crops of which cotton is the predominant one. Changes in the type of cultivation are noticed particularly in the Vellachha and Vankal Talukas of Navsari District.

(4) Decrease of rainfall has also affected the proportion of the long and short staple varieties in the State. In the Amreli District before the famine they used to grow *lathio* (*G. herbaceum*) the staple of which was much superior to the existing *mathio*. This variety has entirely disappeared after the famine.

(5) The rise in the price of cotton has been an important factor in encouraging the cultivators to extend the area under cotton. The rise in the price of cotton for over a decade is relatively so great that in many sections it brings greater returns to the cultivators than any other competitive dry crop. Temporary depressions do not have much effect on the area under cotton, but a considerable decline in prices as was the case in the year 1914-15 after the declaration of war does affect the area under short stapled varieties. In that year the price of M. G. Broach fluctuated between Rs. 200 and Rs. 225 per *khandi* and the bulk of cotton was sold by the cultivators on the basis of that price. In the following year, while the area under cotton in the long staple districts of Navsari and Baroda remained normal, there was a considerable reduction in the Kadi and Amreli Districts, which grow inferior and short-staple varieties. In the Amreli District, the decline was due partly to unfavourable season, but in the Kadi District, excepting in one or two *talukas*, the rainfall was normal and I attribute a sudden drop in the cotton area in all the *talukas* to the decline of prices in the

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preceding year. The relatively smaller decline in the heavy soil *talukas* of Kadi, Kalol, etc., may be attributed to the fact that they mainly grow *wagad* which is a long staple variety and fetches as high or even higher prices than Broach.

(6) After the declaration of war, there was a rise in the prices of cereals and other food-stuffs, and it was a sufficient inducement to the cultivators to substitute cereals for cotton. I am inclined to draw an inference that the cultivators of short and inferior staple varieties like *mathio* and *lathio*, are the marginal ones who would give up cotton cultivation to a considerable extent, should the prices rule at the level they did in 1915. My reasons for the inference are that, in normal years, the margin of net profit to the cultivators of short-staple varieties is much less than to those of high staple cotton. In case of short staple varieties, this margin disappears gradually with the declining prices and when it reaches about Rs. 8 per maund (80 lbs.) of seed cotton, which is the average cost of production, the cultivators are faced with the alternative of either continuing to grow cotton at no profit or even at a loss or to take to other crops. In the case of long staple varieties, however, the margin of profit is so great that even in the years of worst depression as of 1915 some margin of profit is left to the cultivators. Further, in the years of depression, the effective demand for long staple cotton is much greater than in the normal years. This tends to keep the prices up and prevents a slump in the market. My inference is corroborated by the fact that, in 1915-16, the year following the greatest depression there has been a decline in all the sections in the State where the short staple and inferior varieties are grown, while the areas in Navsari and Baroda have remained practically unchanged. 1915 was, however, an exceptionally bad year for the cotton market and it is not expected that under normal conditions the present prices of cotton would fall so low as to affect the area under the crop. With continued high prices, cotton cultivation would extend still further but in the Baroda State the area under this crop has, I think, now reached its limit. There is hardly any culturable waste now left unoccupied where cotton cultivation could extend and its further extension on the area already under cultivation is limited by the necessity for rotations and fodder and grain requirements of the cultivators. The old system of bare fallow has now disappeared and two or three years rotations are generally practised. In some places, however, cotton is now grown successively for two, three or even six years. This is resulting in spread of 'wilt.' Though the cultivators are not yet alive to the risk of the spread of this disease, in course of time they will feel the necessity and advisability of giving up the practice of continuous cropping and adopting regular rotations. The cultivator will, however, always reserve some area for his grain and fodder requirements and grow *bajra*, *juar* or wheat.

(7) All the long and short staple varieties of the State are cultivated in separate regions and excepting one (*goghari*, described further below) they do not compete with each other. Their distribution in different sections is determined by soil and climatic conditions and without considerable changes, over a series of years, in the latter factor, it is not likely to be disturbed. Such changes, if they occur at all, would affect the proportion of short and long staple varieties. If the rainfall increased, the cultivators of long staple varieties would extend in the regions where short staple is now being grown. It would not however much affect the area under cottons as a whole, as arrangements for draining most of the heavy soil sections in the State are now completed.

2901. *Varieties of cotton grown in the State.*—All the *deshi* varieties of cotton growing in the State belong to the species (1) *G. herbaceum*, (2) *G. neglectum*, and (3) *G. obtusifolium*. The exotics consist of Cambodia and Upland Georgian. Practically the whole of Navsari, Baroda, and Kadi divisions are under *herbaceum* varieties, while the cultivation of *G. neglectum* in the State is confined to Amreli District only. Of late, however, *neglectum* varieties are being introduced from Khandesh side into the Songadh Taluka of the Navsari District. Similarly their cultivation has extended upto the borders of Kadi and the cultivators may take to it for its early ripening and subsequent escape from frost, which occurs in the district almost every alternate year.

2902. *The long staple varieties.*—All the long staple varieties of the State belong to this species *G. herbaceum*. These varieties or strains have no distinctive botanical characters (excepting in case of *wagad* whose bolls do not open) and their plants in the fields are not distinguishable from each other. The difference lies in the quality of the cotton and this arises from the differences in the physical conditions under which they are grown. There are at least five long staple strains under this group known generally as (1) Navsari, (2) Surti, (3) Broach, (4) *wagad*, and (5) *lathio*. I am doubtful as to whether or not *lathio* should be included in the long staple class. The staple of this variety used to be long and fine, but it is reported to have much deteriorated after the great famine and as a class is now regarded only slightly superior to *goghari*, a short staple variety belonging to the same species (*G. herbaceum*).

(2) Cotton of each of these strains has distinctive qualities and is grown in a separate region of its own or, to make an accurate statement, regions having different soil and climatic conditions have tended to develop special qualities in the cotton of the indigenous variety growing in each locality. The Navsari strain is confined to the region extending from Bilimora to Sachin. This region with its heavy black soil, an average rainfall of 45* inches to 42 inches, genial climate and proximity to the sea, grows the best staple in India known as Navsari. Beyond Sachin and upto Kosamba is the Surti region. Here though the character of the soil is the same as in Navsari tract the average rainfall is less, amounting to 35 inches.* The quality of cotton grown in this region is slightly inferior to Navsari. In the tract of the Baroda District known as *Kanam* is grown the Broach or *kanvi* strain. This region includes Sinor, Dab'oi, Karjan, Sawli and Waghodia Talukas of the Baroda District. The soil here is heavy black and the average rainfall is about 35 inches to 32 inches. The quality of cotton grown in this district is inferior to Surat and is classed as fine or M. G. Broach. This region also grows *goghari*, a short staple variety referred to further below. The last region of long staple variety lies in the Kadi District. It comprises the heavy soil sections of Kadi, Kalol, and Chanasma Talukas and grows the variety known locally as *wagad* or *gangadia*. Here the average rainfall varies from 28 inches to 18 inches in different *talukas*. The fibre of this variety in the opinion of the ginners is strong, and good in length and feel, and is classed with fine Broach. This variety is also grown on lighter soils of the district with the help of two to four irrigations in winter months. It responds freely to good tillage and irrigation but its cultivation as an irrigated crop is limited by the irrigation facilities and on lighter soils the cultivators generally grow *lathio*.

(3) Starting with Bilimora in the south, the quality of staple deteriorates gradually as we pass towards the north, from sections of higher to less rainfall. The deterioration may be measured by the difference in the prices of cottons offered in the market. Proceeding from Bilimora the "class price" decreases by about

* Averages for 20 years.

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Rs. 5 to 10 per *khandi* between any two successive markets up towards the north till at Miyagam. The difference between Navsari and Broach amounts at the present prices to about Rs. 100 per *khandi*.

2903. *The short staple varieties.*—*Rozi* (*G. obtusifolium*), *mathio* (*G. neglectum*) and *goghari* (*G. herbaceum*) are the only short staple varieties growing in the State. *Rozi* is grown on a very small area, as a perennial cotton mixed with *kodra* in the *goradu* soil of the Bhadrar and Petlad Talukas of the Baroda District, and on lighter soils of the Chanasma Taluka in the Kadi District. It is an unimportant variety as the area under it is negligibly small.

2904. *Mathio.*—This is the only variety growing in the whole of the Amreli District excepting in Kodinar where Upland Georgian is grown mixed with *mathio*. The average rainfall of the district varies from 22 inches to 29 inches excepting in Kodinar where it is 32 inches. *Mathio* is an early ripening variety having a short staple and a ginning of about 33 per cent. As stated elsewhere, this variety has replaced the indigenous *lallo* and was introduced after the great famine of *Samvat* 1956. It is reported that *lallo* is still being grown in parts of Junagad and Porbandar States. Samples of bazaar seed of *mathio* obtained from five different places in the Amreli District and grown under observation on the Baroda farm this year shows that there are four sub-types under *mathio*, viz.:—

- | | |
|-----------------------------------|----------------------------------|
| (1) Yellow flowered narrow lobed. | (3) White flowered broad lobed. |
| (2) White flowered narrow lobed. | (4) Yellow flowered broad lobed. |

The percentage of mixtures found in the samples is as follows:—

Name of place from which seed was obtained.	PERCENTAGE OF PLANTS.			
	White flowered narrow lobed.	White flowered broad lobed.	Yellow flowered narrow lobed.	Yellow flowered broad lobed.
	per cent.	per cent.	per cent.	per cent.
Shahapur <i>mathio</i>	46	27	15	12
Etalia <i>mathio</i>	56	23	8	8
Manpur <i>mathio</i>	47	30	10	13
Amreli <i>mathio</i>	37	37	11	15
Ratanpur <i>mathio</i>	50	29	8	13

This shows that the percentage of white flowered narrow lobed varies from 37 per cent. to 56 per cent. in different parts of the district.

(2) In the opinion of the ginners, the white flowered narrow lobed variety has a higher ginning percentage varying from 38 to 41 and small tests taken on the Baroda Farm go to confirm this opinion. One sample has given 42 per cent. It is reported that the ginning percentage of this type runs down in course of two or three years, but no reliable data are available to substantiate this report. The Agricultural Department is to take up detailed study of this type from next season.

(3) The cultivation of *mathio* now extends up to the borders of the Kadi District and its early ripening quality and consequent escape from frost may induce the cultivators to take it up. So far the local varieties are surprisingly free from *neglectums*. Plants of *neglectums* are found largely mixed with the local *deshi* in the fields of the Songadh Taluka of the Navsari District. This *taluka* is located on the borders of Khandesh where *neglectum roseum* is grown. Seed of this variety gets mixed up in gins and finds its way in fields. *Mathio* cotton is very inferior in quality and is classed generally with staple Bengals.

2905. *Goghari.*—This is the third short staple cotton grown in the State. It belongs to the species *G. herbaceum* but, unlike the other members of its group, it has a higher ginning percentage and a short staple. This variety is indigenous to the *Varnama* section of the *kanam* tract but is now being extensively grown all throughout the Broach strain region and also to some extent in the Surat and Navsari regions. There are two distinct types of this variety known locally as *chhoti* and *moti goghari* grown towards Dabhoi side. The cotton of the latter is better in quality than the former but it gives about two to three per cent. less lint. The *chhoti goghari* was probably introduced in this locality several years ago and has gradually developed the qualities of the local Broach strain, while the *moti* is probably of recent introduction.

(2) *Goghari* grows admirably in any locality north of Bilimora and south of Ahmedabad. Its acreage yield is generally higher by about ten to twenty lbs. than Broach, Surat or Navsari strains. Its ginning percentage is also higher amounting to about 39 to 42 per cent. and it also has a fine colour. Its recent extension, on an enormous scale, is due to these qualities.

2906. *Mixing of goghari with long staple cotton and its effects.*—In the local markets *goghari* enjoys a peculiar advantage. Classed by itself it is much inferior to any of the long stapled variety and would fetch about Rs. 25 to Rs. 30 less per *khandi* than M. G. Broach, if sold in unmixed condition. But the whole cotton business, as it is conducted in the Gujarat markets, is a huge fraud on the public. The mixing of short and long staple varieties is being practised on an enormous scale in almost every market and a large quantity of *goghari* cotton is required for this purpose. The prices of cottons at different markets are based on the quality of the indigenous cotton grown in the locality and cottons sold in any primary market fetches the price fixed for it by trade conventions. Under the circumstances it pays handsomely to the ginners and middlemen to purchase *goghari* which gives about seven to ten per cent. more lint than the local staple variety at the local rates. Where the local production of *goghari* is not sufficient to meet the demand for mixing, wagon loads of seed cotton of short stapled varieties, both *goghari* and others, are imported from outside. To avoid the difficulties and expenses of transport of seed cotton over long distances, many of the ginners and local merchants are now distributing, freely, *goghari* seed and as an encouragement offer special price for its produce. In Surat and Navsari regions, to disguise this object it is often sold under the name of 'farm seed' and some ginners make it a practice to mix *goghari* with the local seed in desired proportions, keep a register of farmers to whom it is sold and make purchases from them in the following season.

(2) These fraudulent practices are not without their effect both on the quality of the staple and on the market. The pure Broach staple has deteriorated considerably and the variety is threatened with extinction. The prices of Broach, Surat and Navsari have all gone down. Last year, at Kosamba, where the bulk

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of the cotton sold in the market consisted of *goghari*, the prices dropped down to the level of the M. G. Broach; while in the former years the local cotton fetched about Rs. 25 to Rs. 30 per *khandi* more than Broach. The cotton of some of the villages near Palej, Dabhoi, etc., where pure fine Broach is still grown, is often sent to Kim, Sayan, etc., and sold as Surtee while best Surtee fetches the prices of Navsari.

(3) Last year I got some samples of cotton from Surat farm seed and also of cotton from some of the villages where best Navsari was grown some time ago, valued in Bombay. The Surat farm cotton was valued as high as Navsari while the local cotton was valued about twenty per cent. less than the Surat farm cotton. The above valuations may be taken as an indication of the extent of deterioration. My personal opinion is that on account of the expansion of *goghari* and the free mixing of short and long stapled varieties in gins and consequently in fields, all the long stapled varieties have deteriorated considerably and there has been a general drop in their prices amounting to about Rs. 30 to Rs. 50 per *khandi*. What was once fine Broach is now equivalent to the present Surtee and what was once regarded as good Surtee now passes as Navsari. It may also be noted that twice or three times the quantity of cotton is sold in the market as pure Broach, Surat or Navsari than is actually produced in the fields. If mixing in gins and presses were stopped and all the long staple varieties sold pure, there will be an appreciable rise in the prices, and it would not pay the cultivators to grow *goghari* in spite of its higher ginning percentage and acreage yield. The situation is getting worse every year and requires the serious attention of all interested in cotton trade. The trade is, however, thoroughly demoralised and it is high time for the Government to step in to safeguard the long time interest of the cotton cultivators and to prevent continued deterioration and perhaps ultimate extinction of some of the finest staples in India.

2907. *Suitability of existing varieties.*—As explained in paragraphs 2900 and 2901, the distribution of long and short staple varieties in the State is determined by soil and climatic conditions, particularly the latter. Excepting for *goghari* discussed above, they do not compete with each other and there is no possibility of one replacing the other. Unsuccessful attempts have been made by individual cultivators in Kalol and other parts of Kadi District to introduce Broach, Surat, and Navsari strains; and in Amreli to introduce *kanvi* and *lallo*. Kodinar is the only *taluka* where possibilities for extending the cultivation of *deshi* long staple varieties exist. With its heavy soil, 32 inches of rainfall and proximity to the sea this *taluka* seems suitable for Navsari or Surat strains and the Agricultural Department of the State intends experimenting with these next season.

2908. *Exotics.*—Cambodia and Upland Georgian are the only exotics being grown in this State. The cultivation of Cambodia is confined to a very small area, about 300 acres, in the Karjan Taluka at the Baroda District. It was introduced only about four or five years ago and is grown, for its immunity from wilt, in fields, where on account of successive cropping of cotton, the pest has established itself firmly. Its average yield is about the quarter to one-half maund (80 lbs.) less than the local *deshi* and its staple has also considerably deteriorated. In the opinion of the ginners it would fetch about Rs. 20 less per *khandi* than Broach, if sold separately. The variety is grown in patches by individual cultivators and is brought to the gins mixed with local *kanvi*. Some of the mixed seed goes back to the cultivators and mixture of Cambodia plants in fields in this locality is slowly increasing.

2909. *Upland Georgian.*—Upland Georgian, known locally as *kadayo*, is grown mixed with *mathio* in the Kodinar Taluka of Amreli District. This variety was introduced in the year 1890 and has been growing since then. It is now quite acclimatized and its staple is finer and longer than local *mathio*. Small staples of these varieties collected separately, gave the following valuations:—

Year.	<i>Mathio</i> .	<i>Kadayo</i> .
1914	225	315
1915	140	170

Sown separately in 1914-15, *kadayo* gave an yield of 86 lbs. per acre with a ginning percentage of 30 per cent. as against 91 lbs. with a ginning per centage of 31 for *mathio*. The tests of a single season are, however, not sufficient to arrive at any definite conclusions about their comparative yields.

(2) The mixed cotton of Kodinar fetches a higher price than *mathio* by about Rs. 50 per *khandi* in the Bombay market. The varieties are sown mixed by the cultivators as an insurance against seasonal fluctuations. In years of heavy rainfall the exotic gives a good yield and *deshi* suffers. While, when the rainfall is scanty, the *deshi* gives a good return and the exotic fails. The *mathio* stands the seasonal variations better than the *kadayo*.

2910. *Experiments with exotics.*—The Agricultural Department had undertaken several trials with exotics on the Baroda and Jagudan Farms and tried to introduce Cambodia in 1915-16. On the Baroda Farm, the experiments which were commenced in 1909-10, were continued till 1915-16. The varieties tried consisted of *buri*, Cambodia, Upland Georgian, Texas Big Boll and Boyds' Prolific. Of these, Cambodia gave the best results. Its average yield per *bigha* was 557 lbs.* as compared with 460 lbs. of local *kanvi*. Its ginning percentage, however, went down from 34 in 1909-10 to 31 in 1914-15. A similar deterioration in the quality of the staple was also reported upon. The Cambodia growing near Itola is probably from the farm-seed and the quality of its staple shows the extent to which it deteriorates in less than a decade if the seed is not renewed or very carefully selected. The deterioration is faster on the heavier soils than on light ones.

(2) On the Jagudan Farm, *buri* and Cambodia were tried along with *lallo*. *Buri* and *lallo* were dropped after two years' trials as poor yielders while Cambodia was continued till 1915-16. The yield from Cambodia was as follows:—

Name of Variety.	Yield in lbs.	Percentage of lint.
1912-13—		
Cambodia	290	37
1913-14—		
Gadag Cambodia	845	36
Farm "	860	34
Madras "	732	31.7
Ahmedabad Cambodia	744	30
1914-15—		
Gadag Cambodia	523	34
1915-16—		
Gadag Cambodia	243	36

* This was irrigated twice.

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In 1912-13, all these varieties were grown without irrigation and the yield was poor. In this year, however, rainfall was heavy and the latter rains were favourable. In the next year, Cambodia seed was obtained from Gadag, Madras, and Ahmedabad and tried along with the farm seed. All the varieties were sown in May with the help of irrigation and in all four irrigations were given. They were also given a top dressing of castor cake at the rate of 400 lbs. per acre. The same treatment was followed in succeeding years. The variety responded surprisingly well to irrigation and good tillage treatment and, in 1913-14, there was a yield of 845 lbs. per *bigha* or roughly over 1,400 lbs. per acre. The average yield for the three years amounts to 537 lbs. per *bigha* as against about 500 lbs. of the local *wagad*. But the yield declined in the following years. Unfortunately, the local *wagad* was not tried in comparison along with Cambodia under the same conditions. Under best treatment as given on the State farm and with the help of irrigation, it is known to yield as high as 1,600 lbs. per acre though such bumper yields are exceptions.

(3) Encouraged by the results of Cambodia in 1913-14, the Department through the co-operation of the President of the Kadi District Local Board, distributed, freely, Madras Cambodia seed to cultivators. In all over 400 cultivators tried the seed, under different conditions of soil and tillage. It was tried on both light and heavy soils, as an irrigated and unirrigated crop. 180 of these cultivators reported their results to the Department. The crop of ten per cent. of them was destroyed by white ants, about five per cent. reported that the variety did not suit their soil and about nine per cent. found the yield poorer than the local *deshi*. The remaining 75 per cent. or so got fairly good yields but they experienced difficulties in disposing of their produce as the quantity offered for sale was very small and the local gins had no facilities for ginning this variety. The cultivators gave up the trial in the next year, and on the farm too the yield and the ginning percentage went down considerably in the following years.

2911. *Prospects of exotics in Baroda*.—The successful introduction of any exotic in the Baroda State, is, in my opinion, a very doubtful problem. In sections having heavy soil and higher rainfall, *deshi* long staple varieties are already being grown. In the short staple regions, having lighter soils and scantier rainfall, the exotics would not thrive without irrigation. The facilities for irrigation are limited and as an irrigated crop, the area under it would not be very great even if a variety well suited to the environments of the Divisions were worked out. The cultivators would not give up other crops, particularly of wheat and other cereals, in preference to cotton, as the former not only bring him a fairly good return but also satisfy his grain and fodder requirements. Where facilities for irrigation exist, the cultivators generally take two or even three crops in a year and this keeps the family and bullock labour well occupied. The general source of irrigation is wells and the area irrigated per well does not exceed three four acres on an average. Cotton is therefore grown only as a part of regular rotation, and if any exotic were to replace the *deshi* cotton, the area under it would be so scattered and the quantity produced in each locality so small that it will be almost impossible to organise a separate market for its sale and preserve the purity of its seed.

(2) Considering the extent of these limitations and also the strong tendency of the exotics to deteriorate, their susceptibility to diseases particularly the leaf roller and to sudden variation in the climate, it would, I think, prove of greater advantage in the Baroda State to confine all attention to the purification and improvement of local strains than to attempt to introduce any exotics.

2912. (5 and 14) *Rotations and manures*.—Both the *deshi* long and short staple varieties receive the same tillage treatment; the details of operations differ in different parts according to the character and conditions of the soil. The manure generally used is the farmyard manure, but cotton crop rarely receives any direct manuring. It is generally given to the preceding cereal crop and cotton receives the residual effect. Dry fields receive about two or three tons per acre and irrigated fields about five to six tons.

(2) Cotton is generally rotated with cereals, pulses and sometimes also with oil seeds. The common rotating crops are *juar*, *bajra*, wheat, gram, *tur*, *til*, *sarsav*, and ground-nuts. The introduction of the last named crop in regular rotation is very recent and is practised only by a small number of cultivators in Navsari District. The usual practice is to take a crop of cereals mixed with legumes and follow it with cotton. Where the soil is heavy and admits of a *rabi* crop wheat, gram, *til*, or *sarsav* enter into the rotation. The old system of bare fallows has now disappeared and the soil is rested either under *tur* or any other non-expensive *rabi* or semi-*rabi* crop. The practice of continuous cropping of cotton is prevalent in many parts. In such fields rows of cotton occupy a space between the rows of the previous crop. The systems of rotations actually in vogue in different parts depend upon the type of agriculture, i.e., soil and climatic conditions and the hobby of individual cultivators. The most prevalent systems are:—

Rotation:—

Baroda.	Navsari.	Kadi.	Amreli.
I.—1. Cotton 2. Cotton 3. <i>Juar</i> 4. Cotton	I.—1. Cotton 2. <i>Juar</i> mixture 3. Cotton	I.—1. <i>Bajra</i> 2. Rapeseed. 3. Cotton 4. <i>Bajra</i> (mixture).	I.—1. <i>Bajra</i> . 2. Cotton.
II.—1. Cotton 2. Fallow 3. Cotton	II.—1. Cotton 2. Groundnut 3. Cotton or <i>juar</i> 4. Cotton	II.—1. <i>Bajra</i> (mixture). 2. Cotton 3. <i>Bajra</i> (mixture). 4. Cotton.	II.—1. Cotton. 2. <i>Til</i> . 3. Cotton.
III.—1. Cotton 2. <i>Rabi juar</i> 3. Cotton	III.—1. Cotton 2. <i>Tur</i> 3. Cotton	III.—1. <i>Bajra</i> and wheat (irrigated). 2. Cotton 3. <i>Pajra</i> and wheat or spices. 4. Cotton.	III.—1. Cotton. 2. <i>Juar</i> . 3. Cotton.
IV.—1. Cotton 2. <i>Rabi tur</i> 3. Cotton	IV.—1. Cotton 2. Cotton 3. <i>Juar</i>	IV.—1. <i>Juar</i> 2. Cotton 3. Cotton	IV.—1. Sugarcane. 2. <i>Bajra</i> mixture 3. Cotton.

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Rotation—contd.

Baroda.	Navsari.	Kadi.	Amreli.
V.— <i>Rozi</i> cotton— 1. <i>Kodra</i> mixed with cotton. 2. <i>Bajra</i> mixed with cotton. 3. <i>Kodra</i> mixed with cotton.		V.—1. Cotton 2. Dry wheat 3. Cotton	V.—1. Cotton. 2. <i>Til</i> . 3. <i>Bajra</i> or <i>juar</i> . 4. Cotton.

2913. (4 and 15) *Yields and profits and comparative returns*.—Annexure II shows the estimates of cost of production, yield and profit and loss of cotton and its comparative crops in different divisions. The cost estimates include the family labour at the ordinary wage rates, the assessment on land and depreciation on farm dead stock. The cost of bullock labour is calculated on the bases of total number of working days. For production, average yield over a series of years is taken and figures of value are calculated on the basis of pre-war prices. The statement shows that the cost of producing one maund (40 lb.) of seed cotton varies from Rs. 3-5-0 in Navsari to Rs. 4-6-0 in Kadi. The differences are due to the differences in the details of tillage operations, cost of picking, the working capacities of men and implements and the area cultivated per pair of bullocks as affecting the depreciation charges.

(2) The profit per *bigha* varies from Rs. 15-8-0 in Navsari of cotton to Rs. 3 in Amreli. These differences are due to the differences in the cost of production and the prices of staples. The margin of profit is greater for all the long staple varieties than for the inferior and short staple ones. Looking into the figures for the other competitive crops, the profits from the commercial crops of groundnut and of castor is greater than that from cotton, but the area under the first is limited by labour required for harvesting and under the castor by the moisture conditions of the soil.

(3) In tracts like Okhamandal, where cotton is not grown at all, the cultivation of castors is large and increasing. Of the cereals, *juar* is the least paying crop, the figure varying from Re. 1 in Amreli to Rs. 3 in Kadi while *bajra* pays relatively more and actually brings higher returns than cotton in both of these districts.

(4) As regards irrigated cotton in Kadi, it brings a net return of Rs. 20 as against Rs. 12 from *bajra* and wheat.

(5) The statement of profit and loss shows that the cotton growers of Kadi and Amreli are not only on the margin but other crops, particularly *bajra*, compete with it very strongly. The cultivators, however, do not interest themselves with details of cost accounting. They are generally concerned with the gross returns, as they do not have to make any direct payment to others, for most of the labour and other cost is their own. Considered from this point of view a glance at the statement shows that excepting for *tur*, gram and *juar* the amount of differences in gross return of all other crops is small. (Navsari is an exception as regards this.) Cotton is, however, a cash-crop and requires less attention and care of the cultivators. These two points go greatly in favour of cotton and cultivators prefer to put larger areas under it even if it brings a slightly smaller return than other crops.

2914. (3 and 12) *Size of holdings*.—The average size of holdings i.e. the total area occupied by each *khatadar* comes to about 16, 18, 20 and 36 *bighas* in the Baroda, Kadi Navsari and Amreli Districts respectively. Classifying the total number of *khatadars* according to the area possessed by them about two per cent. have 100 to 500 *bighas*, about twenty per cent. from 25 to 100 *bighas*, 29 per cent. from 5 to 20 *bighas* and the remaining have less than five *bighas*. The size of holding in different agricultural tracts and of individual *khatadars* varies with the type of cultivations. It varies generally with the proportion of *khari* to *rabi* and of dry to irrigated cultivation. Where the area under irrigation is large as is the case in Charotar tract (Baroda District) and in parts of Gandevi Taluka the size of holding is necessarily small. In the tracts where cotton is a principal crop and is grown extensively the majority of *khatadars* possess sixteen *bighas* and more, and the district averages given above fairly represent the average size of holdings of cotton cultivators in each district.

(2) A statement showing the area under cotton and its proportions to the total cropped area in different *talukas* is appended at the end of Annexure I. The proportion of cotton to other crops varies from 41 per cent. in Kamraj to 1-3 per cent. in Vijapur. The actual proportion in vogue varies with the system of cropping and rotations followed in different tracts and on individual holding. Where the area under *khari* is much larger than under *rabi*, or also where cotton is grown successfully for years on the same field, cotton occupies more than fifty per cent. of the entire holdings, while on the contrary where the area under *rabi* is greater than *khari*, or where regular two or three years' rotations are followed, cotton occupies thirty per cent. or less of the holdings. On an average, it will be fairly accurate to say that majority of the cotton cultivators put about fifty per cent. of their holding under cotton.

2915. (8 and 18) *Uses of seed and seed selection*.—Cotton seed is used as feed for the work and milk cattle and also sold for oil extraction. There is one cotton seed oil factory located at Navsari.

(2) No seed selection as such is practised by the cultivators. The majority or almost all of them obtain their seed directly from the gins or from local *banias* who obtain it for them. The practice of hand-ginning has disappeared long since. In former days, hand-ginning existed along with hand-spinning and weaving and has disappeared along with those industries; with the establishment of gins at all convenient centres, hand-ginning is not likely to revive.

(3) Some of the cultivators, whose fields are noted for good cotton, take back their own seed from gins and sell it to other cultivators. Such seed is always in great demand and is sold at a premium. In the gins, too, the manager sets apart heaps of good cotton and reserves seed therefrom for selling it for 'seed' purposes. Cultivators always pay about one to two rupees more per maund for this seed than for the general lot sold for feed purposes. Some ginners make a speciality about their seed. The gin of Kalidas Narandas located at Itola may be mentioned in this connexion. This gin has established quite a good reputation for its seed and is selling hundreds of maunds of *goghari* seed to the cultivators all over Gujarat from Bilimora to Ahmedabad.

(4) As stated above, there exists in the gins a system of partial selection. It is a selection of heaps and not of fields or plants, and the cultivator does not always get the seed best suited to his locality. The

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control of merchants and ginners over seed has given them an opportunity to distribute seed of any variety and to this fact may be attributed the extension of *goghari* in Navsari and Surat. Seed of strains worked out on Surat farm is, on account of its good germination, purity and slightly higher ginning percentage, greatly in demand. Through the courtesy of the Bombay Agricultural Department this seed is introduced in the Mangrol Taluka of the Navsari District. Individual cultivators have also obtained it direct from the Rander and Sania gins. Farm seed is now pushing its way in the Navsari tract, which, in my opinion, is highly undesirable. Some of the ginners and merchants are selling *goghari* as farm seed and with the cultivators both the varieties are now coming to pass as one.

(5) Last year I had selected heaps of good Navsari cotton and after removing all the bolls of *goghari*, it was ginned separate and given to selected cultivators. About 1,000 acres are placed under this seed and the best fields from this are being selected this year for the supply of seed during the ensuing season.

II.—COMMERCIAL ASPECT

2916. (30) **Local trade customs.**—The cultivators generally sell their cotton to the local merchants who are either independent business men or the agents of gins or exporting firms. They either sell it in advance or take their carts to the market or gins and sell at the price ruling for the day. In selling for future, the cultivator receives some advance money and enters into a contract to sell his entire produce or a certain quantity of his seed cotton at a fixed rate. Such advance sales are more in years of high prices. When the prices are low, the cultivator prefers to wait for a rise in the market. This year on account of abnormally high prices contracts are being entered into even for the crop of 1919.

(2) The small merchants and ginners sell their cotton to the agents of exporting firms who send it to Bombay for sale. Some of them send it for sale to Bombay through their agents on their own accounts. Most of the Navsari and Surat cotton is sold out locally and purchased by the agents of Indian cotton mills.

2917. **Mixing of long and short staple cotton.**—Some of the local trade practices, particularly of mixing, are described while discussing the question of *goghari* (paragraph 2906). As stated there, mixing of long and short-stapled cotton in gins and presses is being practised on an enormous scale. Ship-loads of seed cotton are brought over from Kathiawar to Surat. Wagon-loads are taken from Wadhwan and stations upwards from Central India, and from Rajpipla State and brought to Broach and adjoining stations. Wagon-loads from Khandesh side and cart-loads from Nador and Nandurbar go to Surat and Navsari gins. All this imported seed cotton is mixed with the local, ginned and the mixed lint is sold as 'local.' The current of export of seed cotton and loose bales is always from centres of lower to higher value. Mixing is more rampant in the seasons when the prices are very high, and those who are perpetrating this fraud are individually amassing thousands and lakhs in a single season.

(2) Similar mixing is also being carried on in presses. Loose bales are brought over for the purpose and mixed in desired proportion before pressing in full bales. Loose bales of superior quality of local cotton from Dabhoi, Palej, Anklesar, etc., are often sent to a press located at a few stations (Kim, Sayan, Kosamba) further down towards Navsari, pressed there and sold under the brand of those stations. Full-pressed bales are also sometimes sent up in a similar way, its brand changed and re-exported to Bombay.

2918. **Dampening cotton.**—The practice of dampening cotton also goes hand in hand with mixing. Cotton is kept overnight in a moist room. The fibre is allowed to absorb some moisture and is baled before it dries up. This dampening or watering increases the weight of cotton to the extent of about forty lbs per *khandi* and is stated to improve the feel of the staple. The effect of such fraudulent practices on the market and on the quality of the local staples is discussed in paragraph 2906 and the measures to be adopted for checking it are suggested below in paragraph 2926.

III.—STATISTICAL.

2919. (33) **Improvement of cotton forecast.**—The trade is generally interested in having a fairly accurate idea about the supply and demand. Accurate information about the probable production of each kind or grade of cotton in each locality is of very great importance and the trade returns to be of practical use to the merchants, etc., should give accurate information about the supply of unginned, ginned and pressed cotton available in each market.

(2) I have no personal experience of the methods of collecting agricultural statistics in the districts, and I take it that the figures of crop acreages and the estimates of yields are fairly accurate though I am very doubtful about the latter. But apart from the question of their accuracy, I think that the agricultural statistics, to be of practical value to commerce as well as to students of agriculture and land problems, should be collected and compiled separately for each agricultural tract instead of for administrative divisions. An administrative division may comprise—as it often does—more than one type of agricultural conditions, and unless one takes up village-wise figures he fails to deduce correct inferences from figures representing average conditions of dissimilar tracts. I suggest the desirability of re-grouping of areas for statistical purposes.

(3) For cotton, I suggest that separate forecasts should be issued for each variety or the zone in which it is grown. For instance, there should be separate forecasts for Navsari, Surtee, Broach, *wagad*, *mathio*, etc. etc.. This, however, could not be done without re-grouping of areas.

2920. (34) **Improvement of the statistical information.**—Publication by the Government of weekly returns, giving the quantity of unginned, ginned and pressed cotton available in gins and presses at each centre, would be of great practical use to the merchants and it should be made compulsory on every gin and press to supply the requisite information to the Government.

IV.—MANUFACTURE.

(a) *Ginning and pressing.*

2921. (36) **Type and number of gins and presses.**—From the information collected from the ginners I find that all the gins in the State are of Platt Brothers' type. They have no experience of saw-gins but are of opinion that the existing type works satisfactorily. With saw-gins they think that, though it may turn out more work in the same time, the seed will not come out quite clear, the lint will be spoiled and in case of long staple cotton the fibre will be cut up. They further state that with the change of a sieve costing about Rs. 5 per each gin the existing machinery can gin large seeded exotics.

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[Continued.]

2922. (37) **Size of bale.**—The sizes of bales pressed in the State, as reported by the presses, are (1) full-pressed or compressed bales (a) to 23"×14"×47" and (b) 17"×18"×48" while (2) loose bales (a) 60"×48"×48", (b) 72"×48"×48", (c) 72"×36"×48".

2923. (40) **Factory labour.**—The complaint of labour scarcity both for gins and presses is general. The difficulty is greater when the ginning season starts late. The labour migrates to the neighbouring localities where the season commences earlier and the ginners are often required to give wages in advance. From the nature of the reports received, the actual difficulty, I think, does not arise from scarcity of hands but from the unwillingness on the part of ginners to pay higher wages. I have no figures to know the actual factory cost of ginning and pressing, but I understand that the amount of profit to the ginners is always very great, averaging from 20 to 25 per cent. on their investment. They count upon taking out their entire investment in four or five years' time, and they can as well forego a part of their profits to pay the higher wages, the scale of which has increased everywhere.

2924. (45) **Effect of the cotton market of replacement of short staple cotton by long staple.**—The effect on the Indian market of replacing short staple varieties with long staple ones, would depend upon the extent of the area affected, and the demand for cotton of short and long staple varieties in the world's market. There is already a large import of fine yarns, and with the further expansion of cotton industry an increased demand for long staple cotton may be expected.

(2) If, after the cessation of hostilities, the prices of clothes do not continue to run as high as they are during the war times, the pre-war tendency of the people to go in more and more for finer clothes will continue; and with a large quantity of superior cotton available in the country, attempts will be made to manufacture finer goods in larger quantities; whether the entire production of long staple cotton will be consumed in the country and whether that production will be enough to satisfy the manufacturing demand, will depend upon the quantity produced and the effective demand of local mills. In any case, large production of long staple cotton will decrease the imports of finer yarns and clothes, and give an impetus to the production of fine goods in the country.

(3) The Indian production of short staple cotton is much in excess of the country's requirements. This cotton is exported in such large quantities every year that the local manufacturers would not, for a very long time to come, be affected if its production is decreased on a large scale. On the contrary, if the demand for export remained the same it may raise its prices and indirectly increase the profits of the cultivators, and any scheme of extending the cultivation of long staple cottons, either *deshi* or exotics, would prove of advantage to the country, provided the long interest of cultivators is fully safeguarded.

VI.—GENERAL.

2925. (46) **Attitude of buyers to improved cottons.**—I understand that, several years ago, Messrs. Tata & Sons had undertaken several experiments for cotton improvements in Central Provinces and also in Navsari. The merchants of Surat and Navsari are encouraging the cultivators to grow *goghari* by offering premiums, but this, in my opinion, is the reverse of improvement. Generally speaking the middle men and exporters would not so much care to make any efforts for encouraging improvements; some of the local manufacturers, who are directly interested in the quality of the staple, would offer premiums, provided the quality is uniform and adulteration is safeguarded against.

Suggestions for work on cotton in the Baroda State.

2926. **Purification and improvement of existing varieties.**—For the Baroda State, the line of cotton work should consist of improvement from within, i.e., the entire attention should be devoted to the purification and improvement of the existing varieties. The measures to be adopted for the purpose would consist of—some State action for preventing all possibilities of mixing of seed and cotton of different varieties, organizing agencies for the supply of pure seed and research work for improvements.

For State action I suggest that—

- (1) a detailed survey of cotton areas should be made and definite zones for each variety fixed;
- (2) export of seed cotton, lint or seed, either by cart or rail or ship from one zone to another, should be disallowed excepting under licences issued by the Government.

No such licences should be issued for export or import of seed cotton, but for lint or seed licences may be issued to *boni fide* firms who require it for direct consumption in their own factories. Such measures are urgently required to prevent fraudulent mixing of cotton and to avoid all danger of further mixing of seed of different strains, which has already done considerable harm. There will be some opposition to any such legislation from the interested parties, but it should be urged that the measures are not in restraint of trade but for improving its morale and safeguarding the long-time interest of the cultivators and the cotton trade of the country as a whole.

2927. **Supply of pure seed.**—For removing the existing mixtures, I suggest that the Agricultural Department should undertake to arrange for providing pure seed to the cultivators. For this Government should open special seed farms, one in each zone. Such farms are required, one each at Navsari, Dabhoi, Kadi and Amreli. On the farm, best seed should be selected and given to registered farmers who would undertake to sell their entire produce only for seed purposes. The State should maintain stores for purchasing seed from such registered farmers and re-selling it to the cultivators. In distributing pure seed, an attempt should be made to put as far as possible entire villages or groups of villages under pure seed, and gradually extend the area under it. Arrangement should also be made for controlling the seed of produce from pure seed, by means of co-operation with some gins or merchants. The State may undertake to pay them the extra cost, if any, for collecting and ginning the pure seed-cotton separately. Such control would be necessary for a few years only.

(2) If the seed supplied to the cultivators is really pure and good, they will be in a position to secure good prices for their produce as has happened in case of Surat Farm seed, no special purchasing agencies will be required; but the work of the Department would be greatly facilitated, if some firms would undertake to offer small premiums to the cultivators in the beginning.

2928. **Grants of prizes.**—In addition to the above measures, the State should give special encouragement, by way of competitive prizes to the growers of best pure cotton. The Agricultural Department has this year declared handsome prizes for the Navsari tract.

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[Continued.]

2929. *Other methods of securing improvement.*—The cultivators should also be educated about the necessity of using good pure seed and taught the methods of selection. The Department is appointing, this year a special cotton supervisor for the Navsari tract, who will go from field to field and instruct the cultivator on these points. It is also proposed to open short course classes, lasting for about a week, for giving special instructions in seed selection.

2930. *Research.*—On the farms, besides growing best seed for distribution, there should be a continuous plant to plant selection, and detailed study of each variety should be undertaken with a view to develop a superior strain. The Bombay Agricultural Department has already done considerable work in this direction for Surat and Broach strains and also for *goghari*, but the varieties of Kadi and Amroli Districts have not yet been sufficiently investigated. *Wagad* and *mathio* offer great scope for such work. For *wagad* the ginning percentage in different localities is reported to vary from 32 per cent. to 36 per cent. and *mathio* from 33 per cent. to 40 per cent. The effect of ginning percentage on the quality of staple in *wagad* requires some investigation. Similarly for *mathio* the narrow lobed white-flowered variety should be studied in detail.

(2) In Kodinar, where conditions seem favourable for expansion of long staple varieties, the Navsari strain should be tried and introduced if the results of a series of trials are successful.

2931. *Work on exotics.* In my opinion, conditions in the State are not favourable for the introduction of exotics, but if any locality is found suitable for the purpose, the variety or varieties should be experimented upon for a series of years and cultivators should not be asked to cultivate it till the Department is thoroughly convinced of its long-time advantage to the cultivators.

(2) In considering the question of seed supply for the exotics, no markets outside the country should be relied upon. Localities in the country, where the seed would not deteriorate, should, if possible, be found out, or varieties whose seed would not keep up in Indian conditions should not be introduced at all.

2932. *Staff.*—For carrying out the work outlined above, there should be a special cotton branch created in the Department, and placed in charge of a well qualified officer who should devote his entire time to cotton work.

ANNEXURE I.

(i) Statement showing the area under cotton for the decade ending 1916-17 and the percentage of area under cotton to the total cropped area (in bighas).

[1·7 bighas = 1 acre.]

Serial No.	Name of the Taluka.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	Average area under cotton.	Percentage of cotton to total cropped area.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Baroda Division.														
1	Baroda	47,752	47,625	57,029	54,680	60,482	60,068	62,840	58,743	61,118	66,612	57,695	26·6	
2	Padra	55,971	53,017	58,873	60,848	67,104	66,906	71,204	73,589	67,258	68,235	65,700	33·6	
3	Karjon	90,726	89,719	92,790	91,579	99,827	93,691	91,088	93,211	93,444	98,684	93,476	41·5	
4	Dabhol	60,930	59,150	72,704	66,885	79,645	78,061	71,299	68,731	69,032	76,964	70,510	33·3	
5	Sankheda	43,552	52,477	59,194	64,288	76,213	70,321	72,720	75,389	71,160	68,219	65,253	27·08	
6	Tilakwada	6,303	6,478	8,301	10,512	11,811	10,311	10,764	10,064	10,559	10,885	8,593	25·6	
7	Sinor	33,287	31,518	37,258	39,487	41,730	37,185	34,198	38,520	39,511	40,006	37,361	26·7	
8	Petlad	9,641	8,150	6,122	8,886	14,011	9,206	8,761	9,420	8,178	8,705	9,139	4·4	
9	Bhadran	4,344	3,799	3,897	4,678	1,845	4,237	5,625	5,719	5,123	5,130	4,441	4·6	
10	Saoli	21,886	17,934	18,877	21,712	26,974	32,094	53,790	54,716	60,614	69,517	37,811	16·9	
11	Waghodia	15,526	15,329	20,757	23,958	35,759	35,183	40,795	47,066	49,076	54,524	33,802	18·8	
												483,871		
Navsari Division.														
12	Navsari	19,384	18,206	18,863	21,193	22,971	19,020	19,381	20,768	18,852	21,726	20,035	15·2	
13	Ghandevi	3,365	3,761	3,517	3,573	5,041	3,887	3,840	4,207	2,243	1,928	3,533	7·09	
14	Palsana	30,103	26,303	28,052	30,482	31,235	27,860	29,235	15,359	24,420	25,517	26,857	3·02	
15	Mangrol (Velachha)	80,246	73,402	75,827	72,064	78,314	64,482	69,190	42,060	58,351	35,646	58,958	37·03	
16	Mangrol (Vankal)	9,483	8,305	8,764	9,913	13,055	4,206	9,525	9,425	11,263	35,646	12,365	14·08	
17	Kamreja	60,730	56,741	63,476	65,021	65,327	66,221	63,843	52,687	54,148	68,220	62,542	37·8	
18	Vyara	43,050	28,788	26,623	34,589	27,581	35,696	39,476	36,729	35,153	36,035	34,812	12·07	
19	Sonagada	8,982	7,165	7,046	7,160	9,008	9,135	9,327	9,241	9,114	9,345	8,562	3·51	
20	Mahuva	35,321	38,074	32,289	23,866	32,725	25,783	35,740	37,996	38,156	33,359	33,318	23·5	
												260,972		

MINUTES OF EVIDENCE.

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[Continued.]

(ii) Statement showing the area under cotton for the decade ending 1916-17 and the percentage of area under cotton to the total cropped area (in bighas)—continued.

[1·7 bighas = 1 acre.]

Serial No.	Name of the Taluka.	1907-08.	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	Average area under cotton.	Percentage of cotton to total cropped area.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Kadi Division.														
21	Kadi	46,056	47,725	55,896	49,279	7,039	54,790	84,481	74,834	67,114	86,292	57,480	15·8	
22	Kalol	13,593	15,226	19,735	19,571	4,931	23,180	38,282	38,640	21,582	23,783	21,853	8·16	
23	Dehgum	13,083	8,140	11,863	21,483	13,284	13,561	29,457	27,206	11,301	27,953	25,734	9·37	
24	Attar Sumbhar	378	107	349	981	1,501	674	1,594	2,757	374	1,113	984	1·1	
25	Visnagar	1,425	1,939	4,566	3,436	409	2,004	6,376	6,721	1,444	1,439	3,038	·76	
26	Mehsana	9,021	7,460	8,544	11,004	702	7,921	15,935	12,757	6,192	7,013	8,656	3·77	
27	Kheralu	2,100	1,746	1,600	1,110	1,105	1,188	2,365	2,912	754	2,391	1,727	·71	
28	Sidhpur	3,340	2,408	2,677	3,613	403	2,289	5,691	5,565	61	2,103	2,815	1·09	
29	Pattar	4,891	2,681	6,241	10,347	—	5,918	12,469	10,781	339	4,829	5,850	3·5	
30	Harlija	5,022	3,218	9,206	6,613	321	4,761	9,654	9,518	2,142	1,012	5,207	3·9	
31	Vijapur	4,048	1,446	1,538	1,811	403	1,368	5,523	7,117	2,232	2,733	2,882	1·3	
32	Chanasma	9,776	10,523	17,446	17,100	1,783	17,171	20,909	27,115	14,778	23,589	17,520	6·1	
												153,752		
Amroli Division.														
33	Amroli	89,165	72,592	73,215	83,293	58,500	66,581	75,986	74,529	30,482	24,020	64,738	22·9	
34	Bhimkatta	222	62	30	128	—	50	20	146	65	—	99	1·7	
35	Dhari	70,026	55,183	47,952	29,514	25,070	35,301	50,324	44,045	10,653	15,848	38,992	15·03	
36	Khamba	20,734	22,687	23,137	26,075	24,120	31,861	27,798	26,078	13,040	14,990	23,651	1·6	
37	Damnagar	50,522	35,703	34,481	39,785	20,518	32,268	35,338	37,298	25,030	23,528	33,447	29·9	
38	Ratanpore	9,768	7,399	8,119	9,200	6,571	5,549	10,148	8,408	3,788	3,854	7,270	30·6	
39	Kodinar	32,747	20,240	22,263	23,818	23,833	26,750	34,393	33,436	20,408	26,920	27,981	14·08	
40	Okhamandal	158	1	—	2	—	2	—	—	—	—	—	—	
41	Beyt	—	—	—	—	—	—	1	—	17	6	19	·009	
												191,506		

Total area under cotton for the State 1,090,101

ANNEXURE II.

(i) Statement showing the cost of production, yield and value of cotton and its competitive crops in different Divisions of the State.

[1·7 bighas = 1 acre.]

No.	Name of the Crop.	Cost of production per bigha in rupees.	Yield per bigha in lbs.	Value of outturn in rupees.	Profit in rupees.	Loss in rupees.	REMARKS.
1	2	3	4	5	6	7	8
Navsari Division.							
		Rs. A. P.		Rs. A. P.	Rs. A. P.	Rs. A. P.	
1	Cotton (Navsari)	16 8 0	200	32 0 0	15 8 0	—	
2	Do. (Mangrol)	18 0 0	180	27 0 0	9 0 0	—	
3	Jurr	15 0 0	400 grain.	19 0 0	4 0 0	—	
4	Groundnut	31 0 0	200 bundles.	60 0 0	19 0 0	—	
5	Tur	12 0 0	900 nuts.	14 0 0	2 0 0	—	

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[Continued.]

(i) Statement showing the cost of production, yield and value of cotton and its competitive crops in different Divisions of the State—contd. [1.7 bigha = 1 acre.]

No.	Name of the Crop.	Cost of production per bigha in rupees.	Yield per bigha in lbs.	Value of outturn in rupees.	Profit in rupees.	Loss in rupees.	REMARKS.
1	2	3	4	5	6	7	8
		Rs. A. P.		Rs. A. P.	Rs. A. P.	Rs. A. P.]	
	Baroda Division.						
6	Cotton (Dabhoi)	20 0 0	200	27 8 0	7 8 0	...	
7	Do. (Varnama)	22 0 0	200	27 8 0	5 8 0	...	
8	Bajra mixtures	20 0 0	320 grain. 160 math. 200 bundles.	26 0 0	6 0 0	...	@ 2 0 0
9	Kodra mixtures	20 0 0	400 Kodra. 240 pulses. 80 fodder.	25 0 0	5 0 0	...	
10	Juar (as a Fodder crop)	14 0 0	200 grain. 300 bundles.	16 8 0	2 8 0	...	
11	Tur	11 0 0	240 pulses. 120 fodder.	12 0 0	1 0 0	...	
	Amreli Division.						
12	Cotton	12 0 0	150	15 0 0	3 0 0	...	
13	Bajra	16 0 0	360	20 0 0	4 0 0	...	
14	Juar	11 0 0	200	13 8 0	2 8 0	...	
15	Castors	13 0 0	400	22 8 0	9 8 0	...	
16	Gram	12 0 0	300	15 0 0	3 0 0	...	
	Kadi Division.						
17	Cotton (Lalio)	19 0 0	180	22 8 0	3 8 0	...	On light soil.
18	Do. (Wagad)	18 0 0	180	25 4 0	7 4 0	...	On heavy soil.
19	Do. (irrigated)	36 0 0	500	56 6 0	20 6 0	...	
20	Bajra mixtures	18 0 0	380 grain. 160 pulses. 200 bundles.	28 0 0	10 0 0	...	
21	Juar	17 0 0	400 grain. 200 bundles.	22 0 0	5 0 0	...	
22	Dry wheat	18 0 0	350 grain. 400 fodder	18 12 0	3 8 0	...	
23	Bajra followed by irrigated wheat.	42 0 0 + 28 0 0	1,000 grain. 600 grain. 250 bundles.	50 0 0 + 32 0 0	8 0 0 + 4 0 0	...	

N.B.—Products of all the crops are valued at the average pre-war prices.

Mr. AMRITALAL C. DESAI called and examined.

2933. (President.) I was first trained in the Poona College of which I am a Licentiate in Agriculture. I had about four years' experience in the British Agricultural Department in India, after which I went to the United States of America. I was at the Wisconsin University, United States, for a year and a half. I took my M. A. degree in Agricultural Economics in Wisconsin. I also took some special short courses in Agricultural subjects along with agricultural economics.

2934. My policy as Director of Agriculture is to try to purify and improve the existing strains and to localise them in existing tracts. I want to get Navsari, Surat and Broach back to their former reputations. I consider that the co-operation of the Bombay Agricultural Department, Bombay, is absolutely necessary in this connexion otherwise the object will be defeated. There should also be some control over gins and presses as well as restrictions on the movement of seed, kapas and lint. I would suggest that as a first step there should be a careful and detailed survey of the cotton tracts in the State. I shall require some additional staff to conduct such a survey. At present I have one Deputy Director (Mr. Sane), four Agricultural Inspectors one for each district, and two Farm Superintendents. I had three farms but one is being given up. One is at Baroda, another at Jagudan, north of Ahmadabad and the third is at Dwarka. The farm at Dwarka is being closed on account of irrigation difficulties. The State Council has ordered the opening of two new stations, one each for the Navsari and Amreli districts. The site for the Amreli farm is sanctioned and proposals are being submitted for necessary sanction. The question of the Navsari farm will also be taken up soon. That will mean four farms, one for each district. For the main work, these farms will be adequate but for special local problems it will be necessary to have small sub-stations under trained fieldmen. 2935. The cultivation is very good in this (i.e., the Navsari) tract. The quality of cultivation varies with the tract. In Kadi and Amreli, it is not so good. In parts of Baroda it is very good while in other parts

Baroda.]

Mr. AMRITALAL C. DESAI.

[Continued.]

of that district it is not so. As regards cottons in the Navsari and Baroda districts, the great difficulty arise from trade frauds; unless the ginners and the merchants are prepared to give up their fraudulent practices or unless they are controlled by Government nothing can be done to improve the situation. I think that the Agricultural Department would only be doing unnecessary work in trying to improve the local seed unless there was some restraint on trade. Last year I put 1,000 acres under pure Navsari seed and my latest information goes to show that about 2,000 more acres in those villages have been put under *goghari* and *kanvi*. That has more than nullified my work and there is no use going on at this rate unless there are some restrictive measures. It means that the Agricultural Department has practically no power to stop the invasion of *goghari* in view of its high ginning percentage and its popularity with the ginowners. It is a very short sighted policy because in four or five years' time, the prices of long staple cotton will not, in my opinion, continue at their present level on account of the mixture. The prices of Navsari will drop to the level of Broach and the whole reputation of the Navsar tract will disappear. In fact it is going already. It is really the best Broach which is being sold as Surat and the best Surat which is being sold as Navsari. Pure Navsari has practically disappeared. This shows that the Agricultural Department has a very big task in front of it.

2936. I would not go in for a very large number of State seed farms. I would have registered growers instead. We have not much difficulty in inducing cultivators to take up improvements if we go about it in the right way. The cultivators are always willing to pay a higher price for good seed. The ginners are paying more for the short staple cotton and therefore they are going in for the seed of that variety. The cotton that brings the cultivators greater cash returns is considered by them the best and, in the present circumstances because the ginners and merchants are paying them more for the short staple varieties on account of their higher ginning percentage, they will continue to grow them. If the price of the long staple varieties could be raised, they would go in freely for that seed.

2937. If we had a large quantity of seed cotton to handle and if all the registered farms were centralized in one locality, then it might be advisable to have our own gins. I am doubtful about co-operative societies taking up ginning at this stage. It might be possible after five or ten years but, as the problem is very pressing, we ought not to depend upon them. In ordinary circumstances, it is always possible to find two or three ginners who will undertake to gin *kapas* separately for the Department. Government might give a small bonus for the extra expense that the ginowner may be put to on that account. *Goghari* is fetching Rs. 10 more per *bhar* than the local *deshi* in the Surat and Navsari tracts. In Broach, the area under *goghari* is so large that the merchants do not need to take any steps to get it extended. In Surat and Navsari they are paying a premium in order to extend its area. In order to get things straight at once there should really be a premium for the better cottons higher than the present premium of *goghari*. As there is no better price for long staple cotton, the area under *goghari* is growing. I have suggested in my written evidence that if zones were fixed up we could stop the export of seed cotton or seed or lint by cart, ship or railway from one zone to another except under licenses granted by Government for consumption in factories.

2938. I have not done much investigation in botanical work, but I was classifying cotton when I was working under Mr. Gammie. It will be necessary to have a botanical assistant on my staff, who would devote his entire time to cotton work, seed selection, etc.

2939. (Mr. Roberts.) Some of the best cotton grown in Broach tract is being exported to Kim and Sayan or even to Surat, and is passed off as Surat. The difference in price between Surat and Broach cotton in pre-war times was Rs. 30 per *khandi*. The present difference of 100 to 120 rupees may be due to speculation. If all Broach, Surat and Navsari cotton were pure, then the level of prices should be Rs. 30 per *khandi* higher all round to-day. The present prices are relatively low because there is considerable mixture of *goghari*. I arrived at this figure of Rs. 30 per *khandi* from the difference in the prices of best pure Broach and the mixed Broach. I know of a dozen instances in which the best Broach has been exported from Palej and Ankleswar to Kim and Sayan and has fetched about Rs. 30 more per *khandi* than ordinary Broach. One particular lot was purchased at Ankleswar at about Rs. 215 although the price of Broach was Rs. 205, the price offered for this lot at Colaba was Rs. 235 while the prices for Broach ruled between Rs. 200 to 205 on the same day. It was sent to Kim and rebought to Bombay and passed off as Kim cotton.

2940. I have mentioned the case of a ginnery belonging to one Kalidas Narandas located at Itola which is distributing *goghari* seed. I do not think that it is a good thing. Itola is near Miyangam, fifteen miles north of Broach. The man started the business on his own account. He is selling good seed so his seed is in great demand. The policy of giving *goghari* seed in long staple region is undesirable and ruinous in the long run but the cultivators under present circumstances want it. Farm seed from Surat is doing some damage as far as the Navsari region is concerned because Navsari cotton has a better staple. The farm cotton is no inferior to the present average Navsari but it is inferior to the best Navsari. I think that under the present system after three years the seed passes out of the hands of the Agricultural Department. Some of the cultivators keep their own seed and sell it at a high rate because the cotton fetches a premium of Rs. 5 per *bhar* in the market. The ginners pay five per cent more for it. The merchants are now selling *goghari* and *kanvi* seed saying that it is 'farm seed.' I am sure that the merchants are paying Rs. 5 more per *bhar* even without the guarantee of the Agricultural Department. I know of several cultivators who have sold their cotton from 'farm seed' at premiums; from this it appears that there would be no great necessity for a buying agency or ginners syndicate. Ginners are distributing *goghari* seed as 'farm seed' because the cultivators would not take to *goghari* easily and the merchants are obliged to use deceptions. From this year the merchants are calling *goghari* seed 'mota farm seed' (large size farm seed). The cultivators are finding out the difference between the *goghari* and real farm seed and therefore the merchants have given it a new name. This practice is not confined to Baroda only but extends to British territory as well.

2941. My idea is to keep up the present good strains by selection and to give out selected seed in large quantities to cultivators. I have already started this by growing the seed on a thousand acres and I am purifying those fields now. As to the number of acres that I am going to put under the pure seed next year, it would depend upon how much pure seed I can get. If I could get sufficient seed for two or three thousand acres, I shall arrange to sow that much area. I am, however, getting despondent about the situation. On the one hand I am trying to purify the seed whilst on the other the area under impure seed is increasing. That is not a very encouraging situation. I would not think of forcing seed upon the cultivators. My personal view is that the cultivators will come of themselves and that there would be no difficulty about distributing the seed provided it is good and we can assure them higher prices for their produce. That could not be done unless there were restrictions on mixing and fraud. If we were to stop all mixing in gins and presses, the

Baroda.]

Mr. AMRITALAL C. DESAI.

[Continued,

price of the local cotton would rise automatically and that of short staple cotton would fall as there would be no demand for it for mixing. I do not hold the view that the increase in short staple type is partly due to climatic reason, so far as the Navsari and Surat tracts are concerned. It is entirely the work of the ginners and merchants and the cure for it must be some control of ginneries. Although the extension of short staple varieties is not due to climatic conditions so far as the Broach, Surat and Navsari regions are concerned, in the Amreli district it is due mainly to this factor. There they used to grow *lallo* but now they grow *mathio* because long staple varieties would not grow there without irrigation. In Baroda, I would select and purify Broach. In Kadi tract, there are two different types. On the heavy soils, they grow *wagad*. Here too the line of work would be the same as in the other parts, viz., purification and the improvement of the indigenous strains. I do not think it is any good touching *lallo*. In the Amreli district Kodinar Taluka is the only section where long staple cotton could possibly be introduced. That is an isolated *taluka*. I intend trying Navsari and Surat strains there; judging from the climatic and soil conditions I think either of these two might succeed. As regards *mathio* there is one type, viz., white flowered, which seems to give a very high ginning percentage and this requires to be worked up. A detailed study of each variety is necessary. My immediate policy is to try to purify the strains in order to save them from extinction. After that is done and as men become available, I will take up the detailed study of the strains.

2942. In order to keep myself in touch with the work of the Bombay Agricultural Department, I occasionally meet their officers and also Mr. Gammie. We do not hold regular conferences but we have informal discussions when we meet. There has been a certain amount of confusion in the names of the various varieties of Broach cotton. Unification of terminology and co-operation in work with the Bombay Department are quite necessary. I feel doubtful in expressing any opinion as to whether the substitution of scientific names in place of the local names of cotton would tend to clearness. That is a matter for the trade. *Lallo* is a separate botanical type, which belongs to the same species as Broach. *Goghari* also belongs to the same species, but is a different strain from *lallo*. I could not say whether *lallo* is a pure strain. This requires very detailed and thorough botanical study. If I am correctly informed, Mr. Gammie has not yet traced out or ascertained the origin of *goghari*.

2943. (Mr. Wadia.) The cultivators used to hand-gin cotton but there are no hand-gins now. The establishment of ginneries has been one factor in the decay of hand-ginning. The cultivators do not care so much for home selected seed. The question of home selected seed is not so important to them as that of price of cotton. There is no agency for seed supply other than that of ginneries and merchants and it is for that reason that I have suggested that we ought to have such agencies. The ginneries push *goghari* seed because it gives them a higher ginning percentage and enables them to mix cotton. As to whether the merchants differentiate between pure Navsari *kapas* and *goghari kapas* while making their purchases, it depends upon the individuals. There are some who do handle pure Navsari but they require it generally for their own mills. There are some merchants who send out their own agents here, who try to select pure Navsari. So there are some who do make a little distinction. There is another difficulty as regards selection of cotton. Most of the cotton passes through the hands of middlemen and there are very few merchants who send their agents for selection of *kapas*. There are means by which the middlemen can win over the agents.

2944. There is very little watering. What watering there is, is done to improve the feel of the staple.

2945. In Navsari very few of the ginneries are working on commission. Most of the ginneries are buyers also. I think that is true in other parts, for instance in Broach, Palej, etc., cotton for mixing is often obtained in rather a circuitous way. *Mathio* is brought by sea from Kathiawar to Surat and sometimes also to Broach to be mixed there. It comes by rail from Wadhwan and other stations. The year before last I found that seed cotton was brought from Ujjain and Indore, cotton was also brought in carts from Nandurbar and Khandesh side to Navsari side. It was brought to Navsari and Surat from very long distances for instance from Nanded in Raj Pipla State. It was mixed with the local cotton and the whole quantity was passed off as local cotton. I went into the question for one full season. I have handled a large number of bales and so I know all these details. There should be no export of lint, seed or seed cotton except under licenses issued by Government and no such licenses should be issued for any other purpose than for factory consumption. Instead of licensing ginneries, there should be penal laws against the mixing of superior and inferior varieties. We are opening some short courses for seed selection to teach the cultivators how to select good plants and keep their seed but I do not think this will be of much help so long as the present conditions continue.

2946. (Mr. Hodgkinson.) If the irrigation schemes mentioned by Mr. Jadhav were sanctioned, I do think there would be a very large area that could grow long staple cotton; and the acreage yield would also increase considerably under irrigation. Rice and wheat would not pay as much as cotton. We made some experiments on the Baroda Farm with Navsari and *kanvi* cotton under irrigation and from the records I find we got about 1,200 lbs. of seed cotton per acre for Navsari and 1,300 lbs. for *kanvi* cotton. That means about six times the average yield under dry conditions. That was in 1910-11. If these irrigation schemes were sanctioned, I would go in for our own varieties. For instance if we had an irrigation scheme in the north of the State I would take up *wagad*. I would prefer doing that to introducing exotics. It takes about five or six years to find out whether exotics are suitable or not to a particular locality. There is also the chance of deterioration. Some of the exotics are susceptible to disease. For instance, on the Baroda Farm, Cambodia has left a legacy of leaf roller.

2947. (Mr. Ashton.) As regards the *wagad* variety, the cultivators get about three times as much yield under irrigation as under normal conditions. That was the average yield obtained by cultivators under well irrigation. Some do get a bumper yield extending up to 1,400 lbs. Three to four waterings would be required for cotton. It depends on when the crop is sown. If it is sown in June or July it would require three or four waterings. At present it costs the cultivator about Rs. 6 for irrigation per *bigha*, i.e., about Rs. 10 per acre. We do not get a good monsoon in these parts. Every three or four years we get a drought. A large area under irrigation would bring about a change in agricultural condition. If irrigation canals were constructed wheat would compete with cotton but wheat would not pay as much as cotton.

* Since I gave my evidence before the Committee at Navsari, I have met with great disappointment in my efforts to extend the area under pure Navsari cotton; the cultivators who had sown the seed supplied by the Department could not realize any higher price and in some cases they were actually paid about five to six rupees less per *bhar* than for the ordinary mixture; under the circumstances I have found it useless to press the cultivators to accept the Department seed and I have given up my attempt to extend the area under pure Navsari.

Hyderabad.]

Mr. G. E. C. WAKEFIELD.

XVI.—Hyderabad.

Mr. G. E. C. WAKEFIELD, Director General of Industries and Commerce, Hyderabad.

EXAMINED AT RAICHUR, FEBRUARY 24TH, 1918.

Written statement.

2948. Area under cotton in Hyderabad.—Owing to great demand and high prices, the area under cotton in His Exalted Highness the Nizam's Dominions has increased remarkably during the past fifteen years—

	Acres.
1902-03	2,359,130
1903-04	2,660,663
1904-05	2,730,686
1905-06	2,536,610
1906-07	3,480,143
1907-08	3,100,084
1908-09	2,901,942
1909-10	3,401,042
1910-11	3,561,897
1911-12	3,226,472
1912-13	2,887,514
1913-14	3,653,327
1914-15	3,605,181
1915-16	2,963,806
1916-17	3,190,587

(2) The absolute accuracy of the above figures cannot be vouched for but they fairly indicate the great increase which has taken place. The total occupied dry area of the State (cotton is not irrigated here to any great extent) is 19,689,917 acres, to which the greatest area so far put under cotton (3,653,327 acres in 1913-14) bears a percentage of 18.5. But if we take the figures for the cotton-producing districts alone, in which the occupied dry area is 14,728,616, the percentage under cotton rises to 24.8.

2949. Size of holdings.—The average holding in the Mahratwarra and Carnatic portions of the State, where there is practically no irrigation except from wells, is 26.29 acres as against 16.67 acres in the Telangana country where irrigation is largely practised.

2950. Possibility of improvement in Hyderabad cotton.—During the season 1913-14, the year before the war, the export of cotton from this State was valued at 705 lakhs of rupees. In normal times and indeed even during the latter years of the war since the substitution of the markets of Japan and America for enemy markets, the State has had no difficulty in advantageously selling its cotton, *whatever its quality*, and herein lies our difficulty in effecting improvements in staple; in other words, there is no market for the purchase of long-staple cotton at such prices as would cover the extra cost of production and the lesser yield as compared with short-staple. The State is fortunate in possessing an indigenous variety of long-staple known as "*bani*" or "*gaorani*" which I believe is second to no other indigenous long-staple Indian cotton and we have no doubt that the quality and yield could be much improved by careful seed-selection, but the almost complete absence of markets for long-staple as such, at a higher price than short-staple, renders it practically impossible to hope for any great improvement or increase in long-staple. If long-staple markets could be established I am confident that the area and quality of our long-staple would very soon increase with the demand, and in the hope that such markets will sooner or later arise, we have established long-staple seed-farms and a system of seed-advances on favourable terms and we are, I believe, ahead of the rest of India in that we have penalized the deliberate watering of cotton for the purposes of adulteration.

Mr. G. E. C. WAKEFIELD called and examined.

2951. (President.) At present there is very little encouragement given to improvement in the staple of cotton because the cultivators do not get a price proportionate to the value of the staple. Better prices might be obtained if the mills really took an interest in the matter; at present all their buying is conducted by underpaid agents who, as far as our experience goes, are not to be trusted. If mill managers were to buy themselves, it would be a good thing. I made a tour right through the cotton country and at each centre I held meetings of all the people who were interested in the question. At every meeting, adulteration was absolutely condemned and yet it was said that it had become a custom and that nobody really minded it. But it was admitted that many of our long staple centres had been knocked out by this custom one after the other. When we had got to the stage in which bales of cotton intended for Bombay were being booked in the opposite direction to Bombay simply in order to get the hall mark of a long staple centre which still retained its reputation, it was necessary to take action and we have accordingly taken two steps. Bales are now stamped all over with indelible ink, so that even if they are booked to another centre, unless they are absolutely opened out and then rebooked, they still retain the mark of the place of origin. The second step we took was to amend the Factory Act so as to empower Government to shut down any factory in which deliberate watering is practised. We have a local Factory Act which is based on the Government of India Act. This amendment came into force about six months ago and has not been in force long enough to enable us to see what the results are. We had meetings of representatives of every kind to consider this legislation. Very often the ginner's difficulty is when the owner of cotton comes to him and requests him to mix it, his position is a difficult one. The reason why we went for watering was that short staple cotton will stand watering without discolouration, i.e., immediate discolouration, and long and short staple cannot be mixed without watering. Therefore we went for watering to automatically stop mixing.

2952. The cotton forecasts are compiled through the revenue officials. We cannot vouch for their absolute accuracy but we are trying to improve matters and I think that things are improving gradually. We have had no cadastral survey of the State. The Tahsil officials send for the *patwaris* (village accountants) and find out from them what the area and outturn are and then report. The forecasts are sent to the Residency and go by telegram to the Director General of Statistics.

2953. No ginning and pressing returns are at present sent in. There is a general desire for them and we propose to introduce the system very soon. I do not think the Darbar would have any objection to the submission of ginning and pressing returns being made compulsory.

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[Continued.]

2954. (Mr. Wadia.) It was when cotton was in the form of lint that people used to mix cotton and not when it was in the form of *kapas*. It was after the actual buying of *kapas* had taken place and it had been brought into the factory and ginned that mixing took place. I believe some mixing was done in the *kapas* state but I do not think that it was much. If there were a regular market for long staple in a pure state, there would be some effort to try to keep it pure but even if the seed is extracted separately in the ginning factories it gets mixed because there is no incentive to keep it pure. I am undoubtedly of opinion that the deterioration that has taken place, say in Latur and Parbhani, is due to mixing in the lint state. One finds exactly the same thing everywhere. Latur used to have a good staple. The staple of Parbhani went down because *kapas* was brought in from Jalna district. In the same way the staple of Latur went down because *kapas* was brought in from Barsi and Sholapur. The stopping of the transport of the *kapas* from one district to another by rail would be fairly easy except where there are mills which say that they want a certain quantity of outside cotton for legitimate admixture. Prohibition of transport by carts would be very difficult to control in tracts away from the railways. I do not think the Darbar would have any objection to proposals to prohibit the transport of cotton, either in the form of *kapas* or lint or in fully pressed bales by rail except to ports like Bombay or Karachi or to mills which had got a license from a central board. We should probably be able to agree to it unless the practical difficulties proved insurmountable. The difficulty is in regard to the control of the village traffic in tracts which are not served by rail. We have got something like 30,000 villages where the traffic is carried on by bullock cart. In regard to the suggestion that there should be territorial sub-divisions between which there should be no transport by carts, it is very difficult to say how this would work without investigation. But, generally speaking, I think the formation of such territorial divisions would be difficult in practice. For instance, I hear that one of the effects of our prohibition of watering is that our cotton is being taken over into British territory to be watered. I think we could easily draw a broad line between the northern and southern districts and prevent cotton being taken from the one to the other, but in the northern districts, long and short staple are so intermingled in some places that it would be difficult to differentiate. I do not know that much cotton comes from Berar to be mixed with our cotton. I am absolutely in favour of the proposal that gineries should be licensed and that if any gineries are found to be deliberately, fraudulently and continuously mixing various grades of cotton, their licenses should be taken away. That would be more or less on the lines we are following here for watering. Our prohibition of watering is a step in the direction of preventing fraudulent mixing. We could go still further if we wished and if it were found necessary.

2955. We still get good cotton from Umri, Nander and Karkeli, which are away from the railway stations but in districts like Latur which have been reached by the railway, the cotton is deteriorating. There is always a market for short staple cotton but the mill owners do not take any steps to establish a real market for pure long staple cotton. We have been sending our Director of Agriculture to Bombay for the last three years to discuss matters with the Bombay Millowners' Association. They promise to send up people to buy the cotton but the same thing happens every time. The men who come up are absolutely in the hands of local *aratyas*. There are so many ramifications. The cultivator has not much capital. He is financed by the local *sahukars* who are tied to the *aratyas*. There is no getting out of the web which has got no end. The *ty* is the cultivator. If a man came up who refused to buy any but pure cotton he might be boycotted and not get any cotton at all for a bit but he would eventually and it would not take very long. We have a certain number of cultivators who are men of means and who have large godowns in their villages. They hold up the crop against a falling market and do a good deal of direct business but even they cannot get a proper price for their long staple cotton and so it is not worth while to go in for the cultivation of it. It takes longer to mature and it is more susceptible to climatic influences. And apparently, although Mr. Kenny disputes that point, the yield is less. We have distributed enormous quantities of long staple cotton seed. We have done our best; Mr. Kenny will give you details.

2956. I do not see how ginning and pressing charges could be made uniform. We have some glaring instances of pools. We can show cases in which factories have been put up and have never been worked for a single day and yet they draw profits from the pools. The only weapon we have in our hands but which we refrain from utilising is that no factory can start without permission but so far we have given permission without restriction. But the question has arisen whether we should permit factories to start where there is a pool and where the conditions seem to show that no more factories are required.

2957. As to the establishment of a bureau consisting of representatives of the trade and of members of the Agricultural Department of the Government which would issue licenses, I do not know whether we are far enough advanced for such a system. If such a system were adopted in British territory, it is quite probable that we would take it up if it proved successful. If licenses were issued, there would be no objection to a regulation in the license under which every one would be compelled to keep his gins in order so that crushed and broken seed might not be allowed to go through. If every bale is stamped with the mark and name of the pressing and ginning factory, it can be traced. We should be quite ready to help in that direction but how far we should be able to go, it is very difficult to say. I think that if the transport of *kapas* were stopped, cotton would be kept automatically separate and it would begin to fetch better prices provided there were a proper market for long staple cotton.

2958. (Mr. Hodgkinson.) I feel that we are working artificially all the time. Take for instance, the British Cotton Growing Association: here we have very well known centres for long staple cotton; it would pay the Association to have a regular buying agency here—not only to buy long staple cotton but also to gin and bale it and to see that the seed is returned pure for further cultivation. That is what I mean by a proper market. It does not matter whether efforts in that direction are made by Bombay or Lancashire.

2959. If cotton is not damped, people cannot mix short and long staple cotton together without running the risk of detection because of the texture. If short staple cotton is damped, the texture at once becomes silky and then it is very difficult to detect in the mixture. If the cotton is mixed wet the mixture cannot be detected until spinning begins. So I am informed but I may be wrong.

2960. We have no system for the inspection of weights and scales except that we have taken some trouble lately in having legal weights made in our mint and these have been issued by Government. An inspector of weights was appointed about a year ago and he sends in reports. We are also trying to provide weighing facilities in all markets of which the cultivators can make use. I am perfectly certain that the cultivators do not get correct weights. Legislation will remedy this but only gradually.

2961. (Mr. Roberts.) The cultivators are certainly getting more money as the result of the high prices of cotton but they spend it. It is all wasted on weddings and other domestic occurrences. The standard

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of living has gone up to a certain extent. Their houses are better and their cloths are better but, generally speaking, the cultivator is not very well off. He is much better off in the north than in the south of the State. The cotton tracts are more prosperous than the non-cotton tracts. A co-operative credit department has been in existence for the last three or four years, and the societies are increasing in the most remarkable manner. I think that the movement is taking real hold. I had occasion recently to inspect villages in which these societies have been formed and I was convinced that the people had got hold of the principles in the most extraordinary way. In one society a *dher*—one of our lowest castes—is actually President. We have got an Extra Assistant Commissioner from the Punjab as Registrar of Co-operative Societies. We have not done anything in the way of co-operative sale societies or seed unions yet.

2962. (President.) The Agricultural Department is under me. The strength of the Department is very low at present, considering to the amount of work to be done, but we are going to expand it. We have in contemplation some scheme of agricultural education and schools for the sons of cultivators, but there are all sorts of difficulties in the way of educating cultivators' sons. The Department consists of a Director of Agriculture and his staff. Mr. Kenny will tell you all about it. The staff is undermanned and I am considering proposals for expansion.

2963. The export duty on cotton going out of the State is nominally five per cent but as a matter of fact it is not five per cent, for a very curious reason. A treaty was entered into with the Government of India about forty years ago under which the State could levy five per cent *ad valorem* on exports. For facility of working, the rates prevailing then were taken, i.e., so much money on such and such weight. Since then the price of cotton has doubled, but the same duty is levied on the same weight, so that the duty is no longer *ad valorem*. I went into this question a year or two ago. The increase in cotton duty has already been great due to more cultivation; our customs revenue has increased by seventeen lakhs from cotton. If the duty were realized *ad valorem* the increase would be very great indeed which we consider would be inadvisable during the war. There is an import duty on raw cotton and piece goods which is worked in the same way. We do not charge on grain and food stuffs but everything else is taxed.

Mr. JOHN KENNY, Director of Agriculture, Hyderabad.

EXAMINED AT RAICHUR, FEBRUARY 25TH, 1918.

Written statement.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

2964. (1) Experience.—The Mahratwarra portion of Hyderabad territory has grown *deshi* short staple (Bharat otherwise Khandesh) for some years. I have been in touch with the cultivators for the last five years.

2965. (2) Varieties.—Mostly Khandesh and Ahmednagar is the short staple cotton with which I am acquainted in Mahratwarra.

2966. (3) Size of holdings.—The average holding in Mahratwarra is one of twenty acres, three-eighths of which is placed under cotton. It is gradually increasing with high prices to one-half.

2967. (4) Yields and profits.—The average yield is about 200 lbs. of *kapas* or sixty lbs. of *rui* (lint). The net profit per acre in ordinary times is about Rs. 5, but it is the first crop that brings in an immediate return. *Juar* yields about Rs. 10 per acre net profit, but it is a *rabi* crop. This year, owing to extraordinary prices, the profit will range from Rs. 20 to Rs. 25 per acre.

2968. (5) Rotations and manures.—The rotation is cotton *kharif* followed by *juar*, a *rabi* crop, the next year. Manure is scarcely ever applied. *Til*, *mung* and *ralla* as *kharif* are followed by *juar* as *rabi*.

2969. (6) Comparative returns.—*Deshi* short staple is an exotic in these dominions and till lately fetched as high a price in *kapas* as the indigenous long staple. There are no exotics in Mahratwarra except as field admixtures, if we omit a sprinkling of *nambhari*, a long staple, which appears to me a Cambodia, which has deteriorated, losing its strength when planted in our black cotton soils. In *muram* lands in the Aurangabad Taluka there are samples of good Cambodia, which in course of time may by crossings with our indigenous long staple become a silky cotton. Lawrence Balls says this species does not cross with our smooth-leaved species, but I have seen crossings from the stocks brought for sale. Of course, they are rare.

2970. (7) Conditions affecting increase in area.—The area under short staple is increasing rapidly and would continue to do so were it not for the efforts of the Department of Agriculture. Its increase is limited by the quantity of long staple needed by local merchants to mix the two and sell the whole as staple after it is ginned and pressed.

2971. (8) Uses of seed and seed selection.—The seed is used as food for cattle and is exported in large quantities. Practically no seed-selection is carried out since the introduction of ginning factories. It is still carried on in a few villages such as Bhensa, though it was formerly widespread and even four years ago was not unknown in Parbhani.

2972. (9) General economic conditions.—Formerly the ryot borrowed, say Rs. 20, and returned a *khandi* of *kapas* (480 lbs.), worth about Rs. 60 in those days. A maund of seed worth about twelve annas was paid for by a maund of *kapas*, say Rs. 3, and 95 per cent. of the people were in the hands of the *sahukars* for daily food, seed, weeding, picking, etc. Present prices ought to help to relieve them.

(b) "Deshi" long staple cotton.

2973. (10) Experience.—I have experience of *deshi* long staple cotton in Hyderabad Mahratwarra, Raichur and Warangal.

2974. (11) Varieties.—In Hyderabad Mahratwarra, Hyderabad *gaorani* is grown in Raichur, Westerns, in Warangal, *lal kapas*, i.e., Coconadas about 40,000 acres only.

2975. (12) Size of holdings.—In Mahratwarra, the average size of holding in which cotton is grown is twenty acres, of which three-eighths are under cotton. In Raichur, it is twenty acres of which three-eighths are under cotton.

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[Continued.]

2976. (13) **Yields and profits and comparative returns.**—In Mahratwarra, 200 lbs. *kapas* is the average yield per acre. The net profit was formerly Rs. 5. Leaving out extraordinary prices, the net profit from staple cotton, when *kapas* is purchased by the mills, will be Rs. 12 at least. In Raichur, the average yield per acre is 214 lbs. of *kapas*. The net profit is Rs. 10.

2977. (14) **Rotations and manures.**—In Mahratwarra, the usual rotation is cotton and *juar*. No manures are applied. In Raichur, the rotation was formerly cotton, *juar* and grain, now it is *juar* and cotton. No manures are applied.

2978. (15) **Conditions affecting increase in area.**—The increase under staple *deshi* depends entirely on the price of *kapas* as distinguished from *rui*. The difference of the *rui* price of long and short staple goes to the merchants—the difference in *kapas* prices goes to the *ryot*, and if he finds a higher price for any *kapas*, he will grow that.

2979. (16) **Suitability of existing varieties.**—Our *deshi* long staple is the best for Hyderabad Mahratwarra. Experiments to improve it are in progress. In Telingana, on *muram* soils, Cambodia will, I think, be a success as a *kharij* unwatered crop. Westerns are most suitable for Raichur. Experiments with Coconadas are in progress to find out which will prove the dominant in colour.

2980. (17) **Prevention of mixing of different varieties.**—In the field there can be little chance of stopping crossings, but this can be remedied by large seed farms. New seed, as far as my experience goes, seems to be of great importance in increasing the percentage of lint. I started with Karkheli at 26.24 and last year the percentage had reached to 28.5 to 29. I should not be surprised to learn that it has reached 30 this year in Parbhani and Jalna. When not watered, the coarse short staple is easily distinguishable from the silky long staple in a mixture. The best means to stop watering is to grow a crop that will attract mills as purchasers of *kapas*.

(c) *Exotic cotton.*

2981. (21) **Varieties.**—The only exotic cottons found here are *nambhri*, which appears to be a Cambodia whose strength of lint has deteriorated, found scattered in the fields, and Cambodia of which a very little is grown in the hilly parts of Aurangabad, though the Department of Agriculture is introducing it as a *kharij* crop on the red soil *chelka* lands of Telingana. Of other exotics I can say little now as we are in the very first experimental stages with them.

(2) All cotton imported into this country becomes silkier in the course of a few years, but short staple remains short staple, vastly improved in silkiness, regularity and strength of fibre. In spite of the statement by Lawrence Balls, I have seen crosses in the fields by the hairy and the smooth-leaved varieties, the Cambodia being improved in silkiness by the *gaorani* strain.

2982. (25) **Prevention of mixing of different varieties.**—The purchase price of *kapas* will regulate the spread of exotics. If mill owners are the purchasers of *kapas*, no mixing will be done at the ginning factories, provided their agents are reliable and not sufficiently venal to fall into the hands of *sahukars*.

II.—COMMERCIAL ASPECT.

2983. (30) **Local trade customs.**—My reply to question 9 (paragraph 2972) is practically a reply to this. Market tricks are mentioned in my Memorandum of the cotton operations of the Department in 1916-17. (Annexure III).

2984. (31) **Standardization of commercial names.**—The whole of Mahratwarra can grow long staple but it should be classed as Hyderabad *gaorani* as we spread it over the country and not placed under *Oomras*.

2985. (32) **Buying agencies.**—My suggestions are trustworthy brokers for mill purchases and a reliable bank on the spot for exchange, to do away with the *sahukar*.

III.—STATISTICAL.

2986. (33) **Improvement of cotton forecast.**—The cotton forecast is not accurate. The merchants, who have clever interested agents, will give the revenue better information than the *tehsildars* can get.

2987. (34) **Improvement of other statistical information.**—Reports from ginning and pressing factories should be compared with the returns from the Customs and Bombay arrivals.

2988. (35) **Publication of Liverpool and Bombay prices.**—Competition is so keen among the merchants, who know prices, that the *ryot* does not need figures. They refused to sell one day in Parbhani unless all cottons were classed alike at Rs. 117, because they had heard of the enormous prices of Purna. Next day a rush was made to Purna till prices fell there in a day or two.

IV.—MANUFACTURE.

2989. (41) **Condition of cotton.**—The *ryots* seldom make any deliberate admixture though the weighments of *sahukars* may drive them to it. Standard weights should be insisted on and an improved weighing machine.

V.—GENERAL.

2990. (46) **Attitude of buyers to improved cotton.**—Buyers are ready to pay for *rui* that does not benefit the *ryot*, but very few will pay the price for *kapas*.

2991. (47) **Effect of water rates.**—We have no watered cotton at present except in a few gardens.

ANNEXURE I.

Letter from the Director of Agriculture, Hyderabad, to the Secretary, Cotton Committee, dated 17th October 1917.

Learning from the Press that a Commission is appointed to tour the country with a view to encourage the growth of long staple cotton in India, I have the honour to draw your attention to the fact that the Mahratwarra portion of these dominions originally grew a cotton whose staple was fully equal to American

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[Continued.]

Uplands. It ranks to-day in price as the very best obtainable in India, for it is long and silky with a beautiful sheen and the strongest fibre. In these dominions, we can grow it on 2,500,000 acres. It is no exotic, but is the indigenous crop of this part of India being driven out gradually by Khandesh. The reason is simple. If the *ryot* gets no more for his staple *kapas* than for Khandesh, it is a matter of indifference what seeds he grows. To the foreign *sahukar*, the arrival of Khandesh was a blessing. He gave the *ryot* the same price for Khandesh as for the indigenous Hyderabad *gaorani* staple *kapas*, ginned both, watered the lint, pressed it together and sold it as staple obtaining anything between Rs. 60 to Rs. 80 per *khandi* more by the transaction and gaining twelve per cent. from the watering.

The cotton of these dominions soon lost its name with the mill owners and the spread of mixed cotton growing continued till it is difficult to find our pure Hyderabad *gaorani* (the old Hinganghat-Wardha), though Bombay pays higher prices than Broach for what it considers our staple cotton.

The usual arguments brought against the growth of staple cotton are :—

- (1) Short staple cotton is a hardier plant.
- (2) It produces more *kapas* per acre.
- (3) The percentage of lint is greater.
- (4) Consequently the *ryot* benefits more by its growth.

(1) Speaking of the Hyderabad territory, it is far from proved that short staple cotton is a hardier plant in this country, since on our Government farm and from the reports of Supervisors of the Department of Agriculture, who are pushing the growth of staple cotton, a bad year tells equally on both cottons grown on cotton soil. If there is any hardihood shown by Khandesh, it lies in the fact that, in years of heavy rainfall it thrives well on *muram* soils, where long staple would never be sown, but then in years of deficient rainfall it suffers, while long staple grown on deep soils prospers.

(2) The second objection, which may possibly hold elsewhere, will not hold here, for, though I was at first inclined to admit a nine per cent. difference in *kapas* or three per cent in *rui*, from actual trials in the field, I do not see any difference in the outturn of these cottons grown in adjoining acre plots.

(3) The percentage of lint is certainly greater and would increase still more if carefully cultivated, as most short staples have a higher percentage of lint than long staple, but it is not increasing, while careful selection of long staple cotton raises the *rui* percentage rapidly and we have, on our farms, already reached 32 per cent. quite equal to the percentage of Khandesh.

(4) That the *ryot* benefits more by its growth is only true when the same price is paid for both species of *kapas*.

The Indian mills now see that it is necessary to pay more for staple *kapas* than for Khandesh if the growth of long-stapled cotton is not to die out.

Taking Khandesh *kapas* as producing 32 per cent. lint, as it does in Hyderabad territory—

		Rs. A. P.
We require	2,226 lbs. <i>kapas</i> at Rs. 21 for 145 lbs. =	322 6 2
Less lint seed	784 lbs.	
	1,442 lbs. at Rs. 20-1-10 for 800 lbs.	36 0 0
	Price of <i>rui</i>	286 6 2
Hyderabad <i>gaorani</i>	2,800 lbs. <i>kapas</i> at 28 per cent. Rs. 21 per 145 lbs. =	405 8 3
Less lint seed	784 lbs.	
	2,016 lbs. at Rs. 21 for 800 lbs.	52 14 8
	Price of <i>rui</i>	352 9 7

This shows that when both species of *kapas* are bought at the same price, the difference in price per *khandi* of *rui* is only Rs. 33-12-7. Yet the quotations in the cotton market vary from Rs. 60 to 80 in favour of Broach and Hyderabad *gaorani*, even when not pure, is being quoted above Broach. It is therefore evident that mill owners can afford to pay more for Hyderabad *gaorani* than for Khandesh *kapas* and yet keep within the Rs. 80 limit.

Even with the addition of Rs. 10 H. S. per *khandi* of 240 seers *kapas*, the extra price of *rui* does not rise to Rs. 67 beyond Khandesh.

When I met the members of the Indian Millowners' Association in Bombay on 11th June 1917, I pointed out that there were two things necessary for the spread of staple cotton, viz., the purchase by mills of *kapas* at Rs. 10 H. S. per *khandi* above the local market rate for mixed and Khandesh and a law against the watering of cotton without which admixtures would be immediately detected.

As for the price, there seemed no objection since its equivalent in *rui* is already paid; but it is not the peasant who gets the profit, but the broker, who is nominally the financier but is *de facto* the buyer notwithstanding the presence on the spot of poorly paid so-called mill agents.

The quotations last season in Liverpool on 5th February show 8.45 for Fine *Oomras* against 9.90 for Fine Broach. Our Hyderabad *gaorani* is quoted above Broach and therefore the difference per *khandi* of Rs. 71 easily allows a far higher quotation than Rs. 8-10 above Khandesh for 480 lbs. of Hyderabad *gaorani* *kapas*.

The difficulty of growing long staple in these dominions does not lie with the soil, the climate, the seed or the *ryot*, but with the *sahukar*, who wishes to grow short staple in order to mix it with long and get the price of the latter. This mixing was so annoying in the mills that by degrees Jalna, Parbhani and latterly Nander were avoided by them, the name of our cotton was ruined, no more was offered for long than for short staple and Khandesh threatened to cover the country.

As to the difficulties encountered in dealing with the *sahukars*, I need say nothing beyond what appears in the accompanying "Memorandum concerning the Cotton Transactions of the Department of Agriculture, His Highness the Nizam's Government, Hyderabad, Deccan, during the 1916-17 Season."

That our cotton can be much improved as American cotton was by careful seed selection there is no doubt, for cotton suffers rapid deterioration or improves as rapidly according to the amount of care taken in seed selection and culture. It will be a happy day when we can be assured with the United States Department of Agriculture that "the time is not far distant when an average of 200 lbs. per acre will not excite surprise and a yield of 500 lbs. will be the standard of the best cotton planters."

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[Continued.]

But this will not be accomplished without a great deal of help from Government. There are two volumes that deal to a certain extent with the subject before us, viz., the growth of long staple, and I take the liberty of enclosing a letter written after their perusal to the Director-General of Revenue, Hyderabad. These few pages will show what England, other Governments and other agencies have done in all parts of the world to promote the growth of long staple cotton.

ANNEXURE II.

Letter from the Director of Agriculture, Hyderabad, to the Director-General of Revenue, Hyderabad, dated 28th March 1916.

I have been through the two books accompanying your No. 1416, dated 18th March 1916, which I return with thanks.

A fairly large part of the I.—“Proceedings of the Third International Congress of Tropical Agriculture—London, 1914” is to be read and studied with II.—“Papers and Reports on Cotton Cultivation presented to the International Congress of Tropical Agriculture—Brussels, May 1910.”

By a perusal of these one sees the intense interest taken in cotton culture all the world over. It is evident the demand is not met, especially for long staple. With the Right Honourable Lewis Harcourt, M.P., Secretary of State for the Colonies, I agree that there should not be an attempt to grow merely the finer grades of long staple such as may fetch forty pence a pound, but we should aim at the quality known as “Middling Upland,” which in the past, and for some time to come, will be the staple of the industry. Some other points that strike the reader are the great expenditure incurred in the employment of experts by every Government and cotton-growing association to discover where cotton can be grown and the best species to cultivate. The careful and laborious work bestowed on these points is an object lesson to the Government of this country. The more so as we find how rapidly a new industry can be created and how quickly deterioration may set in.

To begin with Egypt, cotton growing is not 100 years old in that country, yet, it leads the world's markets. Since 1897-98, when 580 lbs. of lint was the average crop per acre, the drop has been appalling, 1908-09 showing a return of only 411 lbs., which further fell to 340 lbs. in 1909-10. Whether this is due to the introduction of more water than can be drained from the soil has become a subject of study of many experts. American cotton is in the hands of clever planters who are aided by the State Departments of Agriculture and the progress made in the United States would have supplied all the cotton required by the rest of the world were it not for the great increase of spinning and weaving mills that must satisfy the wants of their own people. Notwithstanding this, the expansion would be far greater were it not for the cost of labour. The same cry comes, from every Colony, whether English, French, Portuguese, Belgian or German, and it is on this account an attempt is made, wherever possible, to grow the longest staple, so that, picking and other charges will fall lighter on the crop that fetches the highest price. It is true every country produces its own type but the problem is to fix and select the type and get a standardized product which the markets will know, look for, and buy. The work of the British Cotton Growing Association has this end in view. With a capital of £500,000 an allowance of £10,000 per annum for six years and help in every direction from the Colonial Governments trials are made everywhere, some successful, some not, but so far satisfactory that whereas, in 1906, only 500 bales were produced in Uganda, there were 29,000 bales in 1912, fetching $\frac{1}{2}$ to $1\frac{1}{2}$ per lb. more than Middling American.

The German Cotton Growing Association has spent 1,700,000 marks. So earnest is the Government in pushing cotton that they introduced gins and presses free, gave prizes of 150 marks per 2½ acres and forced every owner of a hut to grow at least one acre of cotton. As usual, everywhere, Egyptian, American and all sorts of seeds were first introduced, but it was found that acclimatized Togo Sea Island found in the country was the best and improvements on that pointed the way to progress. But it is also true that constant and careful selection is necessary to prevent it from degenerating into a plant of the type of the ordinary uncultivated West Indian kind, i.e., a perennial with relatively short weak lint. Wherever cotton is to be introduced, whether into our colonies or those of any other nation, an expert is immediately appointed and the money spent on this crop alone would give a shock to those who supply the funds to the various Departments of Agriculture in India.

Whilst the rest of the world is endeavouring to increase the length, fineness and strength of staple, besides adding to the output per acre and the percentage of lint to *kapas*, our neighbours in Berar are encouraging the growth of *Gossypium neglectum*, merely taking care to purify the breed. How long this will continue without deterioration is seen in Mr. Gammie's words: “There seems to be distinct evidence to prove that *jari* (Central Provinces and Berar) which will ultimately be the kind universally grown and which produces the coarsest and shortest staple cotton in India, some thirty years ago was a superior cotton spinning 20s. while at present it rarely spins over 10s. About this time a white-flowered variety (*bharat*), yielding a very high percentage of coarse short cotton, was introduced from Khandesh into Berar. This variety rapidly adapted itself to the conditions of Berar and quickly usurped the position so long occupied by the indigenous race, and Mr. Clouston now estimates that it comprises seventy to eighty per cent. of the mixture in the present day. The bulky fluffy bolls are selected for seed and thus the coarser types in the mixed cotton called *jari* is increasing and the *jari* is ousting *bani* (Hinganghat-Wardha). *Bani* has 26 per cent. lint, fine *jari* 32 and coarse *jari* 40 per cent.” In another part of his paper, Mr. Gammie says: “If a grade cotton can be produced in Sind, then its value is a readily ascertainable quantity depending on the market quotations of the day. On the contrary a below-grade cotton has a very uncertain value.”

If, in the Berars, half the trouble had been taken to improve *bani* that was spent on *neglectum*, the product per acre and the percentage of lint would have settled *bani* (*gaorani*), the indigenous cotton, in the country and brought the peasants an excellent return. On trial plots in Parbhani we have already raised the percentage of lint to 32, quite equal to the quickly deteriorating Khandesh (*Gossypium neglectum*) that has almost driven our fine cotton out of the country. A paragraph from the difficulties experienced elsewhere will show how small the world is and how little we are separated in our difficulties from the people of Southern Nigeria: “Obstacles to the progress of the cotton industry have been mainly due to local developments with regard to the purchase of seed cotton, the most important of which appear to be the employment of native buying agents and the production of a large class of native middlemen whose interest is only to obtain quantity without regard to quality; it being scarcely possible for the association's buyers to differentiate in price concerning the latter. The native middlemen buy from the growers at very low rates, employing spring balances, which are frequently adjusted so as to favour the purchaser to a large extent.”

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[Continued.]

Once mill agents are assured that they can purchase pure long staple *gaorani* in any quantity, the work of the middlemen can be put a stop to as far as Indian mills are concerned. Watering or damping of ginned cotton should, according to Mr. Arno Schmidt, be made a penal offence. At the same time the sale of cotton seed on credit as is done in Egypt is strongly advocated for the purpose of supplying the *ryot* with pure seed.

Many of the measures agreed to in other parts of the world, as a matter of course, are considered revolutionary here in India. But leaving out German and other foreign colonies, we find fairly drastic measures carried out in Uganda for the benefit of the State (*vide* Papers and Reports on Cotton Cultivation, pages 123-125). One of the objections raised against the prohibition of watering is that the trade should put an end to this in its own interests, but as watered bales may not be opened after passing through the stocks of twenty merchants and the mischief is discovered only in the mills, the objection can scarcely hold good. Watering is first pure and simple cheating, secondly, it spoils the cotton, and thirdly, it enables short staple to be mixed with long for improper gain and is discovered, as a rule, only at the mills which refuse to take cotton again from the places whence it came.

If, between the years 1900 to 1913, the German Colonial Economic Committee and the Government jointly expended four million marks in the advancement of German Colonial cotton cultivation, it behoves this Government to spend a little more on the Department of Agriculture. The Government experiments at Tayiba in the Anglo-Egyptian Soudan were eminently successful and the Imperial Government were urged to guarantee interest on a loan of £3,000,000. This was promptly agreed to.

We have no such enormous schemes before us, but seeing what is done elsewhere we may be induced to take a little more interest in the improvement of our own cotton, the keeping out of the country of cottons that are not good, and the introduction after careful experiments into Telingana, which is not a cotton-growing land at present, of cottons that may pay and pay well. For this purpose, no doubt, a careful student of the Mendelian laws should endeavour by hybridization of various Indian cottons to evolve the best strain suitable for the country, and, in the meantime, every measure should be adopted to keep and improve our indigenous *gaorani* and drive out *bharat*. While this was being done it would be possible to see whether a long staple cotton such as Cambodia, Sea Island or even Egyptian could be a rotation with paddy and other *tarri* crops on our sandy soils.

Mistakes have been made in India and grievous ones in dealing with cotton and you will find them pretty plainly stated in my book “Intensive Farming in India,” pages 303-328, a copy of which I sent you on 25th July 1915 and another copy of which was sent to Mr. Fasihuddin on 11th October 1915, but avoiding these, much good can be done. You may perhaps be interested in a very clear statement of the Mendelian law shown in a paper by my younger son now studying for his Science Degree in Dublin. I take the liberty to enclose it.

ANNEXURE III.

Memorandum concerning the Cotton Transactions of the Department of Agriculture, His Highness the Nizam's Government, Hyderabad, Deccan, during the 1916-17 Season.

Before entering on a statement of the work done this season a glance at the operations previously carried out may be useful.

In these dominions three cottons were formerly grown, the indigenous staple silky cotton of Mahratwari that formerly went by the name of Hinganghat-Warda, the fair staple growing round Yadgiri, Raichur and Kupbal and extending into British territory termed Westerns in the trade, and the *lal kapas*, tinged with red as the name implies, found around Madhra and on to the coast, which goes by the name of Coconadas after the chief town in the district where it is principally grown.

Long staple *kapas* (seed cotton) has a smaller percentage of *ru* (lint) to *kapas* than the shorter stapled cottons. Were it not for this, there would be no doubt as to which cotton it would pay best to grow.

The Berars decided early that the *ryot* would be benefited by the cultivation of short staple and the efforts of the Department of Agriculture in that province to differentiate the many *neglectum* species and improve the best by careful seed selection and manuring resulted in heavy crops of short staple cotton with a high percentage of *ru* to *kapas*.

This naturally attracted the attention of the surrounding country, spread through Khandesh and gradually found its way into Hyderabad, at first in Jalna and later *via* Ahmednagar into the Bir and Usmanabad Districts.

Quantity had paid the Berars instead of quality and there appeared no reason why the same should not occur in the neighbouring State though neither seed selection nor manuring was resorted to in order that the result might be attained.

We, therefore, got an inferior cotton whose yield was perhaps a trifle greater at first than *deshi kapas*, with a decidedly higher percentage of *ru*. It was just the thing our *sahukars* wanted and they raised the price of Khandesh *kapas* whilst lowering that of the indigenous *gaorani*.

The *ryot* neither knows nor cares about the price of lint. He sells *kapas* and, being convinced that Khandesh gave a much greater yield that paid as well as *gaorani*, grew the former over large tracts. The *sahukar* bought this at the same price as staple *kapas*, ginned, watered and pressed the two together and sold the mixture as staple, a pretty fair bargain when Khandesh ruled at Rs. 200 and *gaorani* at Rs. 300, while water cost nothing and added twelve per cent. to his gains.

Many people are still convinced that *bharat* (Khandesh) is a hardier plant, bears plentifully and has a very high percentage of *ru*. To test the correctness of these views, the different species were grown side by side on the same farm, through a trying season, on land manured in exactly the same way. The farm soil of little depth was in favour of Khandesh. The conclusions arrived at are:—

As to hardiness, there was no difference between the two crops; both suffered alike from heavy and constant showers during the late rains. Since, however, our Mahbub Bagh farm is not a deep cotton soil, I instructed my Supervisors to report any difference they might find in their tours through the district. The report invariably showed nothing in favour of Khandesh on deep black soils. The results of growing the different cottons on adjoining plots treated alike show:—

10 anna crop	{ Bharat (Khandesh)	266 lbs. <i>kapas</i> per acre.
	{ Gaorani	332 lbs. " " "

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Mr. JOHN KENNY.

[Continued.]

As to percentage the following figures are taken from the ginning tests :—

	Per cent.
Bharat manured with two tons mhowa refuse	31.7
" " " plus two cwt. flour phosphate	31.9
" " " plus two cwt. sulphate of potash	31.9
Gaorani manured with two tons mhowa refuse	27.3
" " " plus one cwt. flour phosphate	26.6
Gaorani manured with two tons mhowa refuse	26.6
" " " plus two cwt. sulphate of potash	28.5
" " " plus two cwt. flour phosphate	28.5
At Nander gaorani manured with two tons, mhowa refuse	26.62
" " " plus two cwt. flour phosphate	27.9

showing that both cottons were low in lint percentage this year, but that *gaorani* staple cotton answered better to phosphatic manuring than Khandesh on a shallow soil suiting Khandesh and so unsuitable for *gaorani* that the peasants deemed it inadvisable to attempt its growth there. *Gaorani* reached 32 per cent. last year on our farm when the percentage of *bharat* was no more. Were we to give half the attention to *gaorani* that the Berars gave to short staple, there is no doubt the percentage would rise rapidly and the price of our cotton with it.

	Per cent.
Taking the ordinary Parbhani bazaar, unmanured <i>bharat</i> may be put at	31
<i>Gaorani</i> on ordinary deep soil in Parbhani at	27.5
and mixed <i>kapas</i> during the past season	29

Another reason why the ryot believes that Khandesh produces a great deal more is that he may get three bags from an acre while only two similar bags will be filled with *gaorani*. They never tried the weight nor look into consideration the silkiness of the staple cotton and the woolliness of Khandesh and that therefore the same weight of *gaorani* would occupy a smaller space.

The first task set before the Department of Agriculture was the question of cotton deterioration in the State. Jalna grew practically unmixed Khandesh and the Indian mills refused to accept anything from its neighbourhood. Parbhani was fast being ruined by admixtures and in consequence was being deserted by mill agents and though the cotton grown around Nander was pure staple, Khandesh was being railed from Jalna and Parbhani and brought in cart-loads from the south to get the stamp of the town or be mixed with the local *rui* to be sold as pure. As had been foreseen, Nander is now being avoided by the mills, and only Umri, Karkheli and Bhensa are visited when staple cotton is required.

Starting with small farms to obtain seed (for even Karkheli has an admixture of three per cent of a staple cotton called *nambhri* that has no strength of fibre) some ryots of Parbhani were persuaded to grow selected seed of staple cotton on the condition that the Department would purchase the *kapas* at market rates, gin and press it, and give them the profit, if any. In the meantime the Parbhani *sahukars* had carefully selected mixed *kapas* and pure Khandesh and representing the former as pure staple did a considerable trade in mixed.

They were agents for certain mills and purchased on their behalf. They saw that the entrance of the Department into the business of growing and selling unmixed staple would harm them and though last season but one, only the produce of 2,000 acres was to be dealt with, they opposed us. Leaving the field to us as the only sellers of unmixed staple in Parbhani not only meant a death blow to future transactions with mills but stamped them as having cheated the mills they dealt with for years. The manner in which credence was given by mills to the statements of agents prompted by *sahukars* during the last season was remarkable.

To return to the struggle of 1915-16: the Parbhani Marwaris learning that we would purchase the *kapas* grown from Government seed with the intention of selling the *rui* to the mills, raised the market price of *kapas* beyond paying rates as they believed. We gave the average price and gained sufficient by the sale to more than satisfy the ryots. They said that correct weightments alone had given them a profit of more than Rs. 5 per *khandi* of 240 seers and the absence of all deductions had added considerably to their gains. When, later, a profit was distributed, the news spread far and wide. The abnormal prices ruling in the market precluded all possibility of profits on the part of Marwaris unless they cheated the ryots at the scales and this they did without any scruple of conscience and so glaringly that further arrivals in the Parbhani market soon ceased and the carts from the surrounding villages passed Parbhani by on their way to Sailu and Purna. Luckily our opponents were not far-seeing people or they would have risked a small loss to cause a complete failure in the business of the Department. An agreement had been entered into by local ginners and merchants that the wishes of Government should be respected and no watering allowed. Having ruined their own market what easier than to cast the blame on the Department? Ginners had suffered, they said, because watering was not allowed in Parbhani and so the cotton was carried to Purna and Sailu where watering was openly carried out. Who would ask if *kapas* prices at these places were as high as at Parbhani? Everybody would agree that the complaint was reasonable and that the Department of Agriculture was to blame.

The ryots, as stated before, were satisfied that *gaorani* paid and instead of 2,000 acres, 38,000 were placed under pure staple cotton seed last season. To purchase *kapas* sufficient to produce 7,000 bales of *rui* was not the work of this Department. At rates which were given this year it meant a turnover of at least fifteen or sixteen lakhs. It was consequently necessary with the view of obtaining purchasers to explain to the millowners of Bombay the necessity of buying *kapas*, not *rui*, if the growth of staple cotton was to spread. A number of gentlemen interested in the textile industry promised in the kindest manner to aid in the "good work" as they termed it. The one thing necessary for success was a higher price for staple than for Khandesh *kapas*, and the limit expected was at least Rs. 10 per *khandi* of *kapas* of 240 seers, since at a public meeting to discuss the watering question held in the office of the Director-General of Revenue, Hyderabad, the Agent of the Currimbhoy Mills stated that was the price he was willing to pay. At Sir Currimbhoy Ibrahim's office, however, they said they would not be in the market if cotton reached the price they expected this season. It appeared that the mills would back the undertaking and that the question of spreading our indigenous *gaorani* all over Maharashtra was practically solved. But the Marwari had not been reckoned with, nor his power over the Rs. 50 clerks sent to buy lakhs worth of cotton for millionaire millowners, nor could it be imagined what stories emanating from these agents would be believed by the managers of such thriving business concerns.

Hyderabad.]

Mr. JOHN KENNY.

[Continued.]

A very plain statement of the case could be made if only the letters exchanged with various mills were copied *verbatim*. For obvious reasons this line has not been taken.

Judging from former years, it was expected cotton would mature in Parbhani about the first week in November and in Jalna ten days, later, so millowners were advised to send their agents to Parbhani about the tenth of the month and to Jalna about the 20th. Unusually late heavy rains followed by hot days ripened the crop earlier. Before the 10th at both stations a fair number of carts had come in. It had been arranged that the ryots should bring *gaorani kapas* to Mr. Olcese's factory in Parbhani and to Mr. Pudumjee Pestonjee in Jalna, as the peasants had brought their goods to these places the year previous and were very pleased with the weightment of the *aratyas* who undertook the work.

Letters had reached the Department about dissatisfaction among the Marwaris, but that was to be expected. As, however, telegrams blaming the Department had been sent to the Director-General of Revenue and the date had arrived when mill agents were to be expected, the Talukdar was requested to call a meeting of the discontented so that their complaints might be heard. The meeting was held on 13th November.

The grievances formulated were the following :—

- (1) Instead of selling the *kapas* grown from Government seed in the cotton market it was taken to Olcese's factory.
- (2) Mill-owners from Bombay had been invited to Parbhani to purchase *kapas*.
- (3) The sole right of ginning had been given to a special firm.
- (4) Samples asked for were not given at first.
- (5) The rate paid for *gaorani* was less than the *bharat* rate.

The following were the Director's replies :—

- (1) It was necessary, in order to avoid the mixing of seed, to have the *kapas* sold at some place where Government officials could watch, where it was taken and secure the seed unmixed. The Olcese factory was very near the cotton market and had served the purpose last year.
- (2) There was no harm in calling to the market people who would give a high price for pure long staple and thus encourage the spread of its growth.
- (3) The sole agency for purchase had not been given to any merchant and they had copies of the circular which would prove this.
- (4) Even if it were true that subordinates of the Department had at first refused samples to local merchants, the latter admitted they had later got all the samples they required.
- (5) The rate given to ryots was the average market rate till the auction should take place when the profit obtained would go to the ryots. Government did not intend to purchase cotton this year but had bought in the carts that arrived before the mill agents had reached Parbhani, as the farmers had brought in loads earlier than was expected.

The *sahukars* present admitted in writing their complaints were groundless and stated they were made owing to a misunderstanding.

It was merely a truce, however. The first day's auction brought bids beyond expectation. It is true the difference in favour of *gaorani* was not quite the Rs. 10 H. S. wanted but considering the very high price of mixed *kapas* Rs. 8-12-0 per *khandi* of 240 seers was not bad. The mills were interested and their agents were on the spot not to buy *rui* any longer but *kapas* direct from the ryots.

Had there been independent responsible persons to represent the mills, no difficulty would have arisen, but clerks on Rs. 50 a month and less could not long remain out of the hands of the Marwari *aratyas*. According to one very large concern, the *aratya* is not the buyer but merely does the calculations for the agent and arranges terms of payment on the spot. It is scarcely credible that the agents of various mills in Bombay, Sholapur, Madras, Ahmedabad and Nagpur would combine to disobey the orders received not to buy pure and mixed *kapas* at the same price. These poorly paid clerks were absolutely dependent on the Marwari *aratyas*. The effect was soon patent. By 17th November the price in favour of pure *gaorani* had sunk to Rs. 2-4-0, on 18th rates were level and on 19th a lower price was offered for staple than for mixed *kapas*. It had to be bought in. A letter to the Millowners' Association, Bombay, stating how matters stood at Parbhani brought the reply that a number of members were not buyers of mixed *kapas*. How little was known of the action of their agents appeared from the fact that one mill spoke of market *gaorani* as opposed to that grown from Government seed and had to be informed there was nothing but mixed *kapas* on the market except what Government guaranteed as grown from pure seed distributed by the Department of Agriculture.

The *kapas* bought in at Rs. 91-12-0 was afterwards damaged by the rain but sold three days later at the price paid for it, which happened to be the rate of mixed *kapas* that day.

Every suggestion of the Marwari *aratyas* of Parbhani was echoed by the mills for which they were buying, thus proving that the clerks who acted as mill agents were worse than mere figure-heads, being actual tools in the hands of wealthier and clever local dealers.

One of the most prosperous mills said the low price offered for pure staple was due to the auction system adopted. The fact is both in the cotton market and at Olcese's not far away, the same system had been in force for years, *viz.*, the fixing of the rate by a public auction.

Another point of advice was that the Department should sell the pure staple at Rs. 2 above the mixed rate and it would find ready purchasers. This would have placed us in more than one difficulty: to whom should it be sold, as there were a number of mill agents? Why should the auction system in vogue for years be broken through? And how far would the ryots be satisfied that we have tried to get them the best price, somewhere near the difference between mixed and pure staple they had a right to expect? *De facto* when an outsider came in to buy, the price frequently rose Rs. 4 above the market rate in the absence of practically any competition. (It was a repetition of what the *aratyas* had suggested in Parbhani.)

One mill alleged that the low price of *gaorani* was due to the fact that mills had to buy mixed stuff for their daily requirements as there was not enough pure staple, and on the heels of this was the further excuse that, having purchased enough staple, mills did not care for more. The call was from Parbhani, the echo came from across the border. The two statements are contradictory, nor can either alone hold good. If there was not enough to go round (and it was only a question of a few thousand bales among hundreds of mills) those anxious to grow staple could lose very little in paying a high price. If the mill agents had refrained from bidding, it would have been bad enough, but one agent offered Rs. 6 per *khandi* less for staple than for mixed *kapas* and the Department had to buy in the arrivals that day. If millowners ordered purchases of staple and *aratyas* were not the ruling factor in the market, why were such offers made?

Hyderabad.]

Mr. JOHN KENNY.

[Continued.]

Another difficulty was, it did not pay commercially to bid above mixed. This was said by a firm that paid Rs. 92-12-0 per *khandi*. Yet another concern paid Rs. 103 when mixed had risen to Rs. 99 and there were practically no competitors in the field.

It is to be expected that independent agents will give at least correct market rates. Even this was not done and the object was to prove the impossibility of buying staple.

To one mill it was reported that the outturn of *rui* was 25 per cent. less than that of mixed ! To the credit of the firm in question it must be said they saw the absurdity of the statement but it was one sedulously created and nurtured all round Parbhani for export purposes, even if it did not always take the same grotesque shape.

The question of percentages has been pretty carefully considered by the Director. From admissions by merchants who brought it as a subject of complaint against the Department *gaorani rui* was 27-6 per cent. or fifteen over *Karkheli*. Khandesh was 31. Owing to the very unfavourable season the percentage of *rui* was low in both species of *kapas*. The difference, therefore, was 3-4 per cent. and with this figure very fair calculations can be made. Reference to this point will be made later when the question of price will be treated. Though staple rose to Rs. 103 later in the season, the representative of an Ahmedabad mill offered Rs. 91-8-0 on 25th November when the market price of mixed was Rs. 93-4. Was this man acting for his mill or was he under the thumb of the local combine of Marwari *aratyas* ?

The very plain and open talk among the Marwaris and the almost instantaneous re-echo of their suggestions by the mills they dealt for were significant. One brilliant plan was that no pure cotton should be grown but that every year seed bought at Karkheli and Umri might be distributed among the ryots so that, in course of time, the country would gradually be covered with staple cotton. This was mooted in Parbhani ten days before it came back from a mill. There were a few points either forgotten or intentionally not considered. Why should the ryots accept the *gaorani* seed if they were not to get a higher price for the *kapas* ? And if the amount of Karkheli seed was increased yearly, was there any likelihood of a decrease of Khandesh ? It was just what suited the Marwari *aratyas*. They would save their face before the firms they were dealing with and explain they had supplied the purest staple procurable, whilst the chance of admixture would be greater. They themselves admit the usual Parbhani mixture is fit to spin only 16s. or at most 20s. It is passing strange that the mills cannot distinguish the stuff, palmed on to them as staple, from *gaorani* that spins at least 40s.

One company gravely stated that mills required to mix cottons. This is common knowledge, but the mixings are done in the mills to suit their requirements and not in the up-country bazaars. Of the various tricks of the trade so well known in other parts of India the Hyderabad ryots were totally ignorant or never put them into practice. It is to be feared they have since learnt some lessons from *sahukars* and mill agents. When for pure staple no offer was made them in Jalna the moment the *kapas* was found unmixed they went home, mixed their *kapas* with an equal weight of Khandesh grown by a neighbour and sold the stuff without difficulty in the market.

If the offer of higher prices for mixed *kapas* than for pure *gaorani* was a scandal in Parbhani it was far worse in Jalna where Khandesh is universally grown and a Khandesh that certainly does not rank as fine. If the mill agents were not implicated, it would be worth knowing why pure staple was invariably refused soon after the season began. How mills could possibly accept Jalna bazaar stuff is another little difficulty that might engage the attention of managers, the more so as such high rates were paid, rates far above the quotations of the Bombay market.

It is true that certain millowners who had paid prices for *gaorani* far above mixed Parbhani found the rates well above Bombay quotations, but how did mills accept mixed stuff from which 20s. often only 16s. could be spun, for exactly the same prices ?

And these mill agents through their *aratyas* stopped *gaorani* carts outside the town on the way to the market and gave high prices but declined to purchase the same once they entered Olcese's compound.

The reason was simple. It was to be mixed. The offer of high prices is an old dodge so well known to the peasant that, when no decent offer was made, they asked the Department to purchase their stocks at Rs. 2 and even Rs. 3 below the market rate, provided the weighments were made in the Olcese yard, confident that they would get a better return than the Marwaris would give them at the higher prices. In the town a scale allowance of six seers per bag was the minimum demanded, whatever the size or weight of the bag. There was no check on the amounts purchased for the mills as the agents were hand and glove with the Marwaris and manipulations of figures showing *rui* percentages were easy. Unfortunately they were believed. In fact the reliance on reports from Parbhani was such that one mill manager demanded from the Director an explanation of his statements regarding market rates which did not agree with information he had received from his agent. One would have thought the demand for an explanation should have been made to his agent. However, he was probably satisfied when Mr. Olcese's Manager supplied him with the rates that prevailed till the date of his letter.

A further proof of the combination to break down any chance of success we might have with pure *gaorani* was the fact that the Department's own *aratya* in Jalna bought two cart-loads in the market one day and offered Rs. 2 less than the Jalna-Khandesh cotton rate for the 150 *khandies* of *gaorani* lying in his yard on our account ; and he was buying for two mills.

It was plain therefore that every effort was made to ruin the work the Department had been doing for the last four years and that by the mill agent under the thumb of the *aratya*.

When matters had come to this pass a Nagpur mill saved the situation. The agent never allowed a cart-load of pure *gaorani* to go at mixed rates but paid Rs. 2 to Rs. 4 per *khandi* more than market price.

Unfortunately that mill was not represented at Jalna.

All hope of reviving the growth of indigenous *gaorani* in that *taluk* must be given up for the present.

In Parbhani, however, there is every hope of covering, not only the *taluk* itself, but most of the other *taluks* of the district with pure staple.

One point alone remains to be settled. Certain mill managers point out that the purchase of *gaorani* and Khandesh *kapas* at the same price means Rs. 50 per *khandi* of lint of 784 lbs. in favour of long staple and that they cannot afford to pay more, but Liverpool quotations in the *Times of India* of 5th February show Fine *Oomras* 8-45 against Fine Broach 9-90.

The peasant sees no earthly reason why he should grow long staple and get nothing more for the extra quality of *kapas*. The mills say plainly they are run on business and not on altruistic principles. Do they expect the ryot, who will not benefit by long staple, to grow it merely for the benefit of the millowner ?

Hyderabad.]

Mr. JOHN KENNY.

[Continued.]

All the world over immense sums are spent by Governments to grow staple cotton. In Hyderabad territory *gaorani* is indigenous, equal in staple to American Uplands, the lint is silkier than anything found on this continent and the fibre is the strongest of all Indian cottons. The percentage of *rui* can be increased very considerably in course of time, but if the peasants are to wait for a better price till the percentage equals Khandesh not an acre of *gaorani* will be left in Mahratwada.

To sum up the result of the year's work, the Department has to postpone any attempt at re-introducing *gaorani* into Jalna next season, for pure staple was absolutely refused by mill agents there under the direction of the local Marwaris ; in Parbhani, however, owing to the action of one or two mills so many ryots saw the benefit of growing pure *gaorani* that the *taluk* itself will be covered with unmixed seed in the coming year and very probably the adjoining *taluks*, if not the whole district. A minimum of 75,000 acres may be expected in spite of all the difficulties of the last season, possibly 600,000 acres in the whole district. There can be no question of mixed *kapas* in the Parbhani market. If only reliable agents come up next year to give a price for staple *kapas* proportionately higher than the neighbouring Jalna stuffs and mixed stuffs, the spread of *gaorani* is assured and Indian mills can be certain before long of a supply annually of 500,000 bales of the best stapled silkiest and strongest cotton in India.

On the decision of Indian millowners depends the continuance and spread of the growth of staple cotton or its early extinction in His Highness the Nizam's Dominions.

A comparative statement of prices reduced to the Parbhani *khandi* in Hali Sicca rupees is appended.

Hyderabad.]

Mr. JOHN KENNY.

[Continued.]

ANNEXURE IV.
Statement showing the rate of kapas at various places on different dates from 28th Azar to 13th Isandar 1326 F.

Dates.	JALNA		SAILU.	PARBHANI.		PURNA.	NANDER.	UMRI.	KARHELI.	REMARKS.
	The rate of mixed kapas per khandi or palla=140 seers reduced to 240 seers.	The rate of guarani kapas per khandi or palla=140 seers reduced to 240 seers.		Rate of mixed kapas per khandi=240 seers.	Rate of guarani per khandi=240 seers.					
1	2	3	4	5	6	7	8	9	10	11
2nd November 1916	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
3rd "	.....	.....	.....	82 0 0	.....	79 4 0	.....	.....	.....	
4th "	.....	.....	.....	82 0 0	.....	80 0 0	.....	.....	.....	
5th "	.....	.....	.....	81 8 0	.....	.....	.....	.....	.....	
6th "	.....	.....	.....	81 4 0	.....	78 0 0	.....	.....	.....	
7th "	74 7 11	74 7 11	.....	80 8 0	.....	79 0 0	.....	.....	.....	
8th "	78 7 11	81 15 11	.....	81 0 0	.....	78 0 0	.....	.....	.....	
9th "	82 8 0	81 15 11	.....	82 8 0	.....	80 0 0	.....	.....	.....	
10th "	81 15 11	81 15 11	.....	83 8 0	.....	81 8 0	.....	.....	.....	
11th "	79 15 11	79 15 11	.....	85 0 0	.....	82 8 0	.....	.....	.....	
12th "	78 7 11	78 7 11	.....	84 8 0	.....	82 0 0	.....	.....	.....	
13th "	75 0 0	75 0 0	.....	86 8 0	.....	80 0 0	.....	.....	.....	
14th "	75 0 0	75 0 0	.....	87 0 0	.....	84 0 0	.....	.....	.....	
15th "	78 7 11	78 7 11	.....	88 0 0	.....	84 0 0	.....	.....	.....	
16th "	79 0 0	79 0 0	.....	87 0 0	.....	83 12 0	.....	.....	.....	
17th "	77 15 11	77 15 11	.....	87 0 0	.....	86 0 0	.....	.....	.....	
18th "	78 7 11	78 7 11	.....	86 8 0	.....	85 12 0	.....	.....	.....	
19th "	81 1 1	81 1 1	.....	87 0 0	.....	85 12 0	.....	.....	.....	
20th "	82 8 0	84 0 0	.....	87 0 0	.....	89 12 0	.....	.....	.....	
21st "	82 8 0	82 8 0	.....	89 0 0	.....	95 0 0	.....	.....	.....	
22nd "	84 15 11	84 15 11	.....	91 0 0	.....	97 4 0	.....	.....	.....	
23rd "	87 10 7	87 10 7	.....	91 12 0	.....	87 0 0	.....	.....	.....	
24th "	84 7 11	84 7 11	.....	93 4 0	.....	80 0 0	.....	.....	.....	
25th "	.....	.....	.....	94 12 0	.....	.....	.....	.....	.....	
26th "	.....	.....	.....	93 12 0	.....	.....	.....	.....	.....	
27th "	91 0 0	91 0 0	.....	94 4 0	.....	88 0 0	.....	.....	.....	
28th "	96 8 0	96 8 0	.....	95 0 0	.....	88 8 0	.....	.....	.....	
29th "	92 8 0	92 8 0		94 8 0		84 4 0				
30th "	92 0 0	92 0 0		95 4 0		84 to 88				

*Date of auction by the Department.

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Mr. JOHN KENNY.

[Continued.]

Dates.	JALNA		SAILU.	PARBHANI.		PURNA.	NANDER.	UMRI.	KARHELI.	REMARKS.
	The rate of mixed kapas per khandi or palla=140 seers reduced to 240 seers.	The rate of guarani kapas per khandi or palla=140 seers reduced to 240 seers.		Rate of mixed kapas per khandi=240 seers.	Rate of guarani per khandi=240 seers.					
1	2	3	4	5	6	7	8	9	10	11
1st December 1916	93 0 0	93 0 0	.....	98 4 0	101 4 0	98 to 101	95 1 11	98-8 to 99	97 8 0	
2nd "	92 0 0	92 0 0	.....	99 0 0	103 0 0	97 12 0	98 3 8	100 to 101	98 8 0	
3rd "	92 0 0	92 0 0	.....	97 8 0	99 4 0	100 4 0	97 13 10	100 0 0	99 0 0	
4th "	89 0 0	89 0 0	.....	96 0 0	99 8 0	98 4 0	97 5 0	100 0 0	99 8 0	
5th "	88 5 3	89 0 0	.....	94 8 0	97 8 0	96 8 0	97 0 8	100 0 0	99 0 0	
6th "	89 0 0	87 0 0	.....	92 4 0	96 0 0	94 0 0	95 3 6	99 0 0	98 8 0	
7th "	87 0 0	87 0 0	.....	93 0 0	96 0 0	93 0 0	93 10 6	95 to 98	97 8 0	
8th "	81 15 11	81 15 11	.....	91 0 0	95 8 0	92 0 0	93 4 8	85 0 0	83 8 0	
9th "	79 0 0	79 0 0	.....	88 4 0	90 4 0	87 0 0	89 4 3	85 0 0	85 0 0	
10th "	77 15 11	77 15 11	.....	91 0 0	92 12 0	92 8 0	88 8 7	85 0 0	85 0 0	
11th "	79 0 0	79 0 0	.....	87 4 0	90 8 9	91 12 0	85 3 10	85 0 0	83 8 0	
12th "	77 0 0	77 0 0	.....	88 12 0	92 8 0	90 4 0	86 5 5	82 8 0	82 0 0	
13th "	81 15 11	81 15 11	.....	90 8 0	94 0 0	88 8 0	84 10 1	85 0 0	84 0 0	
14th "	83 0 0	83 0 0	.....	91 4 0	94 0 0	88 8 0	88 4 2	85 2 0	84 0 0	
15th "	81 15 11	81 15 11	.....	92 0 0	94 12 0	87 8 0	87 12 10	85 0 0	84 8 0	
16th "	.....	.....	.....	89 4 0	92 8 0	87 0 0	90 0 0	85 0 0	84 8 0	
17th "	.....	.....	.....	88 4 0	85 8 0	85-8 to 86-8	89 4 3	83 8 0	82 8 0	
18th "	.....	.....	.....	83 4 0	83 8 0	81 0 0	83 6 7	82 8 0	81 8 0	
19th "	.....	.....	.....	80 8 0	81 0 0	80 0 0	81 15 2	82 8 0	81 8 0	
20th "	.....	.....	.....	81 0 0	82 0 0	80 8 0	82 5 0	83 8 0	82 8 0	
21st "	.....	.....	.....	81 0 0	83 0 0	80 8 0	84 3 9	85 8 0	83 8 0	
22nd "	.....	.....	.....	82 0 0	85 0 0	85 0 0	85 0 11	85 8 0	83 8 0	
23rd "	.....	.....	.....	82 0 0	86 4 0	83 to 85	85 15 8	85 8 0	85 0 0	
24th "	.....	.....	.....	81 4 0	84 8 0	83 0 0	87 8 0	85 8 0	85 0 0	
25th "	.....	.....	.....	81 to 82	86 to 87-8	82 to 84	88 8 7	85 8 0	85 0 0	
26th "	.....	.....	.....	81 4 0	87 8 0	84 12 0	84 14 0	85 8 0	85 8 0	
27th "	.....	.....	.....	81 to 82	85 to 86-4	86 to 87	87 9 5	85 8 0	85 8 0	
28th "	.....	.....	.....	81 0 0	85 0 0	86 to 87	.....	85 8 0	85 8 0	
29th "	.....	.....	.....	78 to 80	82 0 0	88 0 0	85 15 8	.....	.....	
30th "	.....	.....	.....	78 to 80	81 to 82	84 0 0	84 8 2	.....	.....	
31st "	.....	.....	.....	.....	.....	83 0 0	84 8 2	.....	.....	
1st January 1917	.....	.....	.....	.....	.....	83 0 0	85 3 10	.....	.....	
2nd "	.....	.....	.....	.....	.....	80 0 0	87 2 7	.....	.....	
3rd "	.....	.....	.....	.....	.....	.....	82 10 11	.....	.....	
4th "	.....	.....	.....	.....	.....	.....	85 9 9	.....	.....	
5th "	.....	.....	.....	.....	.....	.....	84 2 4	.....	.....	
6th "	.....	.....	.....	.....	.....	.....	81 3 6	.....	.....	
7th "	.....	.....	.....	.....	.....	.....	81 15 2	.....	.....	
8th "	.....	.....	.....	.....	.....	.....	82 11 8	.....	.....	
9th "	.....	.....	.....	.....	.....	.....	83 6 7	.....	.....	
10th "	.....	.....	.....	.....	.....	.....	83 0 9	.....	.....	
11th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	
12th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	
13th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	
14th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	
15th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	
16th "	.....	.....	.....	.....	.....	.....	.....	.....	.....	

Hyderabad.]

Mr. JOHN KENNY.

[Continued.]

Mr. JOHN KENNY called and examined.

2992. (President.) I have been Director of Agriculture in the Hyderabad State for five years. I trained myself in agriculture. I had a share in the profits of the Presidency Manure Works managed by Messrs. Parry and Company, Madras. I studied the subject in the fields of the ryots. I read up agriculture principally from German works and I thought it better to go about among the ryots and get my experience in that way. I have not had any chemical training.

2993. My staff at present consists of two demonstration superintendents and four farm superintendents. One farm superintendent is especially employed on cotton operations, i.e., on the distribution of seed, and has twenty supervisors under him. They attend to the distribution of seed and the elimination as far as possible of foreign cottons from the fields to which we have distributed special seed. At present I have two farms for cotton, one at Parbhani for *gaorani* and the other which was started this year at Mahbubnagar for the spread of Cambodia. I have no farm for Westerns as there has not been any danger of its being mixed with anything else.

2994. I started *gaorani* with pure seed from Karkeli in which there was an admixture of about three per cent. of long staple, weak fibred cotton called *nambhri*. I do not quite know what that cotton is but I think it must be Cambodia weakened in staple owing to regar soil. I have grown Cambodia on such soil and I have found that it is inclined to become weak like *nambhri*. I at first intended to spread cotton seed from our farm at Parbhani but I soon found that the demand was too great. I also found that the mere change from one part of the country to the other appeared to improve the percentage of lint. The ginning percentage of cotton at Karkeli is 25 to 26 per cent. but the same cotton grown at Parbhani, according to the Empress Mills at Nagpur, gave 29 per cent. this year. *Gaorani* is really our indigenous cotton; before the advent of the railway in the Godavari Valley it found its way to the marts in Hinganghat and Wardha. I am not quite certain how Khandesh cotton got into Hyderabad originally but I suspect that the high percentage of *rui* obtained in the Berars and the heavy crops obtained there induced the ryot to introduce the seed. When I came here, Jalna cotton was already ruined, Parbhani was on the brink and Nander was getting a bad name. We had only Umri, Karkeli and Bhainsa left. Bhainsa is off the railway line while Umri and Karkeli refused to take any admixtures. I began at Parbhani to improve the Parbhani cotton and to stop the further advance of Khandesh cotton. The cotton round about Nander is still pure in the field. The carts come by road from the Bir and Bidar districts and bring Khandesh cotton there and mixtures are made and sold as staple cotton.

2995. I tried to improve the percentage on the farm and managed to get 32 per cent. of *rui* by the use of phosphates. The bolls remained the same but the seeds grew visibly smaller. We have been trying experiments on the Parbhani farm to ascertain whether *gaorani* gives less outturn than Khandesh cotton. So far we have found that what seems to be the general belief amongst the ryots that it does is not really correct. At the same time, my supervisors were asked to ascertain what differences there were between the outturn of *gaorani* and Khandesh in the cultivators' fields in the whole of the Parbhani taluk. According to their reports, Khandesh does not give a larger crop than *gaorani*. The Khandesh bolls mature all at the same time. I have been round the country for three months and I have walked miles and miles over the fields and I have not been able to find an open boll and a flower together on a Khandesh plant at the same time. The bolls all open out together and the whole crop is over in two pickings. In the case of *gaorani* there are three pickings. So the appearance of a field of *gaorani* is quite different from that of a field of Khandesh. The Khandesh field appears to have a great deal more cotton in it. Further, Khandesh cotton is woolly and cannot be compressed into so small a space as the silky *gaorani* and so many of the farmers are under the impression that they get a bigger crop, say three bags of Khandesh against two of *gaorani*. I decided upon *gaorani* as the best cotton even when the market price of *kapas* was below that of Khandesh. I saw that it was a good cotton and it ought to pay. The general complaints against *gaorani* cotton are two. The first is that the produce is not as great as that of Khandesh and secondly, that owing to the difference in the percentage of *rui* obtained, it does not pay to give a higher price for the longer staple. As regards the latter, I have worked out the figures in my last letter in which I pointed out a mistake in the previous letter. I have since worked the matter out more simply taking the percentage of *rui* to *kapas* as 29 per cent. for *gaorani* the figure obtained this year by the Empress Mills, Nagpur.

At 32 per cent. 1,225 seers of <i>kapas</i> from neglectum at Rs. 45 (pre-war prices) for 240 seers	Rs. A. P.
At 29 per cent. 1,351.5 seers of <i>gaorani</i> <i>kapas</i> at Rs. 55	229 11 0
Difference in price of <i>kapas</i> sufficient for one <i>khandi</i> of 784 lbs. of <i>rui</i> allowing a difference of Rs. 10 per <i>khandi</i> of 240 seers of <i>kapas</i> and leaving out the price of seed which the ryot does not get	309 11 0
	80 0 0

Deducting the value of seed the difference with a Rs. 10 difference in price of *kapas* is only Rs. 75, still falling short of the difference in market price of *rui*. The trouble with the figures one gets from the mills is that they work out that so much Khandesh *kapas* is required for so much *rui*, and take ginning charges and pressing charges and so make a long business of it. The ryot has nothing to do with these charges. He is merely concerned with selling his *kapas*. If a man wanted to sell 2,450 lbs. of *bharat* *kapas* sufficient for a *khandi* of 784 pounds of lint at Rs. 45 per *khandi* of 240 seers of *kapas*, the price he would get would be Rs. 229-11-0 roughly. He would have to sell more *gaorani* *kapas* to fetch the same amount of *rui*. With a ginning percentage of 29, he would have to sell 2,704 lbs. Now working that out at Rs. 10 more, i.e., Rs. 55 per *khandi* of 240 seers of *kapas* you get Rs. 309-11 a difference of Rs. 80. On one occasion I got Rs. 13-8 extra per *khandi* of *gaorani* *kapas*. I should have had a very good price throughout the season had it not been that the representative of the Nagpur Mills was not always present. When he was absent his *aratya* and 4 and at the end of the season it fell to eight annas because plague had broken out and the representative of the Nagpur mill was not there to attend to matters. This difference of Rs. 80 is not more than the difference between Khandesh and the ordinary price given for our *rui*. It is always at least Rs. 80 or thereabout. So I did not ask for a difference of Rs. 10 (British Government) per *khandi* of *kapas* but I asked for Rs. 10 Halli Sicca which is equal to Rs. 8-2. If the mills were to give that, then the question of staple cotton in this dominion is settled.

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2996. My only difficulty is this, that there is no financial agency except the *aratyas*. People in Bombay think that they get our *gaorani* cotton in their mills but they do not. They first ask for a sample; that sample is doctored and they get the bales of cotton answering to that doctored sample. No millowner comes round to see what his buyers are doing. The buyers are very poorly paid men, and in twenty-four hours, they are in the hands of the *aratyas*. The Empress Mills had their own purchaser last year who bought cotton for them but this year they had an *aratya* in the absence of the purchaser and he refused to bid anything above the price of Khandesh. After complaints from me, he made bids of anything between annas eight to Rs. 2 above the Khandesh price. If we had some agency to finance cotton on the spot, the *aratya* would have to be satisfied with his twelve annas per cent.

2997. That cotton is mixed and that scarcely any pure staple cotton goes down to Bombay has been proved this year. I wanted all the seed I could get and I promised to purchase it at the market rate for pure seed but I could only get 300 *khandis* of unmixed seed instead of 2,800 (allowing for a five annas crop). If we had reliable purchasers, who did not get into the hands of the *aratyas*, staple cotton would spread like the wild fire, but only on one condition, namely that *kapas* must be bought and not *rui*. However high the price that is paid for *rui*, it does not benefit the ryot; it goes into the hands of the middlemen. I have repeatedly told the millowners of Bombay and Ahmedabad that it is absolutely necessary for them to buy *kapas* if they want to spread long staple cotton.

2998. The Parbhani farm is 22 acres in extent and that for Cambodia cotton is about twenty acres. The Parbhani farm is all cotton but on the Cambodia farm castor for *eri* silk is also grown. We found however that it was hopeless to depend on a farm of the size of the Parbhani farm to distribute seed. Khandesh cotton was spreading so rapidly all over the country that I had to look elsewhere for seed and so I bought in markets where there was no Khandesh. I purchased seed either at Karkeli or Umri. I also bought specially selected seed from certain ginning factories at Nander where I was certain that there was no admixture. I first started with seed for 2,000 acres of *gaorani* on condition that I should buy the *kapas* at the market rate and give the cultivators any profit there might be. I did that for two years. The cotton was grown in a fairly compact block in the Parbhani taluk. The following year I covered 38,000 acres with *gaorani* of which 20,000 acres were in Parbhani and 18,000 in Jalna. In Parbhani, we were fairly successful although there was a combination against us but in Jalna the merchants absolutely refused to buy pure staple. As soon as they saw that it was pure, they said that they did not want the real State cotton. The result was that the whole of that cotton got mixed and as seed from 18,000 acres is sufficient for 200,000 acres, it meant that all that seed got mixed with the ordinary Jalna cotton and the result was that this year Jalna *kapas* ruled at the same price as Parbhani. It was satisfactory as far as the ryots were concerned but certainly not for the Department. The merchants refused to buy the cotton until it was mixed and then paid the highest price for it. This year I have purchased seed already for 260,000 acres, with perhaps enough for 40,000 more in view. That will cover three *taluks* in the Parbhani district. I bought the seed from Nander proper and in some of the villages that lie lower down, there is no admixture. There may perhaps be a little *nambhri* but no Khandesh.

2999. My original idea was that, in every district, there should be a farm, and that under the Director of Agriculture there should be at least two Deputy Directors one for the Maharawatwarra country and the other for Telangana. On the farms, there should be as little as possible of the introduction of exotics but the crops of the country should be improved as far as possible. It is true that I have introduced Cambodia into Telangana but I have introduced it into parts where cotton is not grown and principally as a crop upon waste-land. It is so hardy that it should grow on many hundreds of thousands of acres of waste land in Telangana. The present policy is simply to get back the original indigenous cotton. I have not made any experiments to speak of. It might be possible to get a cotton like Egyptian as a rotation with rice. The only difficulty would be that it might lead to a demand for a reduction of rates owing to less water being required. But I think it would be a very good thing to have a rotation for rice and the revenue might be made up by the spread of the cotton to the untitled lands adjacent to the tank watered crop. I forgot to mention I have made two very small trials on two other farms on about the worst soil in Alir where two years ago grass would not grow. I sowed Cambodia and I got from one and a quarter acres very nearly a thousand lbs. of *kapas*. It is not irrigated land at all but is near a canal. The sand thrown up from that has saved the soil which is anything but Egyptian soil. I also tried Cambodia on a quarter of an acre of land at Kamareddi, where we have a sugarcane farm, although the soil there was not suitable, being black soil. The crop has done fairly well. The present crop in Alir is a ratoon crop and the report I got a month ago was that the first pickings had given the farm superintendent Rs. 50 (Halli Sicca).

3000. For the spread of *gaorani*, the Government allow me from one and half lakhs of rupees up to three lakhs as *takavi* as I want it. My men go round from village to village and take a list of all those who require pure seed. The seed is distributed just before the sowing season so that it may not be used as cattle food. The Revenue Department collects the money when the *kapas* is sold.

3001. (Mr. Roberts.) I advanced enough Karkeli seed to cover 62,000 acres but owing to a rumour spread by the *sahukars* seed for about 10,000 to 14,000 acres was not sold. The rumour had some truth in it. Amongst the seed we purchased some had been wetted by the rain and had gone bad. It was sold as cattle food and the money was collected by us and not by the Revenue Department. It so happened that with the first rain a certain number of ryots put the seed into the ground. The soil swells when wetted and the result was that the seed was too deep to sprout above the surface. So a rumour went round that my seed was bad. My supervisors were sent from village to village and they actually dug it up and showed them that the seed had sprouted but could not get to the surface of the soil. Very little was lost in that way but it gave rise to the rumour that spread everywhere. Next year, I expect up to 300,000 acres. I have already got seed for 260,000 acres. I do not think that I shall have any difficulty in distributing the seed. Not very much seed is held in hand by the *sahukars*. *Takavi* will help considerably. If it were not for the *takavi* system, there would be a great difficulty. Our distribution of seed as *takavi* comes under the ordinary *takavi* rules. Payment can be made in instalments spread over five years. I intend to distribute seed in Parbhani and the three adjoining *taluks*, Jintur, Parthur and Pathri. I shall not go too close to the Central Provinces so that the seed will not get mixed there. My idea is to concentrate so as to get the crop fairly pure in one *taluk* before I go on to others. Next year we shall have seed enough for 3,600,000 acres. Last year I had fifteen supervisors on this work; they get Rs. 20 a month. This year I have got twenty. It would be pretty difficult to manage a bigger area with this staff as there is so much plague this year. I map out the *taluks*

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and give a certain part to each supervisor to attend to. He has to report to the cotton superintendent every week and these reports come on to me. I do not make arrangements for marketing the cotton.

3002. I have been to Bombay more than once to speak to the millowners and to the Indian Merchants Chamber and Bureau; I have pointed out to them that it is no use asking us for *rui*; they must come down and buy *kapas*. That is the only way in which they can spread long staple cotton. It does not matter to the ryot at all what the price of *rui* is. In Jalna, I had to buy a certain amount of *kapas* as there was no price offered for it. The State gave me the money to buy it. The first year I purchased the *kapas* from 2,000 acres. I had it ginned and pressed and I sold it and gave the profits to the growers. When the people saw that they got a profit and also that they got full weight, they were ready to take the seed. The next year there was a combination against me; the merchants refused to pay the price of even short staple *kapas*. So I had to buy it in myself. I did not do any more ginning and pressing but I sold it again in the market as soon as there was a price for it. Everything was noted down with the names of the growers and later on I distributed the profits among them. I could only do that for a very short time. I could not go into the market buying and selling. When there was no price offered for the cotton at all, I purchased it at the ruling rate of mixed cotton. Now I do not do any buying or selling. I simply ask the merchants to come and tell them that my men will guarantee the purity and staple of the cotton because they know from what villages it has come. This year I can guarantee without any trouble because I know that in certain *talukas* I shall have pure staple. The merchants have begun to come and purchase, as they express it, blindfold. Whole *talukas* will be covered with *gaorani*. Of course the *sahukars* will not leave me alone; they will try to thwart me by every possible means. We keep a record of every person to whom seed is given. My men are sure to see whether any other cotton comes in; they separate the *gaorani* carts from the others. They separate out the pure Khandesh, mixed Khandesh and the pure *gaorani*. I am glad to say that the prices this year were regulated by the prices of staple cotton but unfortunately for me although it was bought pure in the market, it was in many cases bought simply for admixture at the ginning factories. The *aratya* is the man who mixes the good staple with the short staple. As every millowner will tell you, the *aratya* is properly not a buyer but a commission agent. *De facto* he is the purchaser and it is he who mixes cotton and sends the mixed stuff to the mills. There is no doubt that the standard on which the cotton is bought—the *khandi*—varies a good deal from place to place but that does not interfere with purchases and sales. Formerly the auctions at Parbhani were kept open till 4 P.M. and the result was that by sunset a lot of the cotton had been weighed. Weighments were made then and the ryots sometimes could not get away till one in the morning. Heavy deductions were then made for dampness, dirt and the tare of the bags or scale allowance and the ryot, anxious to get home, had to take what was offered him. He simply cleared away at any cost. Last year it was agreed to hold the auctions at midday or 2 P.M.

3003. It would help considerably if weights were regularly checked. Another great point is the allowance for tare. It is often very heavy. At Parbhani, last year it was agreed to standardize it at six seers. The cultivator knows exactly the maund and *khandi* of his part. They may not be educated but they know that. If the weights were to be standardized it would only get the ryot into trouble. He would not understand the change. The Parbhani people would not understand the Nander *khandi*. I do not think you would be able for many years to come to get one standard for the whole of India. I have stated in my written evidence that the cultivator is done in weighing but that is not due to the fact that he does not know what the *khandi* is. That is due to the incorrectness of the scales, weights and allowances. I consider that they would get Rs. 2-8 more per acre if they could get correct weights and that is why I am so anxious that the mills should send out men who will give correct weights. The mills would not lose, as it is the *aratya* who makes the money by false weighments.

3004. The Karkeli cotton is fairly pure. It is the broad leafed-*gaorani*—small broad leafed plants very much like Westerns. Some plants of *gaorani* and of Khandesh cotton look absolutely alike and it is only when the flowers open that one can tell whether the plant is Khandesh or *gaorani*. Khandesh cotton is all white flowered. *Gaorani* is all yellow flowered. I have seen samples of *roseum* cotton brought in all the way from Berar. People have asked me why we are not introducing it. I have told them that it is the worst stapled cotton that there is and that it would deteriorate at once. As regards the question why if Khandesh is white flowered, it should not have the same ginning percentage as *roseum*: it does not follow because two plants have got the same coloured flower, their ginning percentage must be the same. It must be remembered that *roseum* cotton has been selected from the *neglectum* cottons and it has been carefully looked after for fifteen years. The white flowered cotton in the cultivators' fields only gins 32 per cent. There is another point, *viz.*, nothing improves or deteriorates so rapidly as cotton. If one reads the stories of the new cottons in America, one finds rapid deterioration everywhere. If the ginning percentage of *gaorani* were one point higher, it would beat all the *sahukars* out of the place. It was 26 originally and now it is 29. *Gaorani* is *indicum*—the same as *bani*. It is an extraordinary thing that as soon as you leave the Mahrattwari Country and go to Telingana, the same silky cotton goes down to half an inch in staple. The soil of the two tracts is different.

3005. As to the qualifications of my men working on cotton, they have none except that they have been doing the work for five years. The cotton supervisor knows nothing about cotton botanically but he knows it thoroughly from the trade point of view: his one aim is to stop Khandesh cotton coming in. Broad leafed and narrow leafed *gaorani* give the same yield per acre. The broad leafed *gaorani* is a distinct type but the narrow leafed is like Khandesh. It is impossible to distinguish them until the plant flowers. No attempt has been made to separate the constituents of *gaorani* and to test the different strains.

3006. I have been practically doing the work of the department single-handed. I believe that there is a great future for Cambodia in the southern portion of Telingana in soils which bear either very poor grain crops or none at all and that it will spread and will pay there. There is no commercial area under it at present. I made the mistake originally of spreading it too far. I gave out seed in various directions and although I gave instructions that it should be grown as a *kharif* crop on red soils, the people invariably grew it on black soils as a *rabi* crop with the result that it was a failure. Wherever they followed instructions and grew it on red soils it was a success. It is a promising line of work and will bring new areas under cotton.

Statements have been made that there is very little crossing in the fields but I have seen any number of crosses and have found that the American variety crosses with Indian varieties. Cambodia is a hairy leafed plant and our *nambhri* variety is the same. It is difficult to distinguish between Cambodia and *nambhri*.

3007. (Mr. Wadia.) It would be a good thing to stop the transport of *kapas* by rail from the Berar or Khandesh to Hyderabad but it would interfere to some extent with legitimate trade to prevent its transport from one part of Hyderabad territory to another. For instance, the Empress Mills has a ginning factory

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at Umri. They buy *kapas* at Nander and Parbhani and want to gin it in their own ginning factory. It would be rather hard to make difficulties in the case of one of our best helpers. The cotton could be transported by road. The State authorities have already thought of stopping cotton going in the opposite direction to tracts for which it is really intended. Jalna cotton comes down to Nander to get the Nander stamp. If cotton is sent from Parbhani to Nander, it is probably in order to get the Nander stamp. But if it is going to Umri, it is going for ginning by the Empress Mills. Prohibition of the transport would mean interference with certain mills which have got their own ginning factories up-country. That is the only argument against it. There cannot be ginning factories in every place, *kapas* must therefore be moved by rail, and the proposed rule would stop the very merchants who help us the most. Suppose people from Lancashire came here; they would trade in every *mandi*; but they would be prevented from railing their *kapas*. Nobody would help our market better than they because they would take exactly what they wanted and they would not be satisfied with everything offered them. I was originally in favour of the proposal but when I saw the difficulties in the way, I came to the conclusion that looking to the future, it might possibly do harm to our cotton later on and that the ryots might suffer because good purchasers might be kept away. I am merely putting the difficulties before you. I would like to put a stop to Jalna cotton coming to Nander and being sold as Nander cotton and ruining our reputation. There is nothing to prevent Khandesh cotton being brought in to be mixed with *gaorani*; if the millowner wants our stuff, he can distinguish the *kapas* by its feel in the dark.

3008. My whole idea is to do away by any means with all middlemen who cheat the ryot and the millowners for the simple reason that the millowners never see our real *kapas*; they see only a mixture. Do away with the *aratya*; don't let him ruin the name of the country. If you have a reliable purchaser, all is well. At present there is no financing agency and therefore everything is in the hands of the *aratya*. I do not say that we can do away with the middlemen altogether but do not let him interfere with the trade. Let him be a broker pure and simple but do not let him interfere in such a way that the ryot suffers, the millowners suffer and the country suffers. It is the easiest thing in the world to prevent mixing, provided the millowner makes sure that he is getting what he wants. When you prevent watering to a very great extent, you prevent mixing. Any one can distinguish mixing in *kapas*. If the millowners send their agents here the whole question is solved, if they buy their *kapas*, it is impossible to make a mistake. I have never had anything much to do with *rui* and I could possibly not distinguish a mixture of ten to thirty per cent. of *rui*. But I could certainly tell a mixture of *kapas* in the dark. I repeat once more that the whole question of staple cotton depends upon the millowners. They could cover the country with staple cotton provided they see that they get what they want. A purchaser, say, on Rs. 300 a year, who has to deal with the lakhs and lakhs of rupees which pass through his hands within three or four months, must make money. It is human nature. Do the mills know what they want? If they did, they would surely buy it.

3009. I cannot say whether in the course of time the mills will consume the whole of the staple cotton grown in India. During the war, higher counts have been spun all over the place, at least so far as I can see from their reports.

3010. I do not sell the cotton at the auction, it comes into the market and is auctioned there. I do not interfere. There was no object in our counting the number of carts because we are no longer the purchasers either of the *kapas* or of the *rui*. All that we did was to see that the carts were placed on one side in the market and bid for. The number of carts actually bid for might not tally at all with the total quality of cotton grown from our seed for this reason that when, for instance, Parbhani cotton had gone to a certain height, the market at Purna went to Rs. 20 higher so, in order to get a premium, the cultivators went from market to market and sold wherever they got the highest price. But we got a six-anna crop on say between eight to ten thousand bales, *i.e.*, about 4000 bales. From that I got 300 *khandis* of seed of 240 seers to the *khandi* instead of 1,300. This was at Parbhani.

3011. The cotton is picked in the ordinary way. The leaf will get into any of the cottons here because it breaks off with the *kapas* but there is no deliberate mixing of dirt or anything with the cotton as far as I know in these parts. It is never filthy like Westerns. I don't think there is very much to complain of.

3012. As regards financial agency, the difficulty has been for the bulk of the millowners to remit money from Bombay. I was asked to purchase for the Bombay millowners but had to decline as it meant trading to the extent of 24 lakhs. I do not see any reason why a bank should not be established at Parbhani for three months to meet the monetary difficulties of the Bombay millowners. The trouble is that the mills have to buy *hundis* at Bombay in order to get their money remitted here and the great stumbling block is the exchange between Halli Sica rupees and British Government rupees.

3013. As to the difficulty of deliberate mixing that goes on in the ginning and pressing factories, I say that it is already settled, the moment you get rid of the *aratya*. He is at the bottom of it; he is the original sinner. The *aratya* never puts in dirt and dust into cotton here, nor does the ginning factory. They are responsible for the admixture of short and long staple cotton that is done here. Not very much crushed seed is passed through the gins into the cotton. The licensing of gineries would involve too much inspection. I am opposed to anything like the Cotton Frauds Act. I think that the mere stoppage of watering which we have done already will meet the requirements of Hyderabad. Our difficulty was formerly the mixing of Khandesh with Hyderabad cotton and that cannot be successfully done without watering.

3014. The figures that I have given in my calculations are taken from millowners. Of the difference of Rs. 80 per *khandi* of *rui* between *gaorani* and Khandesh cotton which the Bombay millowners pay without objection the ryot does not get the Rs. 10 which should go to him. It is the *aratyas* who put it into their pockets. It is divided between him and the purchaser. If Rs. 10 extra per *khandi* of *kapas* went to the ryot, my work would be done and *gaorani* would spread like wild fire. But the *aratya* divides the Rs. 10 per *khandi* between himself and the purchaser. The ginning percentage of *gaorani* has been worked for me by the Nagpur Mills at 29. All the cotton that comes in Parbhani gives a ginning percentage of 29. The Empress Mills was the chief purchaser and was the only firm from whom we could get figures as the *aratyas* and the purchasers will not give their figures. They told me in Bombay that it was impossible to deal with our cotton as the ginning percentage was fifty per cent. below Khandesh. That report came to me from a mill, though the millowners themselves could not credit it. Of course the report was absurd. I get a ginning percentage of 29 and I ask only Rs. 10 extra for *gaorani*. If the ginning percentage was 26, then the Rs. 10 would be wiped out easily. We began ginning at Parbhani on the 2nd November. From the 6th of December the price of mixed Parbhani was Rs. 96 and that of pure *gaorani* was Rs. 99. The price of Umri was Rs. 100. So there was a premium of Rs. 3 on pure *gaorani*. Purna suddenly showed

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a difference of Rs. 10 to Rs. 15. In order to attract sellers the price at Purna went up by Rs. 15 one day. It held for two days and then it dropped again. Whenever we have the Empress Mills in the market, we get a premium of Rs. 3 to Rs. 4. The moment the Empress Mills is not in the market, there is a combination to give lower prices—or say only eight annas, one rupee or one and eight annas. The Japanese do not keep under-paid agents. They trade as Europeans.

3015. (Mr. Hodgkinson.) *Gaorani* has not been valued by the British Cotton Growing Association. It is not quoted on the Liverpool market. We have only recently got a separate classification for it; it is now classified as *Hyderabad gaorani* for the first time. It seems to me an absurdity to class long staple and short staple everything under *Oomras*. Somebody must have taken the map and drawn squares on it and classed the short and long staple in them under *Oomras*. I have been trying to push *Khandesh* out. Liverpool will give me a quotation for *rui* that is for lint. I do not want that. I want quotations for *kapas*. It is the ryot who sells *kapas*. Ralli Brothers have not come into the field very much for this *kapas*. I want the Indian mills to help me. Ralli Brothers do not buy *kapas*. I want the millowners to come here, buy *kapas* and give a higher price for it. What is the use of quoting the prices for *rui*? That does not help me; the middleman gets the advantage of it. I do not ask even for Rs. 10. If I could get Rs. 8-8 *gaorani* would spread all over the country. I have to look at it from the Hyderabad ryot's point of view. I do not think imperially. I think Hyderabadally. I am here for the ryots. I have got to think of Hyderabad. If you give him the money, he will grow the cotton. There must not be any intermediate agency to buy up the *kapas*. It is a very difficult question as to how you could get this cotton at home. If one of your men came round once and saw the districts in which the cotton was grown and then went home and said that he wanted nothing but that cotton then he would get it. He must test it in the field and in the market place. If the home buyers come in the market, the purity of the staple becomes assured and *gaorani* will spread like wild fire.

Mr. NANNE KHAN, Cultivator of Kannad Taluk, Aurangabad District.

EXAMINED AT RAICHUR, 26TH FEBRUARY 1918.

No written statement was submitted by the witness.

(Translation.)

3016. (President.) I come from the Kannad Taluka of the Aurangabad district. I have a holding of six to seven hundred acres, one-third of which is under cotton. Half of my cotton area is under long staple cotton (*gaorani*) and half under short staple (*bharat*). This *taluka* is peculiarly situated. Down at the bottom of the Ghâts the cultivators grow only short staple, and at the top only long staple. I consider short staple cotton more profitable to the cultivator because it gives a greater percentage of lint. As a cultivator I know nothing about prices for lint. I only know about prices for *kapas*.

3017. I have heard that a lot of mixing goes on but I do not know anything about it. I do not mix myself. There is no deliberate picking of leaves with *kapas* but is very often done owing to carelessness and is particularly due to bolls falling on the ground. The *kapas* when picked is put into a wrap of some sort and is then heaped on the bare ground without any cloth. Owing to this it gets a certain amount of dirty stuff and extraneous matter such as dust and leaves. The pickers who are women are paid Rs. 2 per *palla* of 240 lbs. for picking and the consequence is that each woman makes a separate heap of her own and the cotton cannot be put on carts at once as it has to be weighed in the evening.

3018. It is known to God or Government why the Government is trying to spread long staple cotton as we get Rs. 2 to Rs. 4 more per *palla* for short staple. As regards seed selection, we keep back a certain amount of *kapas* of both kinds and then take it afterwards to the ginning factories and get it separately ginned. We do not trust the ginners and go there ourselves to watch the cotton ginned. We sell the cotton to the *banias* in our villages, and do not know what happens to the cotton after that. Whenever there is a combination of the local merchants to run prices down, we take the cotton off to some other place. We are in touch with all the surrounding markets and we know exactly what is going on and what price should be paid. We send off carts to the different markets and they bring back news of the prices that are being paid.

3019. I do not think that the publication of Bombay prices would do us much good, owing to limitations in the matter of ginning and trade difficulties.

3020. The people are not in debt in my village. If a man does borrow money from the *bania*, the latter fixes any rate he likes.

Mr. TULJA RAM, Cultivator, Raichur.

EXAMINED AT RAICHUR, FEBRUARY 26TH 1918.

No written statement was submitted by the witness.

(Translation.)

3021. (President.) I am a cultivator and cotton dealer. I have 550 acres of land. I cultivate half the area with cotton and the other half with other crops. I rotate cotton with *juar*, and because the value of cotton has gone up so much, I sow cotton again in the third year so that the rotation is cotton, *juar*, cotton. I cultivate "Westerns" cotton only, because that is the only variety of cotton in this tract. The picking is done by women who bring the cotton along in their cloths and dump it on the ground so that a certain amount of earth, etc., gets in. I manure my fields as they are close to Raichur but the fields far away are not manured. My experience is that I get an outturn of half as much again in the manured fields. My manures are cow dung and the sweepings of the city. I do not use night soil.

Mysore.]

Dr. LESLIE C. COLEMAN.

3022. I am not strictly speaking a dealer in cotton but simply sell my produce to the *ararya* who takes a commission of one per cent. The cultivators hold up their cotton against the market and the *ararya* does it for them without charging anything for storing. As regards rates in the cotton season, there is a daily assembling of *ararya* and buyers at which the cultivator tries to be present. The rates are fixed and the *ararya* then asks the cultivator whether he desires to sell at that price and if so carries out his wishes. The *araryas* are in communication with Bombay and sometimes they advise the cultivators not to sell. Then we sell or not according to our necessities. There is no buyer who will buy direct from the cultivator. They always deal through the *araryas*, the reason being that they hold the *ararya* responsible for the purity of the cotton i.e., he is responsible that it is not adulterated.

3023. I think that the publication of Bombay prices would be a very good thing.

3024. I take advances from the *ararya* and pay 12 per cent. per annum as interest. The rate is fixed. No date is fixed for the return of the advances in cotton. The price paid by the *ararya* for the cotton is the price of the cotton on the date that it is brought in less the interest due on the advances. The advance is given on the condition that cotton is sold through the *ararya*. There is another system which is a gamble. Under that system the rate is fixed at which payment will be made in cotton on a fixed date. No interest is charged and the *ararya* takes his chance. The advance is made on the financial stability of the borrower and not upon his crop. In the case of the bargain in which the date of the delivery of cotton is fixed, if the quantity of cotton delivered is not sufficient to liquidate the debt, the balance is paid in cash at the rate for cotton prevailing on the day.

XVII.—Mysore.

Dr. LESLIE C. COLEMAN, Director of Agriculture, Mysore.

The Witness was not orally examined.

I.—AGRICULTURAL EXPERIENCE.

(a) "Deshi" short staple cotton.

3025. *Varieties*.—There is only one variety of *deshi* cotton which is grown on any scale in this State. This variety is, I believe, identical with the *kumpla* of the Dharwar District. It is locally known as *sannahatti* (small cotton). This cotton is confined to the black cotton soil areas of Chitaldrug and Shimoga Districts, the two northern Districts of the State which border on Dharwar District, Bombay Presidency and Bellary District, Madras Presidency. A small area of *deshi* cotton (about 5,000 acres) is found in the Mysore District in the south-eastern part of the State.

3026. (8) *Size of holdings*.—The average size of holding in the *deshi* cotton area may be taken at about 15 to 25 acres.

3027. (4) *Yields and profits*.—The average yield is from eight to ten maunds of 29½ lbs. to the acre, leaving a profit of Rs. 12 to Rs. 15 in ordinary years.

3028. (5) *Manures and manuring*.—Practically no manure is applied to *deshi* cotton as it is supposed to increase the growth of leaf at the expense of bolls. It is rotated with *jola* (*juar*) and also sown mixed with Italian millet.

3029. (6) *Comparative returns*.—The returns are poorer than those from the two exotic cottons grown, Dharwar American yielding twelve maunds of 29½ lbs. and Cambodia cotton about fifteen maunds to the acre. The net returns are higher than from most other *deshi* crops grown in the cotton area.

3030. (7) *Conditions affecting increase in area*.—No separate figures are available for *deshi* cotton, the "Season and Crop Report" giving only the total areas under all cottons. There is undoubtedly very great fluctuation in area but there has nevertheless been a steady increase in the area under cotton in the State during the past thirty years as is shown by the following figures:—

Decennium.	Average area under cotton. Acres.
1885-1895	49,614
1895-1905	54,918
1905-1915	94,790

Again the average area under cotton for the five years 1905-1910 was 75,370 acres and for the five years 1910-1915, 114,200 acres which shows that the increase in area in recent years has been particularly marked.

(2) The annual fluctuations in area are also very marked and are largely due to fluctuations in prices though climatic conditions also play an important role.

(3) The figures given are for both *deshi* and exotic cottons. They may be taken, however, to represent in general the tendency for *deshi* cotton although in recent years the increase in area under exotic cotton has taken place more rapidly than that under *deshi* cotton.

(4) The increase in area under *deshi* cotton which is at present taking place and which is likely to continue for some years must be for the present at the expense of food crops more particularly of *jola* (*juar*, *sorghum vulgare*). As there is a net export of *jola* equal to from fifteen per cent. to twenty per cent. of the total production, there is still some room for expansion without seriously affecting our supply of food though it may land us in the more serious danger of a fodder scarcity. There are, however, reserves of Government land which, if thrown open, would allow for an increase of at least 50,000 acres under *deshi* cotton. I anticipate an increase in the average area under cotton for the decennium 1915-1925 of at least fifty per cent. of the average area for 1905-1915.

3031. (8) *Uses of seed and seed selection*.—The seed is almost entirely used as cattle food. A company has been formed for the extraction of cotton seed oil but, owing to the war, it has been impossible to get machinery so the scheme is for the present held in abeyance. No seed selection is practised by the ryots

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Continued.

Hand-ginning of seed for sowing purposes is still practised in a few places more especially those far distant from the ginning factories but the practice has lost ground very rapidly during the past ten years. The Department of Agriculture has commenced selection work on *deshi* cotton both for yield and quality but this work will have to be continued for another two or three years before practical results can be obtained.

3032. (9) **General economic conditions.**—The present high prices for cotton have placed our cotton growers in a better position than they have been in for very many years. The present danger seems to be that the area under cotton will increase to such an extent as to affect very seriously the fodder supplies in the cotton districts.

(2) With regard to the improvement of our *deshi* cotton, the Department was able to take up systematic work only two years ago when our only cotton farm was established. The Mysore *deshi* cotton has a good reputation and I do not think there is any great hopes of improving the quality or length of staple by selection. We are confining our attention at present to selection and hope while retaining or slightly improving the present quality to be able to increase the putturn considerably. As soon as we have secured a suitable type we shall take up the question of organizing seed farms, establishing small ginning factories for seed purposes, etc.

(c) *Exotic cotton.*

3033. (21) **Varieties.**—Only two varieties of exotic cottons are grown in Mysore State (a) Dharwar American, known locally as *doddahatti* (Big cotton) and (b) Cambodia. Of these, the former occupies from one-fourth to one-third of our total cotton area while the latter occupies only a few hundred acres and so may be ignored for the present.

3034. (23) **Comparative returns.**—The average yield for *doddahatti* is about twelve maunds of 29½ lbs. per acre—for Cambodia from fifteen to twenty maunds per acre. These yields are higher than for *deshi* cottons and for most other *deshi* crops. The net profits from *doddahatti* may be put at from Rs. 15 to Rs. 20 per acre from Cambodia at Rs. 25 to Rs. 30 per acre at normal prices. Cambodia is grown almost entirely under irrigation but the soils in the particular area where it is grown are very poor.

3035. (24) **Rotations and manures.**—Practically the same rotations are followed with both these as with *Sannahatti*, i.e., a food crop such as *jola* or *ragi* (*Eleusine coracana*) is rotated with the cotton. Very little manure is applied to the cotton, the food crop in the rotation receiving most of the scanty supply of cattle manure which is available.

3036. (25) **Conditions affecting increase in area.**—An increase in area will be influenced mainly by prices though climatic conditions in any year and the competition with food crops will also play a role.

3037. (26) **Suitability of existing varieties.**—Dharwar American has during the past ten years been extending into new areas in the State where cotton has not previously been grown. It is undoubtedly a cotton which will pay the ryot to grow, its chief drawback being its tendency to red leaf-blight. As far as I am aware, there is at present no better cotton available for growth on our red soils. In some places, it is giving quite good results under irrigation also. It is probable that types giving higher yields can be introduced but I do not think there is any scope for the introduction of a cotton of much better staple except in a few areas where irrigation is possible. For such areas Cambodia appears to be suitable.

3038. (27) **Prevention of mixing of different varieties.**—There is, I believe, no intentional mixing of exotic cottons with *deshi* cottons in the field. There is, however, a certain amount of mixing in the ginning factories, with the result that it is difficult to get seed free from mixture. We are this year buying up for distribution Dharwar American seed from cotton ginned before the *deshi* cotton (which is always later) has come into the factories and in this way we hope to get seed free from *deshi* admixture. This is particularly important because *deshi* cotton will not grow well on the red soils upon which Dharwar American is usually grown.

3039. (28) **Importation of seed.**—We have imported small lots of selected Upland American cotton for trial. Our experience up to the present goes to show that these could never be introduced direct to cotton growers as during the first year or so they do very poorly. Whether we shall be able to get any varieties which after acclimatization will prove better suited to our conditions than is Dharwar American remains to be seen but I have strong hopes of improvement in this direction as far as yield is concerned. Egyptian cotton would, of course, be quite unsuitable for our conditions.

3040. (29) **General economic conditions.**—There is certain to be a very considerable increase in the area under exotic cottons in this State. Dharwar American is spreading rapidly into new areas. I personally think there is more hope of acclimatizing selected cottons imported from America than of improving Dharwar American by selection. However, both methods of improvement will be tried. The question of organizing seed farms, etc., is one for the future as far as Mysore is concerned and will be taken up after we have got something which is distinctly better than the cotton which the ryot is now growing.

