REPORT

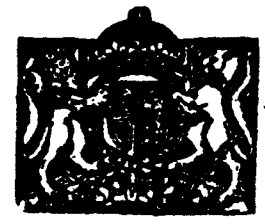
ON THE

OPERATIONS OF THE DEPARTMENT OF AGRICULTURE

MADRAS PRESIDENCY

FOR THE YEAR

1927-28



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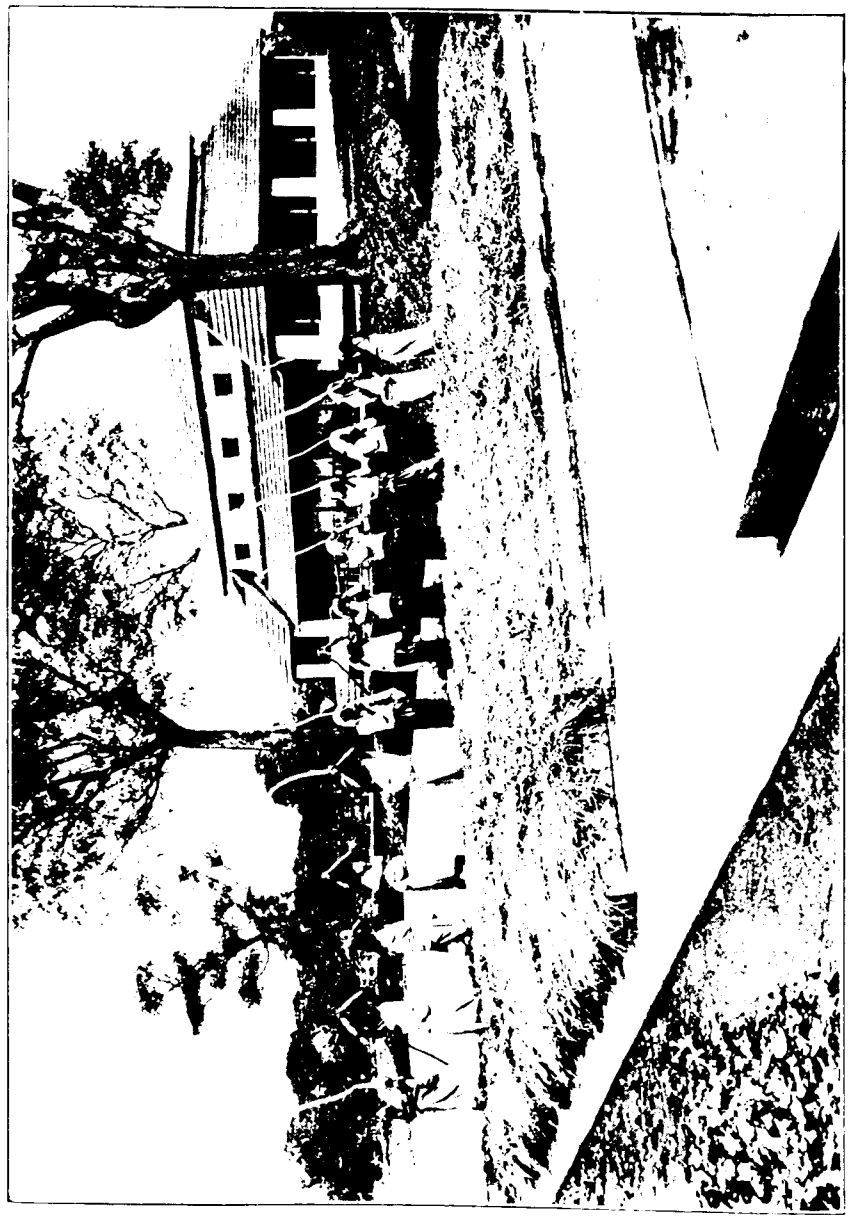

PADDY BREEDING STATION, PATTAMBI.

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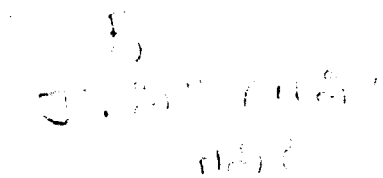
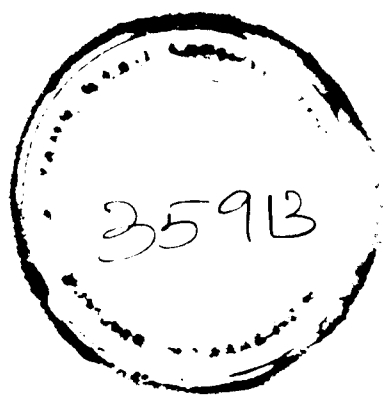




CONTENTS.

OFFICE OF THE
DIRECTOR OF AGRICULTURE, MADRAS,
Dated 30th July 1928.

R.O.C. No. D-45-Pdl./28.

From

RUDOLPH D. ANSTEAD, ESQ., M.A., C.I.E.,
DIRECTOR OF AGRICULTURE, MADRAS,

To

THE SECRETARY TO GOVERNMENT,
DEVELOPMENT DEPARTMENT,
FORT ST. GEORGE, MADRAS.

SIR,

I have the honour to submit the report on the operations of the Department of Agriculture for the year 1927–28. Following the procedure adopted in former years an attempt has been made in this report to describe the more important features of the work of the department and to make it of a "popular" nature and of interest to the general public rather than to go into details. The operations of the department now cover such a wide field that it is impossible for me to do more than touch upon some of the more important or interesting features, and quite a number of items which are more or less of a routine nature are not even mentioned. For further details of the work of the department I would refer Government to the reports of the research and circle officers and to the monthly digest which I personally compile and which is a running commentary on the daily work of the department. I venture to hope that these documents will be perused by Government in connexion with this report which is only of a general nature.

I.—ADMINISTRATION.

2. I was in charge of the department throughout the year with the exception of one short period from 3rd January to 20th February when I was on leave and Mr. G. R. Hilson acted for me.

3. *Tours.*—My many and various administrative duties chain me to my office in Madras more and more and I find it very difficult to tour as much as I should

like and as I feel is really necessary if I am to keep in close touch with my district staff and their activities. Whenever possible I have made district tours, but these have been necessarily short and hurried and I have been compelled to cover long distances as rapidly as possible. During the year I have been able to visit the following localities: Ganjām, Vizagapatam, East and West Gōdāvari, Guntūr, Nellore, South Arcot, Trichinopoly, Tanjore, Madura, Coimbatore and the West Coast. I have also paid several visits to the Agricultural College, Coimbatore, and inspected the experiment stations at Palur, Palakuppam, Pattambi, Taliparamba, Maruteru, Samalkota, and Anakapalle. In July, I attended a meeting of the Indian Central Cotton Committee held at Bombay, and during the hot weather I was at Ootacamund with Government.

These tours were made with some specific object in each case, but during the course of them I have endeavoured to meet as many ryots as possible and to attend meetings of co-operative and similar bodies. I presided over several agricultural conferences in connexion with the co-operative movement in the Tanjore and Trichinopoly districts.

4. *Visit of His Excellency the Viceroy.*—The Agricultural College and Research Institute at Coimbatore was honoured in July by an all too short visit from His Excellency the Viceroy accompanied by Lady Irwin and His Excellency the Governor of Madras. The Director had the honour of presenting his staff and conducting the distinguished guests on a short tour of inspection of the Research Institute where an exhibition had been staged in the laboratories designed to show as quickly as possible the various lines of research being carried out. His Excellency graciously expressed his interest and appreciation of the work being done and promised another visit when he next comes to this Presidency—an occasion to which the whole department is eagerly looking forward.

5. Other visitors of note during the year were the following :—Raja Sir Vasudeva Raja of Kollengode, Sir A. P. Patro, Sir C. P. Ramaswami Ayyar, Sir K. V. Reddi Nayudu, the Hon'ble Dr. Subbarayan, Senor Devoto of the Argentine Republic, Mr. F. M. Howes of Kew, Gen. Hutchinson the Surgeon-General, and Lt.-Col. Bradfield.

In addition to these, we were honoured by visits from a number of Members of the Legislative Council and departmental officers from Pusa, while we had five visits from our Honorary Visitors.

A.—Staff.

Indian Agricultural Service.

6. M.R.Ry. Rao Sahib M. R. Ramaswami Sivan Avargal, Principal, Agricultural College, retired from service on the 14th May 1927. He was succeeded, as whole-time Principal of the College, by M.R.Ry. C. Tadulinga Mudaliyar Avargal. Mr. D. G. Munro, Deputy Director of Agriculture, on reversion from foreign service under the United Planters' Association, Southern India, on the 1st April 1927, was posted to the charge of VIII Circle. Consequent on the confirmation of Dr. MacRae as Imperial Mycologist, M.R.Ry. S. Sundararaman was made permanent Mycologist. Two posts of Deputy Directors of Agriculture and the post of Government Agricultural Chemist in the Indian Agricultural Service were held in abeyance and in their stead three temporary posts in the scale of Rs. 250—25—750 were created outside the cadre of the Madras Agricultural Service. Messrs. M. Govinda Kidavu, B. Ramayya, and B. Visvanath who were officiating in the former posts were placed in the latter with effect from the 14th June 1927.

Madras Agricultural Service.

7. The post of a gazetted assistant was sanctioned for the charge of Anakapalle Cane Testing Station and M.R.Ry. S. Sitarama Patrudu Garu was appointed to it from the 8th June 1927.

8. *Confirmation.*—Messrs. C. Ramaswami Nayudu, Assistant Director of Agriculture, V. Ramanatha Ayyar, Assistant Cotton Specialist, and C. Narasimha Ayyangar, Lecturer in Agricultural Engineering, all on probation, were confirmed in their respective appointments. Messrs. K. Unnikrishna Menon and T. Lakshmana Rao and M. C. Cheriyan, who were officiating in the Madras Agricultural Service as Assistant Director of Agriculture, Assistant Agricultural Chemist, and Assistant

Entomologist, respectively, were provisionally confirmed. M.R.Ry. T. V. Ramakrishna Ayyar, Assistant Entomologist, who was on leave out of India returned and resumed his duties on 1st October 1927.

9. *Deputation.*—At the instance of the Indian Central Cotton Committee and financed by that Committee an investigation into the finance of the cotton crop upcountry is being carried out. M.R.Ry. K. T. Alwa Avargal, Assistant Director of Agriculture, has been placed in charge of this work from 15th December 1927 for a period of six months.

10. *Non-gazetted executive staff.*—The number of upper subordinates in the agricultural and science sections was increased during the year by 20 and 9 respectively. It was not, however, possible to fill all the sanctioned appointments in the agricultural section owing to want of qualified hands. All the available candidates have been appointed and the number of vacancies at the end of the year was seven. Two of these have subsequently been filled up and the remaining vacancies are expected to be filled by candidates who have just left the college.

B.—Buildings, etc.

11. Besides the routine minor works and annual repairs, the following works were undertaken departmentally and executed during the year :—

(1) Quarters for a Farm Manager, a cart shed and an inspection shed at the Experiment station at Palakuppam.

(2) Extension of an engine well at Palur.

(3) Wirefencing at Taliparamba.

(4) A coconut store and a coolie hut at Nileshwar No. II station.

(5) A mud wall round the extension at No. I station, Pilicode.

(6) An operation shed for the veterinary hospital at the Central Cattle Farm, Hosūr.

(7) A cattle-shed at the Buffalo Breeding Station, Guntūr.

(8) A cattle-food store room at the Paddy Breeding Station, Coimbatore.

(9) Quarters for an Assistant at Aduturai.

(10) An irrigation and drainage channel, an approach road, and two threshing floors at Maruteru.

(11) A combined laboratory and office, threshing floors, culverts, quarters for an Assistant, and a well at Pattambi.

(12) A combined gin and chaff cutter room at the Cotton Breeding station, Coimbatore.

(13) Widening and deepening a well at the Cotton Breeding Station, Kovilpatti.

(14) Cemented and masonry irrigation channel and a small implement enclosure at the Millets Breeding Station, Coimbatore.

In addition to the above, the Assistant Agricultural Engineer carried out several works on the College estate. The chief of them were—

(1) Renewing the piping from overhead tanks to laboratories.

(2) Constructing buildings for animal nutrition experiments.

(3) Constructing a machine shop.

(4) Reforming Robertson Road—east half.

(5) Repairs to Benson Road.

(6) Repairs to South Maidan Road.

(7) Repairs to Lawley Road—west end.

(8) Repairs to Kees Road.

(9) Renewing piping to Central Farm.

(10) Repairs to Stuart Road.

(11) Constructing tar cisterns.

(12) Constructing a tank for circulating water for refrigerating plant.

12. Estimates for the construction of 8 "C" and 8 "D" type quarters on the estate were sanctioned and the work was taken up by the Public Works Department towards the end of March.

Satisfactory progress was made by the Public Works Department in regard to the construction of several buildings for the extension of Anakapalle Experiment station and for the Agricultural Middle School at Kalahasti.

13. A scheme for the drainage of the Agricultural College at Coimbatore which has been under consideration for a long time was sanctioned by Government in December 1927. Detailed plans and estimates are

under preparation by the Public Works Department. This scheme includes an experimental activated sludge plant.

II.—AGRICULTURAL EDUCATION.

14. The only course in progress at the Agricultural College, Coimbatore, which is affiliated with the Madras University, was the degree course. Effect was given during the year to what has long been contemplated, viz., the complete separation of teaching from research. This was facilitated by the completion in 1927 of the Freeman Building, which is entirely devoted to teaching, leaving the old building for research. Under this new arrangement the Principal, M.R.Ry. C. Tadulinga Mudaliyar, becomes responsible for all the teaching work and the upkeep and management of the Central Farm and College Estate, the staff concerned being placed directly under him. The titles of the staff have been revised and the heads of teaching sections are now known as "Lecturers" in their different subjects, while the Professor of Agriculture has been designated Vice-Principal. This new arrangement has relieved the Director's office of a certain amount of work, and it has also simplified the administration of the College, enabling stores for instance to be consolidated under the Principal.

15. This does not mean, however, that the research officers are entirely divorced from teaching. The students are given facilities for seeing what is going on in the research sections and the research officers deliver a certain number of lectures each year. Thus during the past year the following were given :—

Three lecturers on Plant Breeding by the Sugarcane Expert, the Paddy Specialist, and the Millets Specialist respectively.

A lecture on "factors affecting the growth and sugar contents of cane," by the Assistant Sugarcane Expert.

Three lectures on "Experiments, how to conduct them" by the Government Agricultural Chemist, and a lecture on "Synthetic Farmyard Manure" by the same officer.

A lecture on "Hydrogeni in concentration and Ph. values" by the Assistant Chemist. A lecture on "Bacteriological technique" by the Bacteriological Assistant.

In addition to these, M.R.Ry. M. V. Vellodi Avargal, my Personal Assistant, gave a series of four lectures on land tenures, revenue settlement, and allied subjects.

These lectures are a welcome feature of the teaching and enable students to hear research officers on their own particular subjects.

Classes II and III went on tour as usual.

16. The selection of students for Class I was made by a Committee consisting of the Director of Agriculture, the Principal, and three non-official members, Messrs. Rao Bahadur T. A. Ramalingam Chettiyar, Rao Sahib V. Krishna Menon, and Khader Moideen Sahib Bahadur, M.L.C. This is an innovation. One hundred and seventy-six applications were received and 130 students presented themselves for interview. Forty-one were selected, 19 from Tamil districts, 11 from Telugu districts, and 11 from the West Coast.

The number of students on the rolls during the year was—

	Class I.	Class II.	Class III.	Total.
Beginning ...	41	39	25	105
End ...	41	39	26	106

17. *Scholarships.*—The scholarships of Rs. 25 per mensem granted in previous years were continued and the following were granted during 1927 :—

(1) A scholarship to the best student of B.Sc., Ag., Class I—R. Krishnamurthi Rao.

(2) Two Scholarships to deserving students from the agricultural community—G. Ranga Rao, a Kapu from West Gōdāvari, and K. Narayanan Nayar from Malabar.

(3) A scholarship for Muhammadans—A. Gulam Ahmed from Chingleput.

The Pentland scholarship, instituted for Malabar students by the late Mr. Vengeil Krishnan Nayanar, was held by K. V. Govindan Nayar of Class I.

The two scholarships available for members of depressed classes were held in abeyance for lack of qualifying candidates. Although a number of the depressed classes were represented among those who applied originally for admission to the College, none of them presented themselves. This was a cause of great disappointment to the Selection Committee who were quite prepared to admit some of them to the College and award the scholarships.

One of the Muhammadan scholarships held in abeyance during the previous year was diverted for award as a special case to P. Seshadri Sarma who tied with R. Krishnamurthi Rao for first place in class I.

18. The results of the B.Sc. Ag. examinations held in 1927 were as follows :—

Twenty-three students appeared for Part I, of whom 19 passed ; in part II twenty students appeared and 18 passed. In addition to this four old students appeared for Part I and two for Part II and all passed.

19. Mr. Kanti Raj who was attached to the Royal Commission on Agriculture was given six months' practical training at the college, and Mr. Lakshmipathi Mudaliyar who had been deputed by Government to England to study agricultural machinery came to the college to begin his studies. Mr. A. S. Rajan was also given a course of practical training as a private student. A senior agricultural instructor of the Ceylon Department of Agriculture was attached to the Paddy Breeding section for three months' special training.

20. *College Day*—The annual College Day and Agricultural Conference were celebrated under the auspices of the Madras Agricultural Students' Union from the 9th to 14th July. The Hon'ble Sir C.P. Ramaswami Ayyar, B.A., B.L., K.C.I.E., presided over the opening of the conference and delivered a stirring address.

This annual gathering which brings together old boys and friends both within and without the department itself has been an enjoyable feature of the year ever since the college was founded in 1907. It serves to keep warm the love of their alma mater in the hearts of our students and, combined with college sports

and social gatherings as well as a Conference at which papers are read by the junior members of the staff and the work of the department as a whole is discussed and the public have a chance, of which they at times freely avail themselves, of criticism, it is a power for good. I regret to find that after all these years objection has been taken to this Conference, apparently on grounds of expense in the way of travelling allowance, and that this year a Government Order will sadly restrict our numbers. This will cripple the function and may bring it to an end which I consider would be a very great pity and I can only hope that Government may be persuaded to reconsider the restrictions which have been imposed.

21. *Agricultural middle schools.*—The Agricultural middle schools at Taliparamba and Anakāpalle continued to function during the year.

At Taliparamba the year opened with forty-nine students, thirty-eight in the new class and eleven in the second year class ; eight of the new students withdrew and the year closed with a total of forty-one. Sixty boys have now passed through this school and it appears to be slowly growing in popularity. Of the old boys, 21 are engaged in farming, two are on plantations, and nine are employed as teachers, so that some small success may be claimed for the school.

22. Unfortunately the same cannot be claimed for the school at Anakāpalle, as students cannot be obtained despite propaganda. Only nine new students joined the classes during the year and of these, five had to be removed for disciplinary reasons. With reluctance, therefore, we have had to conclude that there is no demand for this class of education in this particular district and in December the school was closed.

23. Our experiment in agricultural education in this locality has yielded a negative result, but it is proposed to try again in more favourable localities. A school is being built at Kalahasti, largely owing to the generosity of the Raja of Panagal who has presented land and some of the buildings, while money has been granted for a school at Usilampatti in connection with the Kallar Reclamation Scheme. The possibility of opening a school in the Tanjore District is also under consideration.

24. *Rural education.*—The classes for juvenile and adult labourers at the Central Farm, Coimbatore, and the agricultural stations at Pālūr and Anakāpalle continued work during the year.

At Coimbatore, eight boys passed the examination and left, three more boys from the farm were admitted and eight adults attended the night class.

At Pālūr, the average number of pupils on the rolls in the day school was 14·4 with an attendance of 9·9. In the night school the average number on the rolls was 12 with an average attendance of 7·2.

25. As remarked in former reports, the cost of these schools is no doubt on the high side, since the attendance is small, but they have a value of their own because the boys catered for would probably receive no education at all did they not come to these schools. Here they learn familiarity with improved methods of agriculture which they see going on at the experiment stations, the use of improved implements, and a certain amount of discipline, and they are capable, by the time they leave, of reading departmental publications in the vernacular. This must help to fit them to become better labourers. These schools do not aim high, but they play a useful, if modest, part in the difficult problem of agricultural education in the country.

26. *Agriculture in elementary schools.*—I presided over a committee appointed by the Director of Public Instruction to examine the possibility of introducing agriculture into the curriculum of the elementary and middle schools in the Presidency on the lines adopted in the Punjab. This would imply the institution of a special course for teachers at the Agricultural College at Coimbatore. The committee has made an interim report which is now before Government. It would seem that what is needed is the regular teaching in these schools of nature study rather than agriculture which is a highly technical subject. If some system could be adopted by which a knowledge of the simple processes of nature could be instilled into the minds of children it would pave the way to the learning of agriculture and allied subjects later. It is impossible to teach agriculture in a practical way which will be of any value in after-life in anything but a technical

school equipped with a farm. Such farms must be of a model character and made to pay and it is difficult to see how they can be attached to an ordinary school. The stumbling block in the way of teaching nature study at present is the lack of teachers who know anything about it themselves. The problem is a difficult one to solve but one in which I am personally much interested. Could we deal with ryots who already knew something about natural history and the processes which go on in the life of a plant it would be much more easy to drive home to them the lessons which the Agricultural Department have to teach and to introduce improved methods and the control of pests and diseases.

III.—SEASON AND RAINFALL.

27. The south-west monsoon commenced on the West Coast early on the 27th May and gave heavy rainfall from June to September with breaks now and then. In the Circars, the monsoon became active about the middle of June and gave generally good and well-distributed rainfall afterwards till the 6th October. The Deccan and Nellore received good rains except in August. The rainfall in Coimbatore and Trichinopoly was normal. Most of the other districts had fairly good rains in June and September, but the rainfall was poor in the intervening months. On the whole, the south-west monsoon was up to or above the average except in South Arcot and Tanjore.

28. The north-east monsoon appeared over the Madras Coast on the 20th October but was feebly marked. Its activity was more or less confined to the south till the 31st October. A depression formed on the 30th October between the Andamans and the Coromandel Coast. It developed into a cyclonic storm which crossed the Coast near Nellore between the 1st and 2nd November. With the progress of the storm rainfall was widespread in the Circars and Deccan and on the Madras Coast. The most devastating fury of the storm was experienced in Nellore where men and cattle perished and considerable havoc was done to buildings and trees, in addition to a serious breakdown of communications, and rains continued in the district till the 19th November. Heavy rain was

received between the 6th and 9th November in the Presidency except the Circars and the Deccan. The monsoon practically came to a close thereafter although there was slight rainfall in parts of the Carnatic and Southern districts. Thus the north-east monsoon was unsatisfactory in most districts, especially in Chingleput, South Arcot, the Central districts (Coimbatore excepted), Tanjore, and Malabar.

On the whole, the year was generally favourable in the Circars, and on the West Coast, fairly favourable in the Deccan, and not so favourable in the other districts.

29. The effect of the season on the crops at the agricultural stations and on the work of demonstrating agricultural improvements in the districts is described below :—

The season was generally favourable at Anakāpalle, Samalkota, and Maruteru. At the Guntūr Experiment Station, cholam (jonna) and groundnut gave good yields ; but the yield of cotton, tobacco, chillies, and variga was low owing to the heavy November rains. At Nandyal, the season was favourable for paddy, but cotton suffered from untimely rains and cholam (jonna) from insect attacks. At Hagari, the season was favourable for *mungari* (early) crops but disappointing for *hingari* (late) crops ; cotton suffered from shedding of bolls and flowers, due to the untimely rains of February, while cholam (jonna) and bengal-gram suffered from drought ; the yield of Italian millet was satisfactory. At Pālūr, the season was bad, cost of cultivation high, and the yield of many crops low ; the yield of paddy was, however, satisfactory. At Palakuppam, the season was on the whole fairly satisfactory and crops gave fair yields. At Āduturai, the season was favourable for paddy. At Kovilpatti, the yield of cotton was reduced owing to the untimely rainfall in February ; cumbu and fodder cholam suffered from drought. At Taliparamba, paddy yielded fairly well ; the yield of pepper was low owing to "pollu" attack and the shedding of spikes, and the yield of ginger was poor. At Pattambi, the yield of paddy was good. The season was on the whole very favourable for coconuts on the West Coast stations, but the yield of coconuts was low owing to the

unfavourable season of the previous year. At Coimbatore, the season was favourable for paddy and irrigated cholam, but unfavourable for rain-fed cholam. At Nanjanad, the weather was satisfactory for the growth of main and second crops of potatoes and good yields were obtained.

30. The season aided progress in the demonstration of agricultural improvements in the I, VII, and VIII circles, and the deltaic areas of the II and V circles. In the III Circle, the area under improved strains of cotton was less than in the previous year as sufficient quantity of pure seed could not be had owing to the unfavourable season of the previous year. In the IV Circle, the number of ploughing demonstrations was less than in the previous year owing to the adverse season ; progress in most other items of work was however better. In the VI Circle, the adverse season was responsible for the failure of many of the demonstration plots.

IV.—RESEARCH.

31. The research work carried on by the department is of two kinds: that done by the specialists at Coimbatore, where they are equipped with laboratories and special stations, and that done on the agricultural experiment stations in the districts. This work is interdependent. The fundamental problems underlying the practice of agriculture in this country, of crop pests and diseases, and of the improvement of existing crops by plant breeding methods are studied at Coimbatore by a number of experts. Their discoveries are tested out under local conditions on the experiment stations in the districts.

32. This arrangement is necessary because it is essential that any new method should be proved on a field scale before it can be demonstrated to the ryots. A new strain of paddy, which does very well at Coimbatore for instance, may not do equally well in the Tanjore delta, and it is necessary to try it in the latter place on a field scale before it is given out to the ryots as an improved variety.

33. The agricultural experiment stations are used, therefore, to test improved strains made originally at Coimbatore, to compare them with one another and

with local varieties, to test manures of various kinds on different crops under different conditions of spacing and so on. A good deal of miscellaneous experimental work is also carried out on these stations. Whenever any question arises which is amenable to direct field experiment, more especially local problems, the stations are naturally looked to as suitable places on which to conduct such experiments.

34. Results obtained on these experiment stations, once they have been proved, are demonstrated to the ryots by means to be described later in this report. There are now 31 such stations in the Presidency, some of them designed for the purpose of studying general farming problems, and some, like the Paddy Breeding station at Aduturai, the Potato Station at Nanjanad, and the Coconut Stations on the West Coast, entirely devoted to the study of one particular crop.

35. Such experiment stations, with their expert staff, are absolutely necessary, and all attempts at demonstration must be preceded by careful research on them. The problem of making the results of the research carried out on such stations known to the cultivators is one attended with many difficulties, and it is dealt with under the heading of "Demonstration" in section VI of this report.

36. This regular progress from Research Officers at one end to the ryots at the other, should be carefully balanced but there is a tendency to get away from this and for Research Officers to be caught up in the machinery of administration so that an undue proportion of their time is occupied with routine matters to the detriment of the work for which they were orginally employed. This is apt to vitiate the progress of research work as a whole. Development in the Agricultural Department should, if possible, take place on a smooth wave front, but owing to various reasons our development has taken place in fits and starts with the result that it presents a jagged outline. The time has come to overhaul the whole establishment and see if the work cannot be re-divided so as to avoid this defect, and a definite and systematic policy laid down for the future. Government have requested me to go into this matter and it is now engaging my careful attention.

A.—Crops.

(a) Paddy.

37. Paddy being the most important crop in the Presidency, the main staple food and occupying the largest area, 10,841,686 acres, plant breeding work has been concentrated upon it. We now have four breeding stations, a main station at Coimbatore, the headquarters of the Paddy Specialist, and sub-stations at Aduturai, Maruteru, and Pattambi. The work done on these stations is of two kinds, economic, the multiplication and trial of improved strains produced by selection, and manurial and cultural experiments; and academic, the study of the mechanism of inheritance of characters along Mendelian lines. This latter work leads to the production of entirely new strains by methods of hybridization and the production of disease resistant varieties.

38. It is no doubt difficult for the lay man to understand adequately the nature of the work being done on these stations and all the intricate details which involve infinite patience on the part of the Research Officers concerned. We at all times welcome visitors to whom the work will be explained on the spot. I respectfully commend the very excellent and lucid report of his work presented by Mr. R. O. Iliffe to Government and also his reports on the Paddy Breeding stations. These should be perused by themselves as it is impossible for me to do them justice in this Administration Report even were I capable of doing so. Mr. Iliffe has presented his work and described some of the methods employed, in such a way that it is capable of being understood even by those who have no knowledge whatever of plant breeding.

39. As to the value of these stations and the work being done upon them there can be no doubt. That they are appreciated by the ryots is shown by the increasing demand for seed from them. Maruteru and Pattambi are quite new, the latter only having been started during the year under review. Yet despite the fact that there has been no time to evolve new strains on them the neighbouring ryots have clamored for seed, having seen the preliminary results obtained, and their wishes have had to be met by supplying them

with such seed as was available. Even so it was quite impossible to meet all their demands and the following statement will show what this was. It is a measure of their success and popularity. The figures of issue include seed supplied to district officers which was finally issued to ryots in their respective circles.

	Seed issued.	Total demand.
	LB.	LB.
Coimbatore	30,870	...
Adutturai	53,308	170,660
Maruteru	47,677	137,000
Pattambi	1,400	1,400

40. A perusal of Mr. Iliffe's reports will show the many lines of research which have been undertaken and the many problems which still remain to be attacked and in view of the importance of these it is essential that I should be given the full staff asked for and required for this section, otherwise the work will be delayed and the big programme we have planned out will have necessarily to be curtailed. The importance and value of this work cannot be exaggerated and it should be pushed forward vigorously. Any money spent on it is amply returned in the benefits which accrue to the ryots. This is more especially the case at Pattambi, a new station where entirely new problems which have never been dealt with before await solution. If these are to be dealt with adequately, staff is needed and I would request Government not to stint it. Every new strain produced means lakhs of rupees in the pockets of the ryots. There are now, in all probability, something like 200,000 acres of paddy under our improved strains. If we place a very modest estimate of an increased yield of 10 per cent on these at say 180 lb. per acre at Rs. 3 per 60 lb. (all under-estimates) this represents an added wealth to the ryot population of Rs. 18 lakhs, so that the cost of a few extra assistants becomes a very small matter when set against the monetary advantages to be gained.

As stated above, it is impossible in the scope of this report to deal adequately with all the various activities of this section, but I have selected a few of the more important lines of work for mention in the succeeding paragraphs.

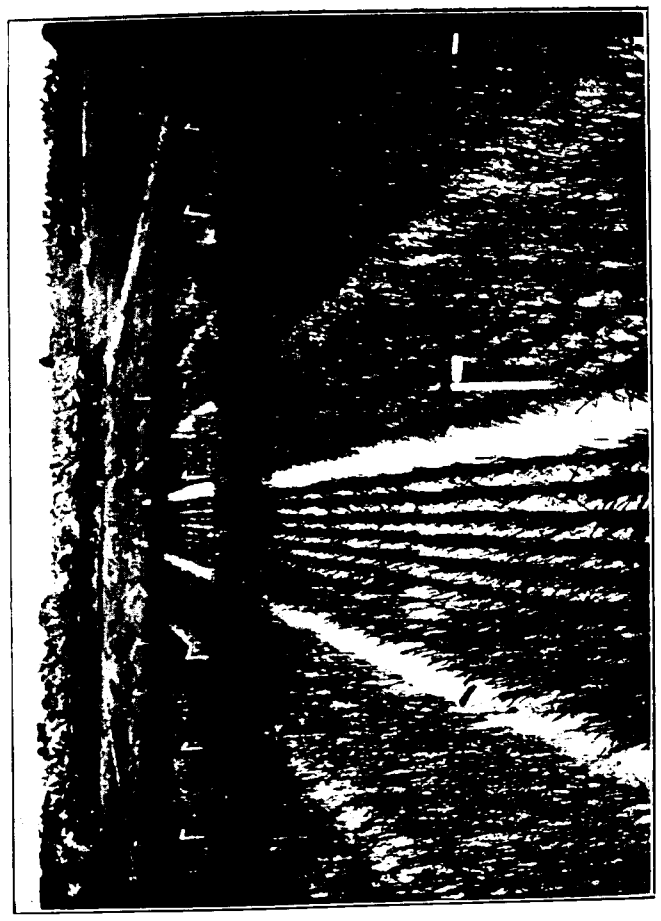
COMPARATIVE SIZE TRIALS OF PURE LINE STRAINS ON THE PADDY BREEDING STATION, COIMBATORE.

with such seed as was available. Even so it was quite impossible to meet all their demands and the following statement will show what this was. It is a measure of their success and popularity. The figures of issue include seed supplied to district officers which was finally issued to ryots in their respective circles.

	Seed issued.	Total demand.
	LB.	LB.
Coimbatore	30,870	...
Āduturai	53,308	170,660
Maruteru	47,677	137,000
Pattambi	1,400	1,400

40. A perusal of Mr. Iliffe's reports will show the many lines of research which have been undertaken and the many problems which still remain to be attacked and in view of the importance of these it is essential that I should be given the full staff asked for and required for this section, otherwise the work will be delayed and the big programme we have planned out will have necessarily to be curtailed. The importance and value of this work cannot be exaggerated and it should be pushed forward vigorously. Any money spent on it is amply returned in the benefits which accrue to the ryots. This is more especially the case at Pattambi, a new station where entirely new problems which have never been dealt with before await solution. If these are to be dealt with adequately, staff is needed and I would request Government not to stint it. Every new strain produced means lakhs of rupees in the pockets of the ryots. There are now, in all probability, something like 200,000 acres of paddy under our improved strains. If we place a very modest estimate of an increased yield of 10 per cent on these at say 180 lb. per acre at Rs. 3 per 60 lb. (all under-estimates) this represents an added wealth to the ryot population of Rs. 18 lakhs, so that the cost of a few extra assistants becomes a very small matter when set against the monetary advantages to be gained.

As stated above, it is impossible in the scope of this report to deal adequately with all the various activities of this section, but I have selected a few of the more important lines of work for mention in the succeeding paragraphs.



COMPARATIVE STRIP TRIALS OF PURE LINE STRAINS ON THE PADDY BREEDING STATION, COIMBATORE.

41. *Economic work, Coimbatore.*—In spite of the poor north-east monsoon the acre yield on this station worked out at 3,000 lb. of grain. This does not represent a full acre yield as on experiment stations alley ways have to be left uncultivated. Mention was made in last year's administration report of four new strains which had been issued to the ryots. Reports of the performance of these are not yet to hand, but Co. 5 may have to be recalled for further improvement as it has developed the defect of producing a high percentage of unfilled chaff, a defect not exhibited on the station itself. This is mentioned to indicate the difficulties which beset this class of work and the necessity for testing out new strains before they are issued on experiment stations under local conditions and the need for such stations. Unfortunately the Coimbatore District is not yet provided with such a station.

42. The effect of sowing at different seasons is under investigation, and also the effect on the ultimate yield of raising seedlings on wet and dry nurseries. A thinly sown dry nursery appears to be best and the disadvantage of thick sowing is emphasized. Manurial trials with nitrate of soda as a supplement to green leaf have again showed that for the Coimbatore soils nitrate is only useful to make up a slight deficiency of leaf, the best return is given by green leaf alone and this also has the merit of cheapness.

43. One of the most important studies which has been undertaken by the section is connected with the food value of rice. It was represented to the Royal Commission on Agriculture in India that the improvement of yield and purity by selection was not by any means all that had to be considered. Something should be known of the feeding value of each selection especially as for the bulk of the population it forms the whole of their diet and no attempt is made at a "balanced diet". It is, therefore, of the greatest importance that the possibility of putting the maximum amount of food into the grain should be explored and that the loss caused in the various processes of preparation such as pounding, milling, and boiling should be investigated. This research has been taken up and considerable progress made with it

If the institute at Coonoor is converted, as has been proposed, into a central institute of nutrition we look forward to continuing this line of investigation in close collaboration with Lieut.-Col. McCarrison and it has every prospect of leading to far-reaching results. So far as I am aware no other Agricultural Department in India has as yet tackled this problem from this point of view. The investigation will obviously have to be extended ultimately to other food crops like millets.

44. *Economic work, Aduturai.*—In addition to the routine work on strains investigations have been carried out in connexion with cultivation and manurial questions. There appears to be little material advantage in favour of economic planting, but it is obviously more economical to use the least number of seedlings and this also saves seed. This is all that is claimed for this improvement. The use of nitrate of soda as a supplement to green leaf and cattle manure has shown once more that this is not financially sound. It is not always possible to plant seedlings the same day that they are removed from the nurseries and trials show that they can be safely kept for four days. There is a local prejudice against summer ploughing which appears to be groundless and another popular belief that red rice germinates more slowly than white has also been discredited as a result of experiment.

45. *Economic work, Maruteru.*—It is impossible to produce pure line seed in such a short time as this station has been open, but to satisfy a strong demand from the ryots a compromise has been effected whereby a modified mass selection has been made to eliminate red rice and standardize flowering. This has been done for *Kristnatukulu*, for the western delta, and *basangi*, *akkulu*, and *garikasannavari* for the eastern, western, and central deltas, and 34,239 lb. of seed were distributed to ryots and 13,438 lb. to circle officers during the year. Another problem which is under investigation is the system of *udu* cultivation and the effect of topping. Owing to the difficulties of second crop cultivation with its precarious water-supply and resultant danger and deterioration of lands, the whole question of the advisibility of allowing this system

is under consideration. This is a big problem and involves a number of considerations and until some definite conclusion is reached one way or another, the station will continue to test methods for its improvement. Problems relating to the inclusion of a green dressing in the rotation are also under investigation.

46. *Economic work, Pattambi.*—The final acquisition of land was only completed at the end of August, so not much could be expected from this new station, but a most satisfactory start has been made. Work at this station will break new ground ; varieties to suit dry land, pallayal land, double crop land, and second crop are already under study. The staff are to be heartily congratulated on the rapid progress which has been made to get this new station into order and on the amount of work which has already been done. That their efforts are appreciated by the ryots who are eagerly awaiting the new strains which will ultimately be evolved is shown by the fact that 1,400 lb. of seed of bulk *thekkan cheera* was eagerly purchased by them for sowing their third crop.

47. *Academic work.*—On all these stations work is being done on inheritance characters, and hybridization is being undertaken. Probably the most interesting phase of this work is the attempt to produce a strain which will prove resistant to *Piricularia* a fungus which in some years causes a lot of damage and which is popularly known as "blast disease". The difficulties surrounding this piece of work are added to by the vagaries of the season. Thus during the year under review there was very little disease and this held up the work a great deal As remarked in my report last year, the possibilities of hybridization by which desirable characters are combined in one variety are enormous and this line of pure research is being pressed steadily forward.

48. An important phase of this work is a complete survey of all the different varieties of paddy to be found in the Presidency. It is difficult for the officers in this section to find the requisite time to conduct this survey, but further progress has been made during the year in the Erode and Tinnevelly areas and a preliminary survey was made in South Kanara and in part

of Malabar and the number of varieties in the type collection now amounts to 531 which will serve to show the magnitude of the work before the section.

49. Economic work with paddy is also carried out at the experiment stations at Anakapalle, Samalkota, and Palur, mainly in relation to local problems such as the production of strains suited to the immediate locality, manurial studies, and the control of pests.

50. On the Samalkota and Anakapalle experiment stations single plant selections were continued. The variation in the performance of some of the selections from year to year and field to field shows the necessity for testing the selections under varied conditions in the actual tract for which they are intended and emphasizes the necessity for experiment stations for this purpose in each district, and probably for even smaller tracts than a district. At both stations some promising strains likely to suit local conditions have been selected. At Anakapalle an examination of all the varieties grown reveals the fact that *navakoti sannan* leads with a five-year average of 2,700 lb. of grain per acre closely followed by Co. 1. Attempts are being made to improve the *mypali* variety, so widely grown in this area, by means of single plant selections. At Samalkota a manurial experiment has been started to test the value of sulphate of ammonia in different combinations with other manures.

51. At the Pālūr Experiment Station an experiment which has been conducted for six years has shown that of short duration paddies, Vellai Kar, *Jaramana-kattai*, and *Chitrakali* are all better than the local variety, Swarnavari, and it can be safely said that for well irrigated paddies under Palur conditions *Chitrakali* is the best for the *kar* season. Among long duration varieties *Thellavadlu* has proved the best, especially in tracts where irrigation is precarious. Of short duration samba varieties Co. 2 has shown itself an excellent strain for an early crop while G.E.B. 24 has the advantage of early maturity and fine quality. Among the main samba varieties *Red Sirumani* has proved the best over a five-year trial closely followed by Ad. 1. These strains have averaged well over 4,000 lb. grain per acre over five years.

52. *Finance.*—The paddy breeding stations are not intended from the very nature of the work being done on them to pay, except in so far as they add to the total wealth of the country by improving the paddy crop, from which point of view they pay enormously as has been indicated above. At the same time it is worth noting that the receipts from the sale of seeds and produce amounted during the year to the sum of Rs. 18,414, which is a considerable advance on the receipts of previous years.

(b) Cotton.

53. Mr. G. R. Hilson, the Cotton Specialist, was in charge of this section during the year with the exception of a short period when acting as Director of Agriculture.

The main work of the section is to produce better strains of cotton suited to different localities both by means of selection and hybridization, the work being both economic and academic.

54. The season at Coimbatore was unfavourable owing to the fact that the north-east monsoon rains were late and when they came they were too heavy. This resulted in late sowings, poor germination, and slow growth.

55. The programme of work was on the same lines as that in previous years, viz., (1) isolation of pure strains from local mixtures, (2) hybridization and isolation of pure strains from the resulting mixture, and (3) testing of pure strains. Both irrigated and rain-fed cottons were dealt with.

56. *Economic work—Cambodia.*—A number of selections from No. 664 which promised to show a lower proportion of undeveloped bolls were grown, but the results were not hopeful, and in all probability this strain along with Co. No. 1 will be continued as pure cultures.

A comparison was made between No. 440 and Co. No. 1 and the former has proved itself the better yielder. It is a more vigorous strain and better able to survive the attacks of insect pests. Spinning tests conducted at Matunga on the 1926–27 produce showed that the highest standard warp count for which

cambodia strains evolved by the department are suitable is as follows :—

No. 15, 34/36s ; Co. No. 1, 38/40s ;
No. 440, 36/38s ; and No. 664, 40s.

57. *Rain-fed cotton.*—Yield tests of four strains of herbaceum cotton were made in comparison with uppam and Karunganni both on black and red soils.

58. *Time of sowing.*—Now that a strain of cambodia cotton has been isolated which is vigorous and produces lint of fair quality and we are in a fair way to do the same for rainfed cottons, the time has come to turn our attention to another aspect of this crop, its cultivation and manuring.

A start has been made during the year to examine the question of the best time at which to sow, the strain used being No. 440. The local practice is to wait for the monsoon rains before sowing cambodia cottons. It has been noticed that the interval between the date of sowing and the date of picking was shorter, the later the crop was sown and it was considered that this might have some effect both on the quantity and quality of the produce. An experiment conducted to test this point has given a most startling result. Early sown cotton gave an average yield of 1,040 lb. of seed cotton per acre, while the late sown crop gave only 260 lb. Early sowing resulted in four times the yield of late sowing, a result not altogether unexpected. If future experiments confirm this, the introduction of the practice among the ryots will have far-reaching results.

59. *Academic work.*—Hybridization work was continued according to plan, but as yet there is little to report. The evolution of a new strain along this line of attack requires time and patience. A few promising crosses have been made and that is all that can be said at the present moment.

60. It was mentioned in last year's report that the Kovilpatti Experiment Station had been converted into a cotton sub-station to study cotton under the local conditions obtaining in this area. The work being done on this station consists of (*a*) the isolation and purification of strains from the local cottons and testing them on small plots, (*b*) the multiplication of

seed of those strains which survive these tests, and (*c*) experiments devised to improve the cultivation methods and manuring of this crop. Satisfactory progress has been made during the year with this programme of work, but the results so far obtained are tentative and do not call at this stage for any special comment.

61. Very similar work is done on the Hagari and Nandyal experiment stations. The most notable result obtained on the former during the year is the trial of H. 62 against H. 25, the strain hitherto distributed. For four successive years the former strain has shown its superiority in yield and ginning percentage, while the quality of the two strains is the same. H. 62 may therefore be considered an improvement over the old H. 25 and it will now be distributed to replace the latter under the designation H. 1.

62. It has been found impossible to recruit suitable men for the posts of Physiological Botanist and Biological Chemist under the schemes for research work in connexion with the stem weevil and bud and boll shedding to be financed by the Indian Central Cotton Committee and this work is still held in abeyance in consequence.

63. *Transport Act—General.*—The Cotton Transport Act continued to be in force during the year in (1) the Tiruppūr-Cambodia area, (2) the Tinnevelly area, and (3) the Northerns and Westerns area. No cotton, kapas, seed, etc., was imported into these areas by rail or sea except under a licence issued under my authority.

64. During the year a new procedure was adopted in that licences for the import into the protected areas of cotton seed for use as cattle food were freely granted during the sowing season of the year under review in order to satisfy the demands of the public and the trade and to minimize the agitation against the working of the act, but it is to be feared that in some instances this concession was abused and such seed was sold for sowing purposes despite all precautions.

65. *Kapas.*—Annual licences for the import of cambodia kapas were granted to applicants as in the

previous two years. To prevent hardship to cotton-growers in districts that have no ginning factories, single licences were freely granted to applicants for import of *kapas* therefrom.

66. *Working of the Act.*—The act worked smoothly on the whole in the Northerns and Westerns area. Difficulties, however, arose over the administration of the Act in the two southern areas on account of the demand of the local traders for the free import of cambodia kapas either with or without licence to safeguard their vested interests. The concession that had to be allowed to the trade on this account limited the usefulness of the Act. Some good results have, however, been achieved as cotton marketed in the south was comparatively free from admixture with Mysore and Deccan cottons, and as cotton in the Northerns and Westerns area was free from admixture with Cocanadas cotton as well as with short stapled cottons from Bombay and the Central Provinces.

67. *Revision of boundaries of the protected areas.*—In view of the strong opposition of the trade, Government have abandoned the proposed idea of dividing the southern half of the Presidency into three areas. Government have also decided to have only one combined area for the south. This decision will make it necessary for the formulation of a plan of action, which will make good the advantages that would have accrued by the formation of three protected areas. This question will be carefully examined in consultation with the Cotton Specialist.

68. *Licences for seed.*—Government has also decided to permit the free movement of seed without licence. There is no definite body of evidence to indicate that seed imported for cattle food is used to any extent for sowing purposes, though instances are known and some suspected of this abuse. The cultivator arrives at his decision about the cotton he will grow by well considered argument. In the main, he is careful to get seed of the kind he requires. However, he is sometimes so placed, chiefly by his own slackness, that for a second sowing he has to get his seed from a doubtful source. It is better that he does so than grows nothing at all. The establishment of a large number of seed unions would eliminate trouble of this kind and it

would not matter then what seed comes in as cattle food. Until there is definite proof that the character of the cotton in a tract is being lowered by the use of seed of another cotton which ordinarily was consumed as cattle food, the importation of cotton seed as cattle food may be unrestricted. To give effect to the proposals above, the present notification and the rules under the Cotton Transport Act require amendment with the approval of the Legislative Council, and it is to be hoped that the subject will be moved at an early meeting of the Council.

69. *Licences under the Cotton Transport Act—Single licences for import of cotton by rail—General.*—The Railway authorities have kindly co-operated with the Agricultural Department in regard to the administration of the rules under the Act. The station staff have understood the rules better this year.

70. 3,220 licences with corresponding certified copies were issued during the year against 1,811 in the previous year. It may be noted that the working of the Act has thus thrown a tremendous lot of work on my office staff. Not only have a very large number of licences to be issued each year, but a great mass of correspondence connected with them needs attention. Of the licences issued, 870 licences alone have been used, 1,041 licences were returned without being used on the ground that the parties did not find it profitable to purchase cotton seed at the prevailing prices, and 1,309 licences have not been returned. Of the licences used, 17 relate to the import of kapas, 13 to ginned cotton, 2 to cotton waste, 13 to cotton seed for sowing, and the rest to cotton seed for cattle food. As for the quantity of kapas, 2,000 maunds from Alakkudi (Tanjore) were imported into Erode and 1,250 maunds from Azhikkal (Malabar), Perugumani (Trichinopoly), Trichinopoly Fort and Pallinelianur (South Arcot) were imported for ginning into Tiruppūr for want of local ginning facilities. There was also an import of 160 maunds of kapas from Cannanore into Coimbatore for manufacture. Ginned cotton was, imported by Messrs. Volkart Bros. Agency, Guntakal to the extent of 2 bales from Davangere, 7 bales from Raichur, 2 bales from Chitaldrug for preparing standard samples. Besides these, there were other imports

of ginned cotton into the protected areas ; viz., 588 maunds into Sankaridrug and Tiruppūr from Virudhunagar, Koilpatti, and Calicut for the purpose of khaddar manufacture, and 820 maunds into Nandyal from Tarlupadu just outside the protected area for delivery to Messrs. Volkart Bros. against their contract. Licences for cotton seed for sowing were granted for the import of 66 maunds from Tiruppūr into Madura, Guntakal, and Muddanuru, 2,830 maunds from Hubli to Nandyal, Tadpatri and Adoni, 496 maunds from Koilpatti to Dindigul, Tiruppūr and Coimbatore, 19 maunds from Madura to Dindigul and 65 maunds from Coimbatore to Madura. Of the number of licences for the import of cotton seed as cattle food which were used, 275 relate to imports from His Exalted Highness the Nizam's Dominions, 237 from Bombay, 108 from Mysore and 205 from places within the Presidency.

The table below shows the quantity of cotton seed imported under licences :—

Figures in railway maunds of 82⅔ lb.

Name of protected area into which cotton seed was imported.	Import from							
				Madras Presidency.				
	Bombay Presidency.	H.E.H. the Nizam's Dominions.	Mysore.	Northerns and Westerns area.	Tiruppur cambodia area.	Tinnevelly area.	Other places.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Tinnevelly area ...	62,200	51,055	3,525	(a) 3,425	(b) 2,295	Nil.	Nil.	122,600
Tiruppūr cambodia area.	23,940	33,461	36,105	(c) 14,251	Nil.	(d) 27,475	(e) 26,730	161,962
Northerns and Westerns area.	36,795	46,275	Nil.	Nil.	Nil.	Nil.	Nil.	83,070
Total ...	(f) 123,035	(g) 130,791	(h) 39,630	17,676	2,925	26,475	26,730	367,632

(*a*) Import from Bellary to Virudhunagar, Madura and Tinnevelly.
(*b*) Import from Dindigul to Sattur.
(*c*) Import from Adōni, Bellary, Kurnool and Hospet mainly to Erode, Karur, and Sankaridrug.
(*d*) Import from Virudhunagar, Tuticorin, Sāttūr, Kadambur, Nallatinputhur and Koilpatti mainly to Dindigul (23,731 maunds) and Kulittalai.
(*e*) Imports from Salem (13,070), Calicut (10,366), and Cochin (2,944).
(*f*) Imports from Bijapur (31,075), Gadag (15,465), Hubli (12,950), Shedbal (11,820), Annigeri (11,565), Sangli (6,740), Kudchi (6,485), Kurduwadi (4,935), Jayasingpur (4,875), Kolhapur (3,300), Pandharpur (2,526), Jeur (2,429), Chikodi Road,

Belgaum, Dharwar, Bagalkot, Sholapur, Hatkanagale, Budghgaon, Bombay and Mallapur.
(*g*) Imports from Warangal (29,405), Latur (28,265), Barsi Town (13,700), Nander (12,626), Dharmabad (8,820), Parbhani (5,060), Jumekunta (5,040), Yadgiri (5,038) Raichur (4,926), Umri (4,286), Purna (3,880), Tandur (3,125), Pedapalli, Seram, Vikarabad, and Mudkhed.
(*h*) Imports from Davangere (16,860), Chitaldrug (17,840), Harihar, Arsikere, and Banavar.

The table below gives the imports into the main importing stations :—

Tinnevelly area.		Tiruppūr Cambodia area.		Northerns and Westerns areas.	
Station of import.	Quantity imported.	Station of import.	Quantity imported.	Station of import.	Quantity imported.
(1)	(2)	(3)	(4)	(5)	(6)
	MDS.		MDS.		MDS.
Madura ...	74,565	Karur	64,505	Tadpatri ...	38,755
Tinnevelly ..	24,815	Erode	30,386	Nandyal ...	22,960
Tenkasi ...	6,000	Dindigul ...	27,206	Muddanuru	13,433
Sāttūr	5,495	Tiruppūr ...	16,577	Kamalapuram.	2,451
Virudhunagar.	5,195	Coimbatore ...	15,370	Adōni ...	1,875
Rajapalaiyam ...	3,420	Kulittalai ...	3,925	Dronachalam.	1,400
Sankaranayinar koyil.	1,000	Sankaridrug ...	1,530		
		Manapparai ...	1,202		

Minor importing stations were Manamadura, Tuticorin, Ramnad, Ambasamudram, and Kadumbur in the Tinnevelly area, McDonald's Choultry, Karamadai, and Kodaikanal Road in the Tiruppur cambodia area, and Mangapatnam, Bellary, Betamcherla, Hindupur, Dharmavaram, and Anantapur.

71. *Cotton Ginning and Factories Pressing Act.*—This Act continued to be in force during the year. Sixty-three pressing factories and about 450 ginning factories were working in the Presidency in the year. There has been steady improvement in the marking of bales, which is the central feature of the Act. The Indian Central Cotton Committee resolved that the half pressed bales pressed by mill-owners for consumption in their own mills should also be marked in one running series of numbers, as required by the Act and rules. In accordance with this resolution, the cotton pressing factory in the Presidency, referred to in the report of the previous year has now been marking the bales properly.

72. Inspection reports on factories were received from Inspectors of Factories and Gazetted Officers of

the Agricultural Department in charge of circles and action was taken whenever necessary to remedy the defects noticed. The manager of a factory in Ramnad was fined on prosecution for failure to maintain a ginning register and to produce the weights at the inspection of the District Magistrate.

73. *Weights.*—The Board of Revenue has now laid down a uniform procedure about the testing and stamping of English weights by the stamping Establishment in taluk offices.

The Board of Revenue has also laid down standards as to the permissible errors in weights used in ginning and pressing factories.

74. The Act and rules have now been published in book form in diglott for ready reference by factory owners and are being sold to them at cost price. Seven hundred and ninety-three forms of ginning register (415 Tamil and 378 Telugu), 14 forms of the pressing register (2 Tamil and 12 Telugu), and 2,026 forms of the pressing return (767 Tamil and 1,259 Telugu) were sold to the owners of factories during the year. Some of them maintained the registers and prepared the returns in manuscript.

75. *Import of cotton by sea.*—One hundred and thirty-five licences were issued during the year for the import of ginned cotton and cotton seed into Tuticorin against 22 issued in the previous year. Only 22 have been returned without being used. Forty-five licences have not yet been returned. Of the remainder, 32 relate to ginned cotton and 36 to cotton seed. The table below shows the quantities of ginned cotton and cotton seed imported :—

Station of export.	Ginned cotton.	Cotton seed for cattle food.
	BALES.	MAUNDS.
Bombay	8,278	22,782
Karachi	3,835	1,550
Calcutta	38	...
Rangoon	...	11,700
Cocanada	...	1,080
Colomboo	...	152

The ginned cotton was imported by Messrs. A. & F. Harvey, Tuticorin and Tinnevelly Textiles Ltd., Koilpatti, for consumption in their mills.

Annual licences for import of cotton by rail.

The table below gives information about the licences issued from February 1927 to January 1928 :—

Cotton year 1927-28 (*licences which lapsed on* 1st *February* 1928).

Name of protected area.	Kind of cotton.	Purpose for which licences were issued.	Number of licences issued.	Number of certified copies issued.	Number of certified copies used.
(1)	(2)	(3)	(4)	(5)	(6)
Tinnevelly area ...	Ginned cotton.	Mill consumption.	6	406	262
	Do.	Export to ports outside India.	7	300	95
Do. ...	Cambodia kapas.	Mill consumption.	6	87	17
	Do.	Export to ports outside India.	4	105	8
Tiruppur cambodia area.	Ginned cotton.	Mill consumption.	5	141	107
	Cambodia kapas.	Do.	1	5	1

Information about licences issued from 1st February 1928 to 31st March 1928 is given below:—

Cotton year 1928-29 (*licences which will expire on* 1st *February* 1929).

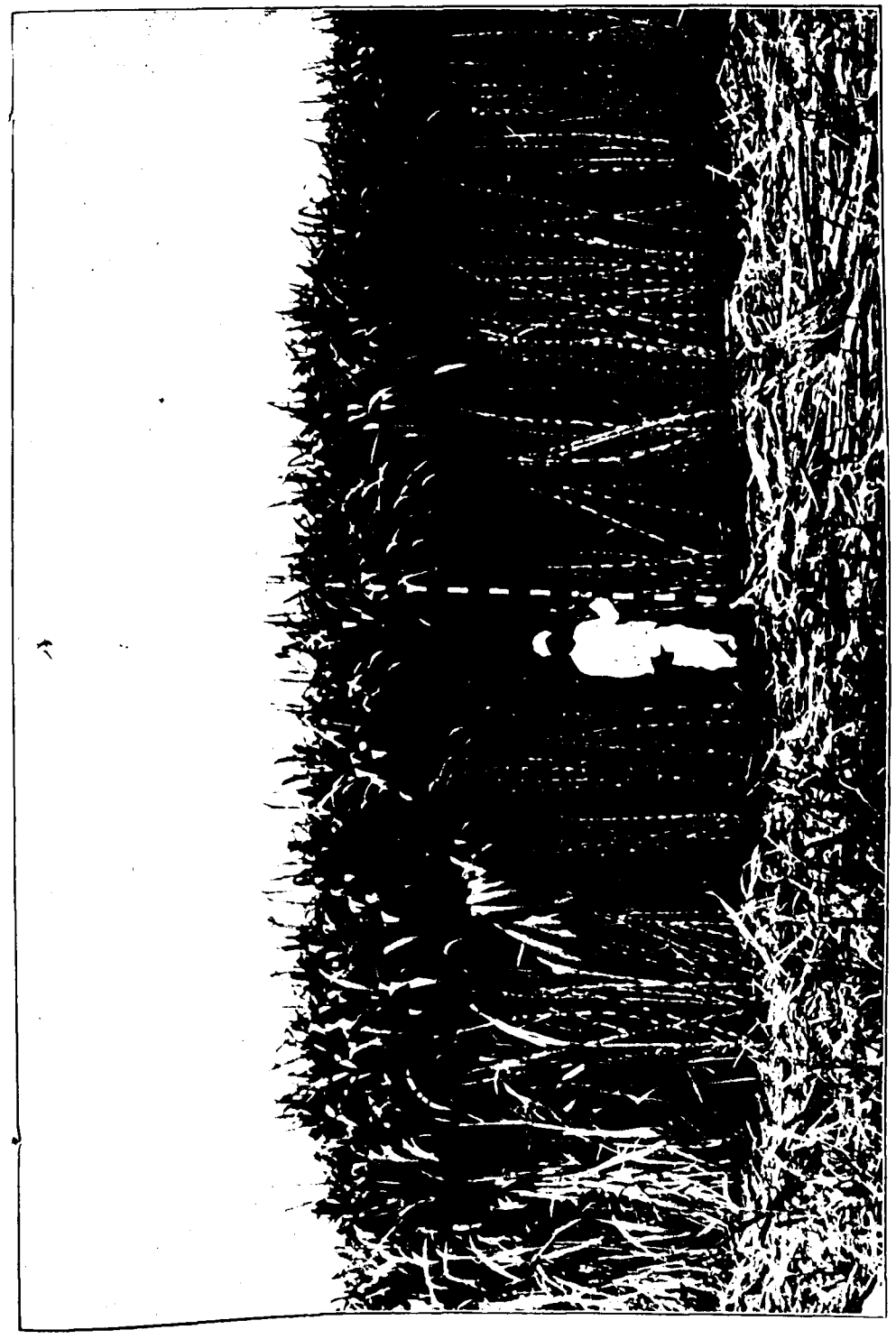
Name of protected area.	Kind of cotton.	Purpose for which licence was issued.	Number of licences issued.	Number of certified copies issued.
(1)	(2)	(3)	(4)	(5)
Tinnevelly area ...	Ginned cotton.	Mill consumption.	6	111
	Do.	Export to ports outside India.	6	97
	Cambodia kapas.	Mill consumption.	6	35
	Do.	Export to ports outside India.	1	5
Tiruppur Cambodia area.	Ginned cotton.	Mill consumption.	5	90
	Cambodia kapas.	Do.	1	5

(c) Sugarcane.

76. At the Anakapalle Experiment Station, the new extension of which will be devoted to the testing of thick canes likely to be suitable for the Presidency and to manurial and cultural experiments, satisfactory progress has been made with the lay-out and buildings. A series of preliminary manurial experiments has just been concluded and definite conclusions reached and the results will shortly be written up and published and a new series will be started to clear up points still obscure.

77. The system of short planting mentioned in last year's report to raise seed material has now been thoroughly tested out and it can be recommended to the ryots for adoption. A publication on the subject is under publication. This year a yield of 30 tons of seed cane per acre was obtained with B. 208 when short planted as well as 1,016 lb. of cumbu, while cane planted in February for seed material in September gave 36 tons per acre. The plot was immediately put under paddy and 2,680 lb. of grain per acre obtained. The economics of the system have been carefully worked out and it shows an increased profit over the local method over four years of Rs. 118 per acre.

78. In last year's report it was mentioned that at Pālūr experiments were being conducted to test the the value of the different kinds of cake for this crop, supplementing them with artificials. These experiments have now been conducted for six years and the following definite conclusions have been arrived at for conditions obtaining in the neighbourhood of this experiment station. When the total application of nitrogen is 100 lb. per acre made up of cake and sulphate of ammonia castor is slightly superior to groundnut cake. When the dosage is increased to 150 lb. better results are obtained. When the economics of the case are worked out groundnut cake supplemented with sulphate of ammonia is much the most profitable, this cake being available locally. Fish manure, either by itself or in conjunction with sulphate of ammonia, is not profitable. It now remains to discover the right proportions of these two manures, organic and artificial, to use, and the experiment will henceforth be designed to test this point.



79. Varietal trials have also been conducted at Pālūr and as a result of these it can safely be stated that J. 247 is the best cane for this locality. Java varieties on account of their high tonnage are worth growing while some other varieties obtained from the Sugarcane Expert at Coimbatore are very promising.

80. A rotational experiment with sugarcane which is being conducted at this station, though far from complete, has finished one cycle and as regards cane alone indicates that a four-year rotation is the best though this may not be the case when the profits on the whole rotation are taken into account. It is however too soon to draw any definite conclusions.

(d) Dry grains.

81. The Millets Breeding Station was established in 1923 and under the able charge of M.R.Ry. G. N. Rangaswami Ayyangar Avargal, good progress has been made and the first of the improved strains which this station is designed to evolve are in sight. Attention has so far been mainly concentrated upon periamanjal cholam and ragi and both the academic and economic aspects of these crops are under intensive study. The pick of the selections made with the former have been put to their first comparative trial on dry land and these will be made this season. From the results obtained a good strain for the ryots will be selected.

82. In the case of ragi a strain known on the station as E.C. 47 has established its superiority and this will probably be the first to go out to the ryots. A bulk test is now being made and this will give us seed enough to go out into the district round Coimbatore.

In addition to this a satisfactory start on the same lines has been made with korra, arika, panivaragu, and kuthiraivali.

Ragi forms one of the staple food crops of the Vizagapatam and Ganjām districts and is cultivated in three distinct seasons. The varieties grown are admixtures of different types; so at the Anakapalle Experiment Station selection work has been done for several years and a number of pure strains have been

produced, one of which shows an increased yield of 30 per cent.

(e) Coconuts.

83. Seed selection work, manurial trials, spacing experiments, etc., are being undertaken on the Coconut Experiment stations. With a perennial crop of this nature it will take a long time before significant results can be obtained and there is little that can be said at present. There is, however, a decided indication that the trees respond best to bulky organic manures and an attempt is being made therefore to grow green manures between the trees. It is difficult to find a really satisfactory plant for the purpose, the local cow-gram is the best that has been found at present.

84. On the stations planted *de novo* the system of dry farming employed is being justified. Of the trees planted in 1918, 82 per cent are now in bearing and have yielded 4,829 nuts to date. Of those planted in 1919, 76 per cent are in bearing and have yielded 926 nuts to date. This is a great advance over the local system under which trees are not expected to begin to bear till they are ten years old or more.

(f) Fruit culture.

85. In accordance with G.O. No. 669, Development, dated the 12th May 1923, a profit and loss account of the fruit gardens on the Nilgiris is shown below:—

—	Pomological Station.		Burliar Garden.		Kallar Garden.	
	Expenditure.	Receipts.	Expenditure.	Receipts.	Expenditure.	Receipts.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Working charges.	2,469 15 1	...	1,416 1 0	...	1,845 7 8	...
Sale of fruits and plants.	...	2,168 11 9	...	1,301 15 3	...	914 1 3
Profit or loss ...	...	−301 3 4	...	−114 1 9	...	−931 6 5
Percentage of expenditure returned as receipts.	...	87·8	...	91·0	...	49·5

86. Taking all the three gardens into account 76·9 per cent of the expenditure has been recovered in receipts as compared with 74 per cent last year. The season was not a really good one, but there was again a very heavy crop of plums at Coonoor. We can now state with confidence that certain varieties of plums will grow on these hills and bear well and continuously. The trial with apples is being continued, a large number of new varieties were successfully imported from Australia during the year and planted out to enable us to continue our search for good varieties suitable to local conditions.

87. It is becoming more and more evident that manures play a very important part in the growth of fruit on the Nilgiri Hills. All the trees at Coonoor Station receive a mulching of cattle manure applied in semi-circular trenches opened on one side of the tree, the sides being changed in alternate years. In addition to this 5 lb. of bone meal and 1 lb. of sulphate of potash is given to each tree. The cattle manure is applied when the trees are resting, the bone meal after harvest, and the potash when the fruit is setting. Soil erosion is most carefully prevented by growing a thick cover of *Indigofera endecaphylla*. As a result of this treatment continuous good crops, more especially of plums, have been secured. These fruit gardens have a decided economic value. fruit growing is becoming popular on the hills and might be still further developed, especially among the Badagas, had the Department but demonstrational staff to popularize it. The demand for plants showed signs of improvement this year and 637 grafted fruit trees and 1,273 seedlings were sold from the nurseries which are kept well stocked.

88. At Burliar the Mangosteen crop was again a poor one, the season being unfavourable, but other crops were satisfactory. A young litchi tree has fruited for the first time and the fruit was of excellent quality. This will be an acquisition to these hills if it can be grown successfully.

89. At Kallar the Sapotas are the most successful and a large fruited variety grown there is an acquisition. Arrangements are being made to work up a a good stock of grafted plants for the benefit of the

public. Mangosteens have been established in these gardens.

90. *Plantains.*—At the Samalkota Experiment station it has been successfully demonstrated that a crop of plantains can be harvested within ten or eleven months of planting if well cared for. This year 80 per cent of the three varieties grown on the demonstration area, Chakkarakeli, Bontha, and Mauritius, were harvested before the middle of April and gave a net profit of practically Rs. 1,000 per acre. We are now sure of this method, and can safely recommend it to the ryots and a description of it will be published in the form of a bulletin.

(g) Medicinal and tanning plants.

91. Considerable progress has been made with the cultivation of *Ipecacuanha* and a large stock of plants has been worked up in the nurseries. After several attempts we have at last been successful in germinating seeds of *Gambiar* imported from the Federated Malay States and 77 plants have been raised. Twelve have been put out at Kallar and are growing rapidly. *Jalap* and *Foxglove* are also grown, but as there appears to be little demand for these drugs and they require a great deal of manure which is difficult to obtain, their cultivation has not been extended.

(h) Potatoes.

92. The results of experiments carried out on the Potato Experiment at Nanjanad near Ootacamund over a series of years has pointed to the fact that good crops depend upon deep cultivation and the liberal application of organic manures. In order to put this conclusion to the test on a field scale the station as a whole was ploughed this year with an Eagle plough and heavy dressings of manure were given. The result has been a bumper crop all round. It is true the season was on the whole favourable, but pests and diseases were troublesome and the success is largely due to this improved method of cultivation. One of the manurial experiment plots treated with 3 tons of farm yard manure, 15 cwt. fish guano substitute, 10 cwt.

lime, 5 cwt. superphosphate and 2 cwt. muriate of potash per acre, gave a record yield of 7·61 tons per acre and showed a handsome profit. Without the aid of co-operative societies probably the ryots could not afford the capital expenditure necessary to adopt this system, but could they do so it would pay them.

93. In view of the fact that organic manure is so important for this crop every effort has been made to increase the stock on the station itself by using *Bracken*, *Eupatorium* and other green materials, which can easily be collected from the waste lands, as litter in the cattle shed and by putting *Lobelia* into the manure pits. In this way with 5½ pairs of cattle 16 tons of manure were collected for the second crop of 1927 and 42 tons for the main crop of 1928. This is a practical method which can be adopted by the ryots at small cost.

94. Potatoes cannot be grown on the same land year after year and a system of rotation with cereals and green dressings has been introduced. In this a new crop to the ryots, *Samai*, has been introduced with success and this is gradually becoming popular among the neighbouring ryots who purchased 5,100 lb. for seed purposes. These cereals provide fodder for the work cattle.

Varietal tests were continued and a few new varieties introduced and a feature of these was made at the annual flower show at Ootacamund.

(i) Groundnut.

95. There is as yet no crop specialist for oil-seeds, but owing to the growing importance of the groundnut crop which occupied 2,680,156 acres during the year the largest area ever put down under this crop in the Presidency, work has been begun on a special Groundnut Experiment Station situated at Palakuppam. The main line being undertaken here is the conduction of varietal trials with the object of discovering the best types to grow and something better than the local Mauritius. There are two main groups of groundnuts cultivated in this Presidency, long duration types which have a spreading habit, and short duration types which have a bunched habit.

96. The crop appears to be a difficult one with which to deal and there is undoubtedly a need for a specialist to devote the whole of his time to intensive research on this and other oil seed crops. Season appears to have a great deal to do with the yield of different varieties which greatly complicates the situation. This year the varieties tested against one another showed an entirely different order of merit to last year.

97. Some light has been thrown upon this phenomenon as a result of morphological studies. A good season appears to increase the number of flowers produced, but has no effect upon the percentage of pods to flowers. There appear to be two waves of flowering, the interval between them being very different for the main types, and the second wave is practically useless in the case of bunch varieties. This will serve to indicate the complexity of the subject and the necessity for intensive research.

98. An investigation has been begun to determine the best time at which to harvest the crop and there is reason to believe that the ryots harvest the spreading varieties too early and thus get an undue proportion of immature pods.

99. In the Ceded Districts it is the custom to drillsow groundnuts, while in the south the crop is always sown behind a country plough, which not only requires a large amount of labour, but results in uneven and defective germination, because the seeds are buried at different depths. An experiment conducted with drill-sowing as compared with the local method showed that the former method resulted in a monetary gain of Rs. 14 per acre. If this method can be introduced therefore it may give considerable monetary returns to the ryots.

100. Hybridization work has been begun between desirable types, and in collaboration with the Mycological Section a study of *Rhizoctonia*, a fungoid disease which does a good deal of damage to this crop, is being made with the object of finding a remedy on the one hand and a disease-resistant variety on the other.

101. This crop has of late years assumed an economic importance of the first magnitude in the

neighbourhood of Guntūr and consequently experiments have been laid down at the Guntūr Experiment Station to determine the best varieties to use in this locality and to devise improved methods of planting and harvesting the crop.

(j) Betelvine.

102. A small experiment station was established at Vellalur three years ago to investigate the cause of certain diseases which have attacked this crop and to test whether there is any truth in the popular belief that earthworms are the cause of the trouble. It is as yet too early to make any authoritative statement. It has always been the belief of the Department that the trouble was due to defective drainage and this point is receiving particular attention on the station. A complete crop has been taken from one of the plots and the results go far to substantiate these views. Where the vines have been grown on raised beds to facilitate drainage the yield has been increased by 27 per cent over vines grown on beds at field level, the local practice, and in addition to this the quality of the crop was better. Manurial trials are also being carried out and the earthworm problem investigated from every point of view.

(k) Fodder crops.

103. The question of fodder to tide over the hot weather period is a very difficult one. The ryot naturally refuses to put land which will give him a substantial profit under tobacco, cotton, or groundnut, down to fodder, and in some places money crops are displacing fodder. This problem is closely linked up with the cattle breeding problem, and increased attention has been paid to it during the year in collaboration with the Imperial Physiological Chemist at Bangalore.

104. A number of experiments are being conducted at the experiment stations with different fodder crops. Where irrigation can be provided elephant grass and guinea grass give good results as the following typical figures will indicate.

	Yield per acre lb.
Palakuppam Groundnut Experiment Station	41,100
Palur Experiment Station	30,514
Central Farm, Coimbatore	62,808
Elephant Grass :	
Hosur	34,660
Guinea Grass :	
Palur Experiment Station	21,330
Central Farm, Coimbatore	30,314
Hosur	37,220

Lucerne is a useful crop and on the Central Farm at Coimbatore it gave 50,487 lb. per acre, but it will not grow in all localities.

Among fodder cholams experiments conducted at Palur Experiment Station have shown that under the conditions obtaining in that locality *kaki jonna* is the best variety to grow followed by *chen cholam*. The former gave 23,742 lb. per acre and it was a dry year.

105. At the Hosūr Cattle Farm where fodder is of the utmost importance extensive experiments are being tried with a number of fodder grasses. Kolukattai grass is most promising and attempts are being made to replace spear grass by other grasses. It is yet too early to say that success will be obtained.

106. This year two stacks of hay and two pits of silage were made from spear grass before it flowered. The remainder was combed while still standing to remove the spears and this has materially improved the quality of the hay. The best hay, however, is produced when the grass is cut before it flowers. Rhodes grass is also promising and ten acres gave a yield of 15,000 lb. as well as three or four grazings.

107. A number of specimen plots of different grasses is maintained at the gardens at Ootacamund and is well worth a visit. *Paspalum dilatatum* is a valuable fodder grass which grows well on the hills and it is gradually spreading. It should in time materially increase the fodder supply around Ootacamund and Coonoor. Another valuable fodder grass which is doing very well on the hills and spreading rapidly is *kikuyu* grass, a native of Africa. There are great possibilities for this grass if land can be enclosed and

protected from grazing till it becomes established. At the Central Farm, Coimbatore, it gave an acre yield of 8,734 lb.

108. *Silage.*—A special effort to popularize this useful method of storing fodder against the hot weather has been made during the year. Silo pits have been laid down on many of the experiment stations as a demonstration to the ryots with the following results.

109. At Taliparamba, 9·3 tons of hill grass and 3 tons of fodder cholam were siloed in three pits. The result was not so good as last year, but the silage was relished by the farm stock and they were maintained on it during the hot weather.

110. At Chintaladevi, four pits have been filled with 105,765 lb. green fodder consisting of maize, jonna, and spear grass.

111. At Guntūr Experiment Station, two pits were filled with sunnhemp and green jonna, respectively. At the Central Farm, Coimbatore, 38,908 lb. of green fodder cholam, 2,592 lb. of sunnhemp, and 1,736 lb. of dhaincha were pitted and 35,698 lb. of ensilage was obtained, showing a loss of 17·5 per cent on the green weight. This may be compared with 77,412 lb. of green fodder cholam turned into hay, 25,804 lb. of hay being obtained, a loss of 67 per cent.

112. At Hosūr, silage making is a regular part of the work and we depend upon it largely for feeding our stock during the hot weather. Seven hundred and sixty-two tons of material were silaged during the year.

B.—Chemistry.

113. The chemical section is a very important one and almost all phases of our research work are dependent upon its co-operation and help and problems are constantly being submitted to it. A great deal of the work is of a routine nature and consists in making analyses in connexion with field research going on at the experiment stations and of soil and manure analyses for the public. Two thousand two hundred and twenty-nine samples were dealt with during the year, seventy-three of these being for ryots and

forty-six for the United Planters' Association of Southern India. The increase of work done by this section will be seen if these figures are compared with those of last year when the total number of samples analysed was 1,118, eighteen being for ryots.

114. On the purely research side the most important items of investigation were the following :—

(a) Soil survey.—The soil survey of South Malabar was completed and is now in the press along with that for North Malabar. This survey shows that the soils of this area are well supplied with nitrogen and potash, but are deficient in lime and phosphoric acid and this indicates that a manurial system should be adopted which provides for the supplementing of organic matter with phosphate and great care must be exercised in the choice of suitable artificial nitrogenous fertilizers.

(b) Conservation of soil moisture.—A series of experiments have been laid down during the year to study this problem on the black cotton soils of Bellary and the Ceded Districts. Past experience has shown that manures are ineffective when soil moisture is absent and it is necessary to devise some method of preserving moisture in these soils.

(c) The effect of manuring on crop and seed.—An important memoir on the " effect of manuring a crop on the vegetative and reproductive capacity of the seed ", compiled by M.R.Ry. B. Viswanath, was published through Pusa during the year and this has been well received by all scientific bodies. This important and far-reaching investigation has been continued under varying conditions and much more remains to be discovered. It is very intimately linked up with the work on nutrition in general which is being done by Lt.-Col. McCarrison at the Coonoor Institute and arrangements are being made to collaborate still more closely with him. This research may have very far-reaching results and affect our views on plant breeding and irrigational schemes as well as dictating a rational manurial system for all food crops. Mr. Viswanath, the Agricultural Chemist, is to be congratulated on the progress he has made with this piece of work which is of worldwide interest.

(d) Synthetic farm-yard manure.—Considerable progress has been made with work on this problem. Research under the last head has emphasized the fact if that was necessary that large quantities of organic manure are essential to our crops. We have been able to demonstrate to the public successfully the methods we recommend for converting different kinds of waste materials, such as cholam stubble, gram stalks, prickly-pear, etc., into good cattle manure.

The study of this process of making manure has now reached a stage where we have begun to test it on crops in comparison with ordinary village cattle manure carefully prepared by the loose box method. In all the trials so far carried out, whether applied on the basis of equal bulk or quantities calculated to supply equivalent amounts of nitrogen, it has shown its equality and even superiority. It now remains to evolve a practical and " fool proof " method of preparing it and demonstrating this to the ryot. Considerable progress has been made in this direction and a large number of successful demonstrations have been given.

(e) Manurial experiments.—Experiments with *Calcium cyanamide* were continued and showed that significant increases of crop can be obtained by the use of this fertilizer but they are not always profitable. The supplying firm conducted a number of demonstrations with the manure on the West Coast but few of them showed a profit. Experiments conducted to test the effect of *sodium nitrate* on paddy indicate that it is largely physical. It appears as if the effect of this fertilizer on Coimbatore soils induces flocculation and this results in a too rapid drainage with a decrease in crop as compared with green manure. From a financial point of view manuring with green manure or cattle manure gives a better result than when sodium nitrate is used alone or in conjunction with green leaf. Pot cultural experiments were made with a number of different phosphates now on the market, but results are inconclusive.

For an account of other investigations undertaken by this section I would refer those who are interested to the annual report of the Government Agricultural Chemist.

C.—Botany.

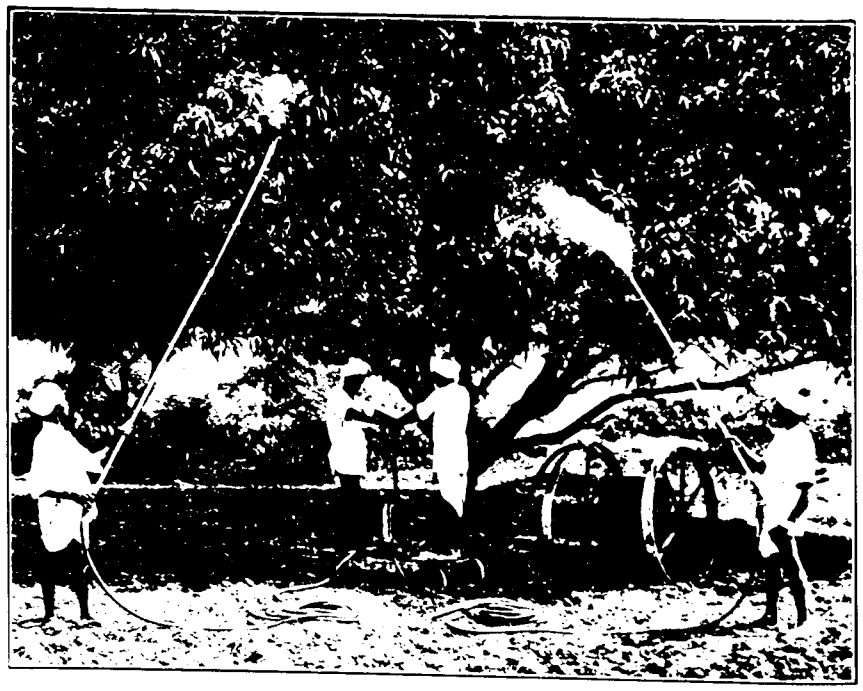
115. This section was called upon during the year to identify a number (278) of specimens for both institutions and the general public and to supply seeds of economic plants. The Professor of Botany, St. Berchman's College, Travancore, brought a collection of herbarium specimens for identification and every facility was given him for naming them.

116. With the object of improving our knowledge of the botanical resources of different parts of the Presidency, which is one of the duties of this section, 200 specimens were collected from the reserve forests of South Kanara district and incorporated in the Herbarium. This Herbarium is now a most valuable depository of knowledge of the botanical resources of the Presidency, and it is seldom that any specimen is received which cannot be promptly named correctly and full information supplied about it. The flora of the Madras Presidency, which is being prepared at Kew, is based on this collection. Seven parts of the Flora have been completed and are now on sale ; no new part was however issued during the year.

117. The section is responsible for the upkeep of the Botanic Gardens at Coimbatore and the avenues planted on the estate. The Gardens, which were started by Dr. Barber when the College was first built in 1907, are a place of popular resort to the public of Coimbatore town and a valuable teaching ground for the students. They contain a good collection of named trees and plants of economic importance and under the loving care of M.R.Ry. C. Tadulinga Mudaliyar, who is now the Principal of the College, they are maintained in excellent order and are bright with flowers throughout the year. They add a great deal, not only to the usefulness, but also to the beauty of the College Estate.

D.—Mycology.

118. This section deals with diseases of plants caused by fungi and research is conducted to discover the precise organism which causes the disease, to study its lifehistory and behaviour under varying conditions, the ultimate object being to suggest a remedy or a preventative method of control which can be adopted



A MODERN SPRAY PUMP.

THE KNAPSACK SPRAYER.

by the ryots. The diseases of the major crops have been studied and a number of minor diseases have also been under observation.

119. In the case of the blast disease of paddy caused by a fungus known to scientists as *Piricularia* an attempt is being made to combat it by evolving a strain which is naturally resistant. No variety appears to be absolutely immune, but at the same time there is a wide range of relative resistance which affords hope of ultimate success.

120. In the case of mosaic disease of sugarcane the same policy is being adopted, a research for resistant strains, and here again there is promise of success. The role which certain insects play in the transmission of this disease is also under study. A bulletin is now in the press describing the disease and the necessity for combating it, and suggesting certain tentative methods of control.

121. A boll rot and seedling blight of cotton caused by a fungs called *Vermicularia* was studied in detail and its physiology worked out as a preliminary step towards its possible control. 'Pollu' disease of pepper which is due to a combined attack of an insect and a fungus was under study. An attempt is being made to control this disease by means of certain sprays but curiously enough this introduces a third factor, a scale insect which attacks the sprayed vines and this pest is more harmful than the "pollu" so that satisfactory control of the latter is rather hopeless unless a spray can be found which does not kill the fungus which keeps the scale down naturally. Our methods have hitherto upset the nice balance of Nature with the usual disastrous results. This is a complicated and difficult problem.

122. A serious wilt disease of betel vines made its appearance during the year in the Chingleput district. The causative fungi have been discovered and isolated and remedies suggested and it remains to be seen how successful these will prove.

123. Another wilt disease does a great deal of damage to groundnuts and here the evolution of a resistant strain as in the case of paddy and sugarcane mentioned above is the line of attack which is being followed up.

124. A number of minor diseases of various crops have been investigated during the year among which may be mentioned the stem bleeding disease which attacks both coconut and areca palms. A simple and practical remedy has been found for this which consists in cutting out the portions of the stem attacked and disinfecting the wound with hot tar. If this is done in the early stages it is quite effective and attacked trees can be saved. Efforts are being made to demonstrate this to the palm growers and persuade them to co-operate to adopt it over large areas so as to reduce chances of reinfection. A wilt disease of plantains which appeared in Madura may prove of importance as it appears to be closely akin to the famous panama disease. The matter is receiving the very careful attention of the Mycologist.

125. Advice and help was afforded to the Cinchona Department with reference to a collar rot. During the year 70 specimens submitted to us from all over the Presidency were examined and advice given whenever possible. Cultures asked for were supplied to Mycological workers at Kew and Porto Rico and also to the Imperial Mycologist at Pusa.

On the academic side a study of the sooty moulds of economic importance has been taken up.

E.—Entomology.

126. This section deals with the insect pests which attack crops. Research is devoted to the intense study of the lifehistory of these insects under varying conditions and especially to their natural enemies, the aim being, as in the case of fungoid diseases, to discover a simple remedy or control measure.

127. Among the major pests to which special attention has been devoted during the year, the following may be mentioned :—

The paddy stem-borer was studied in detail and attention was particularly devoted to finding out how the pest tides over the interval between succeeding crops. There appears to be a relationship between the existence of wild paddy and the degree of infestation and there is undoubtedly a heavier attack in double crop lands where the second crop overlaps the first crop of the succeeding year.

128. The problem of Calcoris attack of cholam was under study and its control in the dry districts of Bellary, Anantapur, and Kurnool can probably be solved only by a detailed study of the agricultural and climatic conditions of the tract.

129. Mango hopper work was continued and the remedy recommended is timely spraying. To make this successful the right type of machine to use must be discovered. A powerful hand sprayer was used with success and other types of sprayers are being investigated.

130. Fruit flies which attack plums and other fruits on the Nilgiris are found to breed on one of the common local species of solanum and so no remedial measure can be recommended. Varieties which are not susceptible to attack may be grown.

131. Rice grasshoppers have been studied and the most effective remedy appears to be to scrape the bunds and thus destroy the eggs early in the year. Bagging and the use of poison baits are also being tried.

132. Thrips which attack chillies were specially studied during the year and the remedy appears to be to spray the nurseries and this line of attack will receive further study.

133. A large number of miscellaneous pests were investigated and 224 enquiries or reports were received and dealt with. Whenever possible such cases are dealt with personally by officers of the section and in other cases advice was given by letter. The number of cases which can be attended to in person naturally depends upon the staff available and this is limited.

134. A number of definite campaigns against special pests were conducted and these are described under the heading of " Demonstration " in another section of this report.

135. On the academic side a study was made of *Acari*, *Syrphids*, and *Peripateri*, and a number of groups in the general collection were sorted and classified.

136. Consignments of insects were sent to the Imperial Bureau of Entomology, London, and to a number of Entomologists in Europe and America as well as to Pusa.

F.—Horticulture.

137. The Botanic gardens at Ootacamund and Coonoor are annually becoming more popular. They are a favourite public resort in the evenings and appear to be particularly appreciated by Indian ladies and gentlemen. The Ootacamund gardens are unique and contain a wonderful and most valuable collection of trees and shrubs. The economic side of such gardens is naturally limited, but their aesthetic value is considerable and the money spent on them is well worth while from the point of view of public health and happiness. There can be no argument that they add very much to the attractions of these popular Hill Stations. Their excellent condition reflects great credit on the Curator, Mr. Butcher.

138. The conservatory which is always tastefully arranged and a mass of bloom is a special feature of the Ootacamund gardens. A number of new and interesting plants have been added to the collections during the year and my thanks are due to all those who have so kindly and generously presented plants and seeds. The Curator on his return from home leave brought out with him a valuable collection of new bulbs and plants partly purchased and partly obtained in exchange and by gift. Among these the following are specially worthy of notice. A collection of Daffodils and Freesias from Messrs Wallace & Co., of Tunbridge Wells, many of which have already flowered and attracted a great deal of attention from the public; *Manettia inflata* a graceful twining plant with scarlet and yellow tubular flowers, a native of Paraguay may be seen in flower at the time of writing this report and should prove popular with Nilgiri gardeners; *Fuschia* var *Thalia* is also in flower and is a useful acquisition.

139. Sim's Park which is as popular in Coonoor as the Government gardens are at Ootacamund has been maintained in excellent order during the year and the collection of young trees from Australia and South America which have been planted out in recent years are making good growth. This class of drought resistant tree appears to do very well under Coonoor conditions.

140. The following is a statement of the expenditure and receipts for the official year under report, but

it is really unfair to charge the whole of the Curator's salary to the Gardens as he also has charge of "Government Parks", the Potato Experiment Station at Najanād, and such demonstration work as can be done with the present limited staff:—

—	Government Gardens, Ootacamund.		Sim's Park, Coonoor.		Other Public Gardens and Parks.	
	Expenditure.	Receipts.	Expenditure.	Receipts.	Expenditure.	Receipts.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Salaries and allowances.	12,738 14 0	...	1,261 4 0	...	...	...
Capital outlay ...	969 4 0	...	10 9 0	...	...	...
Rates and Taxes	857 11 6	...	165 10 4	...	...	...
Working expenses	9,386 14 11	...	3,636 14 9	...	...	...
Repairs	953 15 3	...	146 6 9	...	3,171 11 5	...
Miscellaneous	369 10 0	...	75 4 0	...	...	...
Sale of seeds and plants.	...	2,818 11 0	...	734 5 8	...	...
Sale of flowers ..	...	2,028 1 0	...	160 9 0	...	...
Sale of catalogues, etc.	...	25 3 0	...	14 4 6	...	...
Miscellaneous ...	...	661 5 5	...	100 14 6	...	188 5 0
Total ...	25,275 1 8	5,533 4 5	5,296 0 10	1,009 1 8	3,171 11 5	188 5 0

G.—General Investigations.

141. The Agricultural Department now works as a whole and there is close co-operation between all the research sections themselves and between them and the district staff. The resources of the whole department are concentrated on each problem presented to it and "team work" is made a feature. Though research and teaching have now been separated, the students at the Agricultural College are given ample facilities for seeing what is being done on the research stations and this side of the work is explained to them both by visits to the research stations and laboratories and by special lectures delivered by the research officers.

142. Help is never refused to other departments which may require it and during the year the investigation into the problem of the storage of *ganja* for the Excise Department has been continued and is now practically complete. A beginning has been made

with the study of the botanical side of ganja-growing and other problems which have arisen as side lines in the course of this investigation have been followed up. During the coming year we shall be in a position to submit a complete report to Government on this question which I expect with confidence will result in the saving of large sums of money.

143. Forty-six analyses of soils and manures were made for the United Planters' Association of Southern India. Samples of fish manure and of fish preserved in different ways were analysed for the Industries Department; foods, water, and soils have been analysed for the Jail Department; and soils have been analysed and advice given to the Cinchona Department. In addition to this enquiries have been dealt with and help given to the following :—the Agri-Horticultural Society, Madras, the Anglo-Indian Dairy, Ahmedabad, the Garden Superintendent to His Excellency the Governor, the Agricultural Adviser, Rajkot, and the Principal, the Leather Trades Institute.

144. Advice has also been given in connexion with the sewage farms at Madras, Trichinopoly, and Madura, on various technical points.

Advice has been given by the Livestock section to the Lady Willingdom Leper Asylum, the Ootacamund Municipal Council, and the Tanjore Municipal Council.

145. Help has been given by the Botanical section and specimens supplied to the Industrial workshops at Pavur, the Plant Pathologist, Poona, and others. The Forest Department have been aided with their coconut area at Chaliam and as a result they have been able to raise the rent on their trees from Rs. 1-4-0 to Rs. 1-10-0 per tree. The Central Jail at Cannanore has been given advice with regard to the cultivation of vegetables and dry land farming.

146. Replies were made to several references from the Royal Commission on Agriculture in India and information asked for was supplied. The Principal and Vice-Principal served on a committee appointed to draft a scheme for the establishment of an Agricultural College under the Andhra University.

147. A senior Agricultural Instructor from the Ceylon Agricultural Department came to us for three

months and was given all facilities for studying paddy cultivation in this Presidency.

Mr. Howes from Kew who was touring in connexion with a Plantain Survey was given help to see that crop and to obtain material which he required.

It will thus be seen that the Agricultural Department is doing its best to collaborate with scientific and industrial departments both in and out of India.

V.—LIVESTOCK.

148. The Livestock section in charge of Mr. R. W. Littlewood is a large and important part of the work of the department. Four cattle farms are maintained, the largest being at Hosur which serves the centre, south and west of the Presidency. At Chintaladevi a farm is maintained for the study of the Ongole breed; at Guntūr there is a small farm devoted to the study of buffaloes; at Coimbatore a milch herd is maintained supported by a model dairy for teaching purposes.

149. The primary object of these farms is breeding and the milk supply is a secondary object. The utlimate object is to produce bulls of the best type for distribution in various parts of the Presidency. This entails the keeping of a number of different herds. The Kangayam is accepted all over the centre and the south as a good general purpose animal, while the Scindhe is probably the best type for the West Coast where at present the animals are poor and of no particular breed. Cross-bred bulls and cross-bred milch cattle are produced to serve Madras and the Nilgiri Hills as well as the Coimbatore dairy, where the main object is milk production. It will thus be seen that the work of the section has to cover a very wide and varied programme.

150. *Cross-breeding.*—The object of this work is to arrive at a decision as to whether the cross between an Ayreshire and the Scindhe and Sanhiwal will result in a permanent improvement of milking powers. There is a good deal of difference of opinion on this question among cattle-breeding experts in India and definite conclusions have by no means been reached. The results we have obtained justify the conclusion that the experiment is well worth continuing as far as this Presidency is concerned at any rate.

151. The half-bred bulls resulting from the first cross are mated with half-bred cows, the resulting progeny being the second generation, usually designated by the symbol F_2. Members of this second generation are mated and the resulting progeny is the third generation, usually designated by the symbol F_3, and so on. In this way the stock raised maintain the half and half ratio of Ayreshire and Indian blood. This is slow work as each generation takes at least four years before it begins to reproduce. We have just reached the F_4 generation, but have only one cow of the F_3 generation as yet in milk. The numbers in the herd are F_1 23, F_3 40, F_3 27 and F_4 4.

152. Three of the F_1 cows yielded over 7,000 lb. of milk in their last lactations and the best cow has given 7,234 lb. in 191 days with a daily average of 37·9 lb. She gave at one time as much as 50·5 lb. in one day and is still in milk with a daily average of 29 lb.

Ten F_2 cows at present in milk have given a daily average of 19 lb. The best cow of this lot gave 8,200 lb. in 411 days with a daily average of 20 lb.

The only F_3 cow in milk is giving a daily average of 19 lb.

These results are satisfactory and promising.

153. *The Coimbatore herd.*—This herd consists of cross-breds with various proportions of imported blood in them derived from various breeds. It is maintained to augment the milk supply of the dairy at the Agricultural College. A good many of the progeny are sold as second class milking cows. A pure bred Indian bull is used on this herd to see if the milking strain derived from the imported blood will be retained.

154. *The Ongole herd.*—This herd was started in 1918-19 at the Ongole Cattle Farm at Chintaladevi with the object of improving this breed of cattle which had shown signs of deterioration. The milk yield shows steady and progressive increase. This year it averaged 10·1 lb. per day over 40 cows, last year it was 9 lb. and the year before 8 lb. That there are great milk possibilities with this useful breed of cattle is shown by the following results. Two heifers, the offspring of bull Ganapathi, have yielded 5,222 lb. and 5,356 lb. with a daily average of 14·5 lb. and 14·7 lb. respectively, while another heifer still in milk has given 2,847 lb. in 140

days with a daily average of 20·3 lb. and is still giving 18·3 lb. a day. The record has, however, been put up by heifer No. 111, who has given 2,497 lb. in 117 days with a daily average of 21·3 lb. She is still in milk and giving 20·2 lb. daily. Her highest yield in one day was 25 lb. These yields are good and most encouraging when it is remembered that the average yield of the country Ongole is 2,500 to 3,000 lb. per lactation.

155. Some promising experiments have been conducted with the transport of milk and if the results are borne out in the hot weather it should be possible to transport and sell surplus milk in Kavali, 36 miles distant from the farm.

156. *The Kangayam herd.*—The object of this herd, which is kept at Hosur, is to produce good breeding bulls for distribution in the Presidency. At the same time, efforts are being made to try and improve the milk yield by selecting bulls from the heaviest yielding dams for breeding purposes, in fact a dual purpose animal is being aimed at. The average milk yield during the year over 16·7 cows was 6·5 lb. per day. The best cow gave 2,848 lb. with a daily average of 9·9 lb. which indicates the possibilities of selection on the above lines. It is hoped to be able during the coming year to issue some young bulls for breeding purposes.

157. *The Scindhe herd.*—This is a well-known breed noted for its milking capacity. The aim is to build up a herd of cows with high milk yield which will breed regularly. Bulls will be distributed where milk is desired and it is also proposed to try and improve the general standard of West Coast cattle by means of bulls of this breed. The daily average of the herd over 13·8 cows in milk was 10·5 lb. The best cow gave 8,244 lb. in 320 days with a daily average of 15·9 lb. We now have some young bulls from high yielding dams who will soon be ready for stud.

158. *The Buffalo herd.*—The herd is maintained at Guntūr on a farm on the Lam Reserve about five miles from the town opened first in 1923. The object is to improve both the size and the milk yielding capacity of buffaloes by crossing the country animal with a Delhi bull. There is a great demand for good buffalo bulls and they are gradually becoming available on this farm

for stud purposes and for sale. The farm also serves to demonstrate to the ryots and milkmen in the Guntūr district, where buffalo breeding is carried on, how to rear and feed their stock in order to obtain good stock.

The weather was very unfavourable during the year and grazing was scarce. This was reflected in the milk yield which fell to a daily average of 10·3 lb. as compared with 11 lb. last year.

The following are among the best results obtained and these will serve to show the possibilities of cross-breeding if they are compared with local yields:—

Buffalo number	Days lactation.	Yield		Remarks.
		Total.	Daily.	
		LB.	LB.	
6	341	4,863	14·3	Pure Delhi.
	211	4,052·7	19·2	Still in milk. Average 15 lb. daily.
9	352	4,512	12·8	Pure Delhi.
	229	3,311·3	14·5	Still in milk Average 10 lb. daily.
8	311	3,550·5	11·4	Pure Delhi.
	156	2,758·8	17·3	Still in milk. Average 17 lb. daily.
12	201	3,439·9	17·1	Half bred. Still in milk.
20	175	3,201	18·30	Three-fourth bred. Still in milk.

159. *Stud bulls.*—As already stated the main object of the cattle stations is to raise a stock of improved bulls and place them at stud so as to improve the ryots' cattle. The stations are young and it takes time to rear the necessary animals in any numbers. Still steady, if slow, progress is being made.

Seven bulls were maintained at the Veterinary College, Madras, during the year and 401 animals were served during the year. These bulls are undoubtedly improving the dairy stock in Madras as could be seen very plainly at the S.P.C.A. Show this year. The fact was remarked upon by His Excellency the Governor. As His Excellency pointed out more attention must be paid by owners to the feeding of young stock. In order to encourage this the department award prizes

annually at this Show for the best cared for calves born to Government bulls.

An Ayreshire bull "Glenside Aivator" is stationed at Ootacamund and he performed 74 services during the year.

160. A new scheme of placing Government bulls at stud at veterinary hospitals and under District Boards has been begun this year, and bulls are now available at Ongole, Guntūr, Māyavaram, Mangalore, and Palakonda. A Veterinary hospital is by no means an ideal place at which to station a breeding bull, but until more public bodies will come forward to house our bulls we have no other alternative.

Government bulls are also at stud at some of the Experiment Stations, e.g., Adutural, Koilpatti, Taliparamba, and Amalapuram. In all, the Government stud bulls performed 829 services during the year.

161. *Premium bulls.*—Grants of Rs. 100 per annum are given by Government towards the cost of maintenance of good breeding bulls approved by the department. Fourteen bulls are maintained under this arrangement, seven by co-operative societies, two by other public bodies, and five by private individuals.

162. *Sales.*—Nineteen bulls were sold for breeding purposes during the year, and 29 other animals were also sold, the sale proceeds amounting to Rs. 7,634.

163. *Coimbatore dairy.*—Once again the daily average yield of milk of the dairy herd at Coimbatore was raised and 183,193 lb. of milk were produced. The progress is shown below, and this justifies our system of breeding and selection.

	Milk production.	Daily average yield per cow.
	LB.	LB.
1913-14	...	5·4
1924-25	132,343	12·2
1925-26	150,978	13·2
1926-27	180,829	13·4
1927-28	183,193	16·1

164. Nine thousand and twenty-nine lb. of butter were made and sold, a daily average of 24·7 lb. There is a great demand for our butter and the sales have nearly doubled in the course of the last six years, 94 per cent being to outsiders. The dairy is run on a commercial

account system but the result of the year's transaction was a loss.

Nothing is credited to the dairy for training students or maintaining stud bulls or for experimental work and though commercial accounts are kept the dairy cannot be looked on as being run on strictly business lines. No Government concern can possibly be conducted on strictly business lines, the rules which it has to obey prohibit this.

In addition to the regular training given to the students one private pupil was given training in practical dairying.

165. The survey of the Ongole cattle was continued and the work in the Guntūr and Narasaraopet taluks was completed.

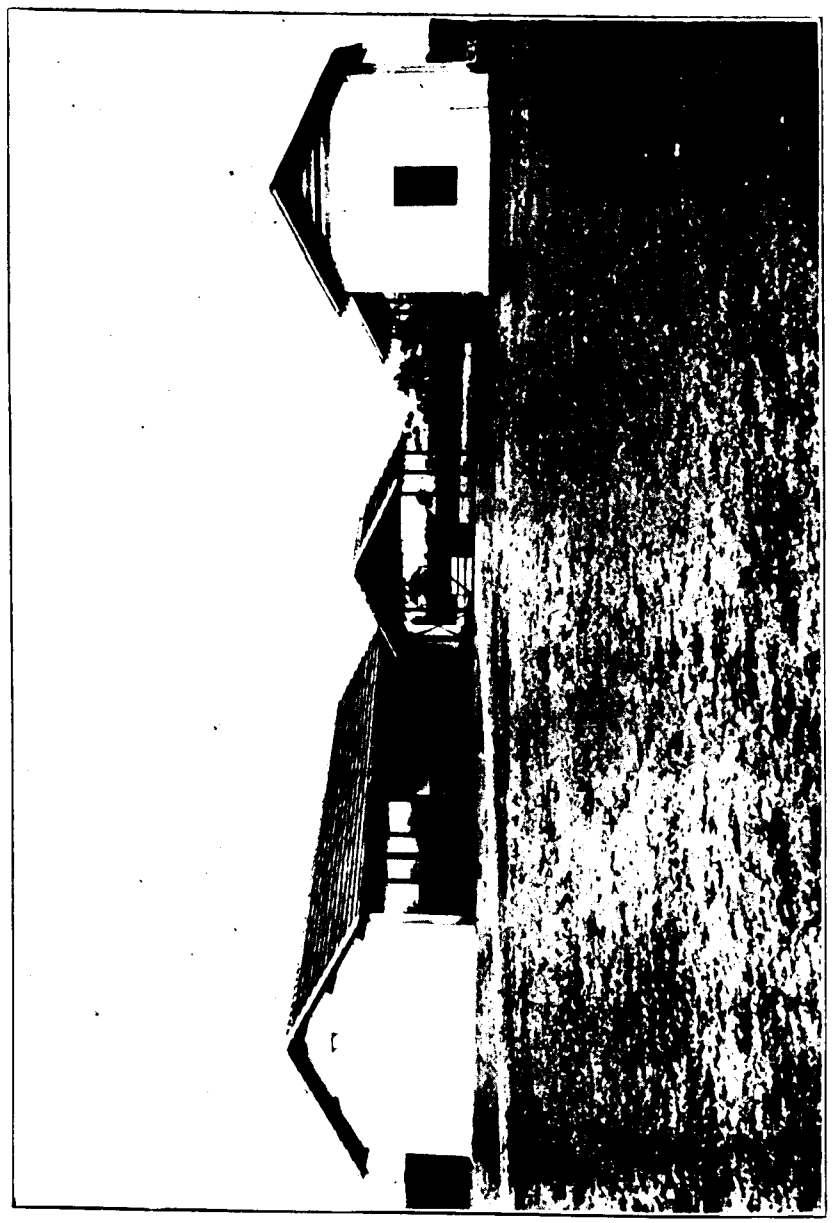
166. *Sheep.*—The mortality among the sheep during the year was high due to the wet weather. The wool yield averaged 2 lb. 7 oz. which is an improvement on last year's figure of 1 lb. 15 oz. This is partly due to a newly introduced system of two shearings a year. Two rams produced 5 lb. 3 oz. and 4 lb. 13 oz. respectively. Fifty-four sheep were sold for breeding purposes.

167. *Poultry.*—Interest is only just beginning to be taken in poultry in India and this department has not as yet had staff or opportunity to take the subject up seriously. Imported utility breeds are kept with the idea of producing birds and eggs for distribution. One hundred and twenty-four birds were sold for breeding purposes and 348 eggs for hatching purposes.

168. *Pigs.*—These are kept to consume bye-products. Berkshire and Yorkshire Middle White are kept and there is a ready sale to pork butchers and 121 were disposed of.

Finance.—It is of interest to note that the following sums have been realized during the year by this section :—

		Rs.	A.	P.
By sale of cattle		7,634	8	0
Do. pigs		1,908	5	6
Do. sheep		428	13	0
Do. poultry and eggs		674	10	5
Do. dairy produce ...		28,623	3	0
Do. fodder		294	0	0
Do. farm produce, etc. ...		1,992	11	9
Total ...		41,556	3	8



BUILDINGS FOR ANIMAL NUTRITION EXPERIMENTS.

169. *Animal nutrition.*—The science of animal nutrition is concerned with the principles underlying the economical transformation of the produce of the soil into articles of human diet like meat and milk, and also into energy which can be used as bullock power for cultivating the fields. The elucidation of these principles depends upon the knowledge of two sets of factors, the nutritive requirements of different classes of farm stock for purpose of maintenance and production, and the capacity of various feeding stuffs for supplying these requirements.

170. The fundamental problems are being worked out at Bangalore by the Imperial Physiological Chemist under the Government of India, and the Madras Agricultural Department is collaborating with him and giving him facilities to carry out some of his researches at Hosur. Nine Ongole milch cows were lent to Mr. Warth to enable him to carry out tests regarding the consumption of food in relation to the amount of milk produced as compared with Scindhes and cross-breds. An experiment on a big scale with 55 animals and lasting over three months was carried out at Hosur in collaboration with Mr. Warth to compare the feeding values of spear grass silage, spear grass hay, and ragi straw.

171. In addition to this it was felt that the Agricultural Department should be in a position to carry out their own animal nutrition experiments to study local problems based on the general fundamental results produced by the Imperial Physiological Chemist. A special assistant was, therefore, sent to Bangalore for training and during the year under review the necessary buildings have been erected and work will be begun to study the nutritive value of maintenance rations with the roughages and concentrates usually used in this Presidency.

172. There is apparently some confusion between this work which deals with the nutrition of cattle and the work being done by Lieut.-Col. McCarrison which deals with nutrition problems in general, but especially as they affect human beings, and the study of our food crops. The problems are no doubt related, but they are quite distinct and both are being dealt with by the Agricultural Department in collaboration with the

Imperial research officers concerned, Messrs. Warth and Lieut.-Col. McCarrison.

VI.—DEMONSTRATION.

A.—Operations against Diseases.

173. *Application of the Pest Act to Cambodia cotton.*—The Act was applied, as usual, in the taluks of Omalur, Tiruchengodu, Salem, Namakkal, and Rasipuram in the Salem District, Karur, Kulittalai, Musiri, Trichinopoly, and Lalgudi in the Trichinopoly District ; and the whole of the Madura District, and the Coimbatore District, except the Kollegal taluk, and a few villages in the Pollachi Taluk.

174. The Act makes it illegal to have Cambodia cotton on the ground after 31st August and no individual notices need be given to ryots to remove their cotton. There was a slight improvement this year in the prompt removal of the cotton all round but in very few places indeed was it removed by the proper date. Usually it was left on the ground a week or ten days longer than it should have been. Thus in Coimbatore district in only one taluk was the cotton removed by 31st August, in all the others the date of removal ranged from 7th to 12th September and the same was the case in other districts. In a few taluks it was left as late as 28th September. These delays defeat the object of the Act. Already the dead period has been reduced to such a short time that it is probably not really effective and a week's delay in removal makes the remedy aimed at totally ineffective.

175. My thanks are due to Collectors who gave my staff a great deal of assistance and the small improvement noted is largely due to this co-operation. It was, however, very largely due to an unfavourable season. Coimbatore and Salem and parts of Madura were less favoured by rain during the summer months and rains came too late to benefit the second crop. Consequently a large portion of the acreage under cotton was abandoned after the first picking.

I regret to say, therefore, that I cannot regard the general situation with any less degree of pessimism than I have expressed in former reports and I am still of the opinion that to make the remedy aimed at by

the act really effective the date of eradication should be moved back to 31st July.

176. *Crab-catching campaign.*—Crabs do a considerable amount of damage to paddy and a very simple method has been devised to deal with this pest. This consists of sinking *chatties* in the water channels and fields, so that the necks are flush with the ground, baited with rice bran. At first this was fried but it has now been found that this is unnecessary. Crabs do not swim but walk along the ground and once they enter a pot they cannot get out as they can get no grip on the incurved neck. They are captured and drowned and can be daily collected. Crabs of all ages are caught in this way and young released from gravid females are also destroyed. The method is cheap and most efficient as may be judged from the fact that on the Aduturai Paddy Breeding Station 124,308 crabs were caught during the year and the crops were completely protected. So large was the catch indeed that manure was prepared from the captured crabs and it proved of high value.

A leaflet has been published describing the method for the benefit of the ryots.

177. *Rats.*—Rats are another troublesome pest to paddy growers, both on account of the damage they do to the crop itself and also the damage done to the bunds. On our experiment stations we have been able to keep them under control by the use of cyanogas applied to the burrows with a foot pump. Despite the price of this material which is at present on the high side this was found to be cheaper than employment of professional rat catchers and it also did away with the damage done to bunds by digging out rats.

178. *Application of the Pest Act to palm disease in Northern Circars.*—The usual methods of dealing with this disease, viz., cutting and burning dead palms and inspecting trees within fifty yards of a diseased tree and treating those found to be affected, were continued. In tracts where the disease was bad the patrolled belt was 200 yards in depth.

179. In East Gōdāvari, which is the home of the budrot disease and where it was at one time virulent, the number of deaths this year was reduced to 7,600, as compared with 11,413 in 1926, and 14,488 in 1925.

At the same time, the percentage of infected trees examined and treated has fallen from 5·7 last year to 4·4, and the number of villages in which more than twenty trees had to be cut has been reduced from 140 to 102. This indicates that intensity of the disease in this district has been reduced as a result of this campaign.

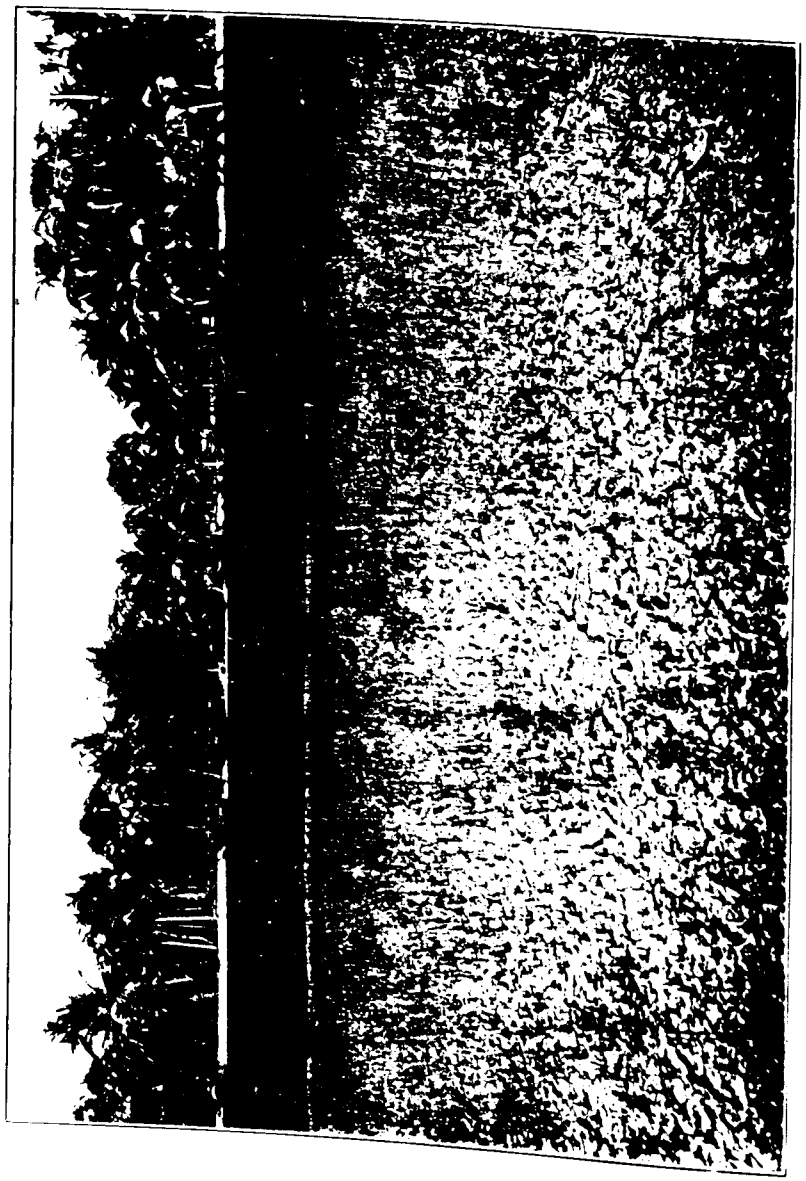
180. In West Gōdāvari the position appears to be stationary and the disease is just being held in check. Thus 1,276 trees died this year as compared with 1,252 last year, but an improvement is shown on former years, e.g., in 1926, 1,666 trees died.

181. In Kistna there is a very marked improvement, 384 trees only had to be cut this year as compared with 1,361 in 1926, and 1,706 in 1925. At the same time the percentage of infected trees has fallen from 10 to 3·6. This is very encouraging and satisfactory.

182. In Guntūr fourteen new villages have been included in the zone under patrol, yet the number of dead trees has been materially reduced and headway is being made against the increase of the disease caused by the cyclone in 1925.

The disease may safely be said to be in hand, but it is still serious and has a tendency to spread in new localities. Thus it was discovered during the year in Repalle and Tenali taluks. It is very doubtful whether the time will ever come when Government will be able to give up the control of this work entirely, though attempts are being made by the Special Officer in charge, by means of lantern lectures and general propaganda, to teach the people the value of the operations and the need for carrying them out themselves.

183. *Application of the Pest Act to the coconut caterpillar.*—There is no doubt whatever that this pest has come to stay and despite all our efforts it is spreading, especially along the coast and backwaters where infected leaves are carried along the trade routes. All we can do is to deal as promptly as possible with new outbreaks and continue the steady campaign against the disease as a whole. It is largely a question of staff and the efficiency of control will, for many years to come, be in direct proportion to the staff employed. That the pest is a serious one there can be no doubt and there is undoubtedly a danger of its killing large



PADDY FIELD IN THE KOLE AREA IN PONNANI TALUK AFFECTED BY *Spodoptera*.

areas of coconuts if it is not dealt with promptly, so that there is every justification for the expenditure of comparatively large sums of money on its control.

184. As has been explained in former reports an organized attempt is being made by the department to control the pest by a biological method, the introduction and liberation of its natural parasitic enemies of which several have been found. It is because of the fact that it was originally introduced without these parasites that it has been able to spread with such rapidity and do so much damage.

185. The Pest Act was extended to include Malabar in November 1926 and it has been in operation in both Malabar and South Kanara throughout the year. In the latter district the pest may be said to be fairly well under control, but in Malabar it is distinctly on the increase and a large number of fresh infections have had to be dealt with.

186. The efficiency of the several parasites employed appears to be dependent to a large extent on the climatic conditions. Last year it was mentioned that the *Bethylid* parasite was very successful, this year the *Eulophid* parasite, which attacks the pupæ, has been found very efficient. On the whole, the situation may be said to be well in hand and given time complete control may be effected.

187. *Spodoptera*.—Both in 1927 and 1928 a successful campaign was carried out against this pest of paddy. Methods of flooding, sweeping, kerosinating were demonstrated and where the ryots themselves adopted these simple remedies success was obtained. A special demonstration was given this year in the *kole* areas of Ponnani Taluk and other places.

188. *Hairy caterpillar*.—As explained in my report last year this pest can best be controlled by catching the moths by hand as soon as they emerge after the first rains and what is really needed is organization. A demonstration was given of this method with success in many places. At Mudukulam, for instance, where a big landlord co-operated with the department, about 4½ lakhs of moths were collected over 200 acres with the result that an increased yield of groundnut amounting to 20 kalams per acre worth Rs. 40 was obtained.

189. Statistics of yield taken at harvest time in the South Arcot District showed an increased profit on the groundnut crop of Rs. 15 to 23 per acre despite a very bad season as a result of hand-picking moths at an expenditure of Re. 1 per acre. Despite this, and all our efforts the ryots in this district will not advance money to have the work done nor will they form a co-operative society to do the work. Under these circumstances, it is difficult to see how they can possibly be helped.

190. *Anti-smut campaign.*—In the III Circle, 6,957 packets of copper sulphate were sold sufficient to steep jonna seed for 34,716 acres. Demonstrations of the method were given in 100 villages. The difficulty is to persuade the ryots to buy the sulphate in time despite its cheapness. In the Coimbatore and Salem districts 900 acres were sown this year with treated seed as compared with 550 acres in the previous year.

B.—Demonstration Plots.

191. It is the business of the research sections to discover improvements in the local methods of agriculture. When this has been done, and after suggested improvements have been thoroughly tested out on the experiment stations and found to be applicable to local conditions, the next step is to teach the improvements to the ryots. This is the business of the district staff of Deputy Directors and demonstrators.

192. The Research section is absolutely necessary, as without it we should have nothing to demonstrate; the district work section is equally necessary as without it, it would be impossible for the ryots to benefit by the discoveries of the Research Officers. These two sections of the department are, in fact, interdependent.

Now, it is not at all an easy thing to teach the ryots a new method and persuade them to adopt it. It is no good simply to go about and tell them about it, and advise them to try it. The ryot, like every other farmer, is cautious and quite rightly wants to be convinced of the reliability of anything new before he adopts it and changes his ways. The experiment

stations do not impress him. In the first place, they are *experiment* stations and not demonstrational farms, and in the next place, the ryot is very apt to think that he cannot hope to do on his land what Government can do on their stations with facilities of staff and money behind them. The consequence is that the ryots do not visit the stations as much as they should. Finally, most of the ryots are illiterate and leaflets do not reach them. A certain amount of good can be done by means of lantern lectures and agricultural exhibitions, but more than this is needed. It is necessary actually to go to the ryot and show him, and not wait for him to come to us and be told.

193. The plan has, therefore, been adopted of establishing demonstration plots on the ryots' own lands on which the improvements which have been tested out on the experiment stations, and which are recommended by the department, are carried out. This method has proved successful, and it is very popular, and there is a constant demand for more and more of such demonstrations. In this way, the research side of the department is brought into direct touch with the ryots and they benefit by the discoveries made in the laboratories.

194. In theory, each demonstration plot should be carried right through to harvest, weights should be taken and the ultimate benefits worked out into rupees, annas, and pies. Cultivation sheets are maintained by the agricultural demonstrators in charge showing a profit and loss account, and in all cases the improved method is contrasted side by side with the local method it is desired to replace. It is not, however, always possible to carry the demonstration right through, though attempts are always made to do so. At harvest time, it is not every ryot who will agree to reap small plots separately and thresh them separately so that accurate weighings may be made. He is often quite satisfied without this, though others who have not seen the crop in the field may not be convinced and may wish to see figures. It is very difficult to get accurate figures, and a much bigger staff of demonstrators is needed if more figures are to be obtained, for the demonstrator must be present at harvest time and on the threshing floor to make weighings himself.

However, as far as possible, each demonstration is carried out to its final and logical conclusion.

195. There are many hundreds of these plots in the Presidency and they deal with a large number of agricultural improvements, beginning with quite simple ones which need no extra expenditure on the part of the ryot, like thinly sown nurseries and economic planting of paddy, up to more elaborate ones where artificial manures are used. The general policy is adopted of beginning with simple improvements, and after the ryots have seen that these are really effective and we have gained their confidence, to lead them on step by step and improvement by improvement till all we have to teach is being demonstrated.

196. The idea of co-operation finds a place in this chain and the last improvement of all to be pressed upon a village or group of ryots is the formation of a co-operative society for agricultural credit work. This is its proper place and it is quite useless to begin by preaching co-operation. It is only when the ryots have learned the value of the agricultural improvements we have to show them and have adopted them that one can begin to talk to them with any benefit or hope of success about agricultural co-operative loan and sales societies, etc.

197. We now have a long list of improvements to demonstrate, the use of iron ploughs and better methods of cultivation, the use of better mhote buckets and wheels, the use of green manures instead of depending on the forest for leaf, better methods of making and storing cattle manure, the use of better strains of seed. In the cotton areas, demonstrations deal with new strains of seed which give bigger yields and better quality of lint, drill sowing and intercultivating with bullock power, better methods of irrigation which conserve water, clean methods of picking, and finally, co-operative ginning and marketing. In the sugarcane areas, deep cultivation, line planting, propping and wrapping, manuring, the use of iron mills and sindewahe furnaces are demonstrated.

198. In a large number of cases, final monetary results have been obtained so that the ryots can see just how much they can benefit from the improvements which we advocate. This report is not the place in

which to discuss them, but some of them have been published from time to time in the Monthly Digest. Too much stress cannot be laid on the economic and financial side of the improvements which are advocated, since they aim at practical and economical farming. We are always careful to demonstrate only such methods as we know will result in financial gain. It must be confessed that all our demonstration plots are not a success. Sometimes factors come into play over which the department has little or no control, such as failure of rains, lack of water, or unexpected attacks of disease. This is unavoidable, but in these cases the departmental demonstration plot is no worse off than the control plot conducted under local method, and it simply means that the demonstration fails to show what it was intended to show as far as that particular season is concerned and it has to be repeated under more favourable conditions. In the very large majority of cases, however, the demonstration plots show what they set out to show and it is on the result of this majority that the success of this method must be judged.

199. The limiting factors in this work are men and money, and for lack of sufficient staff we are not able to do as much of it as we wish nor to meet all the demands which are made upon us. It is absolutely necessary to concentrate the work on comparatively small areas. The Agricultural Demonstrators must pay constant visits to the ryots to keep them interested, to get to know them, and to encourage them, and the plots themselves need constant attention At present, the department possesses only about 112 Agricultural Demonstrators and the jurisdiction of each extends over two or more taluks. This is too large an area for really concentrated work and the consequence is that many localities have to be neglected. It is hoped to work up to a staff of such a magnitude that there will be at least one Agricultural Demonstrator for each taluk, with sufficient money available to allow him to move about in his jurisdiction freely all the year round. This desirable state of affairs will take time no doubt but I am happy to say that of recent years the district staff has been strengthened. At the same time, we have a long way to go before the ideal which I have in view is reached.

200. The map attached to this report indicates the distribution of the present staff and the areas in which the department is operating.

C.—Demonstration Areas.

201. The demand is sometimes made that the department should run "model farms" to show the ryots that the methods which they advocate are really of a practical nature and that such farms would pay. The experiment stations are, of course, not farms in this sense and cannot and are not meant to pay. Under existing rules, it is quite impossible for the department to conduct a model farm. In the first place, the salaries of the officers in charge could not be adjusted to correspond to the income of a farmer and in the second place, finance rules do not allow of a rapid turn over of profits or forward contracts or any of the expedients which would be adopted by a business-like farmer. However, as explained in last year's report, the demand has been met as far as possible.

202. At the Samalkota Experiment Station an area of 6·76 acres is set aside to show local farmers how they can improve their land. Of this, 5·88 acres were under paddy this year, 0·38 acres under sugarcane, and half an acre under plantains. An acre yield of 3,597 lb. of paddy was obtained and the sugarcane yielded at the rate of 15,190 lb. of jaggery per acre. The price of this is low so the net profit was not large. The net profit per acre worked out at Rs. 174 as compared with an average of Rs. 176 during the previous five years.

203. In the IV Circle, large demonstration plots have been conducted during the last few years in which local methods are contrasted side by side with departmental methods. The original areas have been closed down as they have served their purpose. This year a new area was opened in the Chittoor District near Chandragiri and an area of ten acres of wet, dry, and garden-lands was dealt with. The season was most unfavourable and two of the wells commanding the area ran dry. Despite this a fairly successful demonstration was given. A feature was made of treating cholam seed with copper sulphate before sowing as a preventive against smut. Drill sowing was also demonstrated and over the whole area an increased

profit of Rs. 75-7-0 per acre was shown as a result of our improved methods.

204. In the II Circle, the demonstration areas conducted last year at Gudivada and Chintaladevi had to be given up for various reasons, but a new area was started at Varahapatnam in Kaikalur taluk on an area of three acres of wet land and on this the use of artificial manures to supplement sheep penning were demonstrated and an increased profit varying from Rs. 2 to Rs. 13 per acre was obtained. At the same time, another demonstration on a large scale was carried out on private lands with the help and consent of the owner on which the benefit of supplementing green manure with phosphate in contrast to the use of cattle manure by itself was demonstrated and here the increased profit per acre worked up to over Rs. 23.

205. A small demonstration farm is being conducted at Usilampatti for the benefit of the Kallars, and here economic planting of paddy, the Java variety of sugarcane, and departmental strains of Cambodia cotton are being shown. A demonstration area is attached to the Deputy Director's office at Madura, half of which is cultivated by the department and half by a tenant on varam lease according to local methods. This offers a useful contrast in methods.

206. The development of this system of demonstration areas carried out by agricultural co-operative societies mentioned in last year's report was continued with great success in the Tanjore and Trichinopoly districts. A new society for this purpose was started during the year and there are now six of these societies each of which has its own farm on which the cultural and manurial improvements advocated by the agricultural department are carried out, and seed and manures are distributed to members and others. The Lalgudi Sivagnanam Society, which is the senior one, may be taken as an example of the excellent results which are being achieved. This society during the year, realized an extra profit over local methods by the use of the departmental methods of Rs. 37 per acre on the first crop and Rs. 34 on the second crop. It distributed 10,000 lb. of A. 65, 2,800 lb. of A. 3 and 3,600 lb. of red rice seed to ryots and 200 tons of different manures and earned a profit of Rs. 3,000.

207. Not only co-operative societies but individual landholders are being encouraged to conduct demonstrations on similar lines. Wherever they are prepared to do so the departmental officers will prepare a cropping scheme and supply technical advice. In special cases we are prepared in addition to lend implements and supply manures and seeds free of cost if these are quite new to the locality. I am happy to say that this method of spreading the knowledge of improved methods of agriculture is becoming more and more popular.

D.—Miscellaneous.

208. *Agricultural exhibitions.*—An increased amount of attention has been paid to the holding of agricultural exhibitions all over the Presidency during the year. There is only one Agricultural Show of any size held in the Presidency each year, the Cattle Show at Tiruppur, but it is felt that exhibitions play an important part in the task of disseminating knowledge among the ryots. It is difficult to prove this definitely, but I believe that if such exhibitions are held widely and persistently some of the information broadcasted at them must come home to roost in the proper quarters. Advantage has been taken of as many local festivals, meetings of bodies like co-operative unions, the jamabandi camps of Collectors, etc., where large numbers of the rural population are gathered, to stage an exhibition and in all 104 exhibitions have been held. My sincere thanks are due to all those who have so kindly helped us, not only by presiding, but by placing buildings and facilities at our disposal. Their hearty co-operation has gone far to make such shows a success.

209. The most important exhibitions given have been at the following places and on the following occasions.

The Y.M.C.A. Rural Service Exhibition held in Madras. The All-India Industrial and Agricultural Exhibition held in Madras during the meeting of the Congress at Christmas time. Here a large scale exhibition was staged covering every phase of the work of the department and it was kept open for a month. This is one of the biggest exhibitions this department has ever attempted to hold and it was on the whole a success and it was visited by a very large number of people.

The Agricultural, Industrial, and Sanitary Exhibition at Ponnur opened by the Collector of Guntūr. The ryots' conference under the auspices of the Trichinopoly District Federation of Co-operative Societies at Srirangam, and the ryots' conference in Gōdāvari, East district. This latter will be made an annual show. The Industrial Exhibition at Dharakota in the Ganjām district organized by the Rajah of Dharakota. The Provincial Co-operative Conference at Madura presided over by the Hon'ble the Minister.

210. The series of lectures and exhibitions given for the benefit of the officers and non-commissioned officers of the 12th and 13th Malabar Territorial Battalions given last year at the suggestion of Major Frere, the Administrative Commandant, proved such a success that it was repeated this year. Lectures were delivered during the course of this exhibition by various officers of the agricultural, veterinary, and co-operative departments. It was visited by schools and cultivators from Cannanore.

211. During the North Arcot District Conference, a ploughing competition was held in which twelve ploughmen took part and three prizes in the shape of ploughs and green manure seeds were awarded.

212. I am happy to say that this side of our propaganda work will be still further developed during the coming year since Government have sanctioned the building and fitting up of two exhibition motor lorries which will travel round the country with a permanent exhibition and be able to penetrate to the interior villages. In North India, exhibition trains have been run with success, but it was considered that in this Presidency lorries would be able to cover a wider field than a train. This experiment will be most interesting and I am confident of its success. It has already attracted attention and inspired a number of firms who are likely to put lorries of their own on the road to travel round with the departmental exhibition cars to demonstrate and advertise manures, pumps, etc.

The research sections have taken part in the exhibitions held during the year, and have staged exhibits

largely self-explanatory by means of charts, diagrams, and labels to explain the work they are doing and the benefit that the ryots can derive from their researches, and this has added a great deal to the popularity of our exhibitions.

213. *Tiruppur cattle show.*—A cattle show was held at Tiruppur on 14th and 16th June, and was opened by the Hon'ble Mr. MacMichael while the prizes were distributed on the last day by the Hon'ble Dr. Subbarayan. The show and fair was not so well attended as usual, but there were approximately 2,500 head of stock on the fair ground and probably some 5,000 were brought altogether. Considering the succession of bad seasons which have been experienced the condition of the cattle was remarkably good. The Pattagar's cattle as usual stood out above all others for type and condition and he again won the gold medals presented by Government. It is much to be regretted that again there were no entries in the class for pairs of bullocks belonging to small ryots. This is a very great pity because the prime object of these shows is to encourage the small owner and breeder.

The Agricultural Department staged an exhibition on a larger scale than usual in connexion with the show and gave demonstrations of a Sindewahe furnace, a chaff cutter at work, roll easy mhote wheels, and ploughs. Lantern lectures illustrating improved methods of cultivation of paddy, and sugarcane, were delivered. This exhibition appeared to be appreciated and the show committee awarded the department a gold medal.

214. *Co-operation.*—In addition to the agricultural co-operative societies described above it has been mentioned that in the year 1926-27 Cambodia cotton was grown under seed farm conditions in the Avanashi and Tiruppur areas by 11 units consisting of 148 ryots. Two of these units were registered as cotton seed co-operative societies and others will be registered as soon as the bye-laws have been amended by the Registrar of Co-operative Societies. Proposals for financing the cultivation expenses from amongst the seed farm ryots themselves, or by local banks, are under contemplation and have been the subject of several conferences during the year with the officers of

the Co-operative Department. As this is done the advances given for cultivation expenses by the agricultural department can be gradually reduced to the vanishing point and we shall be able to utilize our grant for starting similar organizations in new places, gradually working up to the stage when co-operative societies can be formed to take over the work, our ultimate aim being to produce enough seed of improved strains to supply the whole Presidency. In pursuance of this policy the advances given out this year have been reduced from Rs. 15,690, the sum advanced last year to Rs. 9,880.

215. I and several other officers of the department gave evidence before the Committee on Co-operation and a great deal of information was compiled for the Committee. A meeting of officers of the Co-operative and Agricultural Departments presided over by the Registrar and attended by the Chairman and several members of the Committee was held at the Agricultural College at Coimbatore to discuss the possibilities of organizing seed and sale societies with special reference to cotton.

216. A few lectures were delivered by the Vice-Principal, Agricultural College, to the Coimbatore co-operator's class. An Agricultural Demonstrator was specially deputed to assist the Bellary Loan and Sale Society to enlist members and persuade them to send their kapas to the society, and permission was given the society to build a godown on land leased from the Experiment Station at Nandyal. A Demonstrator was deputed to work under the Deputy Registrar, Madura, to aid with the organization of a co-operative purchase and sale society at Koilpatti and to grade their cotton before sale. 437,750 lb. of kapas were co-operatively ginned, and in all 289 candies of lint were obtained, of which 249 candies were sold and the profits were estimated at Rs. 1,291.

Officers of the Agricultural Department have regularly attended co-operative meetings of all sorts and a number of lectures and demonstrations have been given at such meetings. A number of officers have accompanied the Deputy Registrars on their tours and given every help in their power.

217. It was stated in this report last year that attempts were being made to induce co-operative societies to undertake some of the work of seed, and manure distribution now done perforce by the agricultural department. These attempts have been continued but with not much success. In a few cases societies have distributed a certain amount of seed and manure, but on the whole little has been done in this direction. As in past years I have personally endeavoured to keep in touch, as closely as possible, with the co-operative movement and to collaborate with my colleague, the Registrar, and when I am on tour I always make it a point to meet as many co-operators as possible and attend meetings of co-operative societies and unions. I stated last year that in my opinion it is desirable that non-credit work should be entrusted to officers who have had an agricultural training and who know the real needs of the agriculturists and I note with satisfaction that the Committee on Co-operation have made proposals to this effect.

218. *Criminal settlements.*—The four criminal settlements in the II Circle were regularly visited by agricultural officers during the year and at Bitragunta two demonstration plots were conducted, and a visit was paid to the settlement at Kavali by Mr. Hilson while he was acting for me and special advice was given to the Superintendent as to how to utilize his labour to better advantage.

As stated last year little can be done by this department for these settlements, where the problems to be solved are more horticultural and the finding of employment for their inmates than strictly agricultural from a farming point of view.

E.—Crops.

(*a*) *Paddy.*

219. *Reduction of seed-rate and economic planting.*—It is now part of the general routine of propaganda work in all Circles to demonstrate this simple improvement on the ryot's lands. It is within the reach of the poorest ryot since it needs no actual increased expenditure and it results in a saving in cultivation expenses. It is difficult to estimate the exact area over which the

improvement has spread as a result of our propaganda work, but it is undoubted that an appreciable reduction in the seed-rate has been universal and whenever one goes now one will see some form of economic planting being adopted, if not actually single plants are transplanted, at least the bunches are reduced to twos and threes. There is ample evidence to show that the area under this improvement is increasing every year and in some places it has become a general practice over very large areas.

220. In addition to a reduced seed-rate and economic planting the use of levelling boards has been demonstrated with success in some places, notably in the Gōdāvari district where the soil is apt to carry excess of alkaline salts and where unevenness tends to form salt pans.

In the Hospet taluk also where the fields have been sloped to provide drainage for cane cultivation and subsequently divided up into very small bunded areas for paddy the advantages of levelling and making bigger fields have been demonstrated. Over 50 acres have been covered and the demand for help from local demonstrators to carry this improvement further afield is increasing.

221. *Introduction of new varieties.*—New strains evolved on the Paddy Breeding Stations are in increasing demand each year and it is impossible for us to meet the full demand for seed though attempts are being made to do so by every means in our power. The ryots have learned the advantage to be gained from sowing these strains very thoroughly and the long years of research work on the breeding stations are now reaping their well deserved harvest. So widely spread are these strains that it is impossible to keep track of them and say exactly how many acres are being cultivated under them.

In the I Circle, Navakotisannam is widely cultivated in the Vizagapatam district, while in other places the area under G.E.B. 24 has doubled. The ryots themselves produced 83,238 lb. of seed of improved strains which is nearly double the amount produced last year. In addition to this the department distributed 117,247 lb., while three co-operative societies produced 24,900 lb. of Navakotisannam.

In the II Circle 5,576 lb. of seed was distributed by the department during the year and 1,852 acres are said to be under improved strains.

In the IV Circle, Co. 2 is the most popular variety mainly on account of its short duration and it yields some 350 lb. per acre more than the local *chinna samba*. Other strains which are popular in this Circle are *poombalai*, and *chitrakali* as a *kar* crop. The latter gave yields of 2,700 lb. up to as high as 4,000 lb. in the Chittoor district and is therefore competing with the local strains of *swarnavari* and *chitrakar*. G.E.B. 24 continues to be popular everywhere and in Chingleput is even grown as a semi-dry paddy and gives better yields than the local strains. 43,742 lb. of seed were distributed in this circle sufficient to sow 1,958 acres which is nearly double last year.

In the V Circle, which is served by the Aduturai Paddy Breeding Station, there is a specially heavy demand for seed and every possible means have been adopted to try and meet it. Seed farms have been established, co-operative societies have been formed to produce seed on demonstration farms, and sell it to friends and neighbours. As a result of all these agencies it was possible to distribute during the year under review 725,194 lb. of seed sufficient to sow 18,130 acres. This by no means represents the total area under improved strains however for ryots saved seed both for themselves and for their friends. It is within our knowledge that there were at least 40,667 acres under improved strains in this circle during the year. For the coming year provision has been made for a sufficient quality of seed to sow 56,500 acres.

In the VI Circle a seed farm has been started at Kodiyalam where A. 65 is being grown under the supervision of departmental officers on land taken on lease. This covers some 18 acres and 31,428 lb. of grain were obtained of which 5,237 lb. went to the lessor. The balance after drying amounted to 25,312 lb. and was distributed to ryots in the Trichinopoly and Tanjore deltas.

On the West Coast, 11,747 lb. of selected seed was distributed from the Taliparamba Experiment Station and an equal quantity was obtained from Coimbatore. G.E.B. 24 is also popular in this Circle as it will give a double crop.

In the VIII Circle, 1,575 lb. of seed was produced for the first time by seed farms and 15,735 lb. were distributed from other sources and 3,000 acres or more are known to be under departmental strains. Nearly half the total paddy area in the Gobichettipalaiyam taluk is said to be under an improved strain of Nellore samba. G.E.B. 24 and Co. 1 are, however, in the greatest demand.

About 170 tons of seed of improved strains of paddy were distributed by the department during the year but on the whole the demand for seed is greater than the supply and every effort will be made during the coming year to increase the number of seed farms and gain the help of public bodies like co-operative societies and village panchayats to multiply seed.

(b) Sugarcane.

222. The main lines along which demonstration with this crop is conducted continue to be the introduction of (*a*) better varieties, (*b*) the practice of line planting, (*c*) trenching, (*d*) propping and wrapping, (*e*) manuring, (*f*) improved furnaces and (*g*) improved mills. To this has been added yet another cultural improvement, viz., the use of immature setts produced by a short cropping system.

Efforts have been made to ensure that demonstration coolies sent out into the district for demonstration work are thoroughly familiar with these improved methods.

223. A number of demonstration plots were laid down in the Vizagapatam district to show the ryots the effect of the planting immature setts for seed. It has been shown on the Anakapalle Experiment Station that germination is improved by 5 to 10 per cent and that the increase in vigour of the plants raises the yield. The results of these demonstrations have, in almost all cases, confirmed our experience and the ryots have been shown on their own land that they can get from 10 to 15 per cent more jaggery by planting good setts obtained by the short cropping system.

224. J. 247 is rapidly becoming a very popular cane on account of its resistance to disease and drought. In the I Circle, 277,445 setts of this and other varieties were distributed from the Anakapalle Experiment

Station and the ryots themselves produced 44,515 for sale. At Etikoppa in the Vizagapatam district, 94,500 setts of J. 247 were produced on a seed farm conducted by the Hon'ble Rao Bahadur Narasimha Raju, M.L.C., and distributed in the neighbouring villages.

225. In the IV Circle, the season was unfavourable to cane and the area under improved varieties was about the same as last year. This is estimated at 2,400 acres, but it is probably very much more than this. J. 247 is rapidly replacing other canes in this Circle and in some localities quite 85 per cent of the cane grown is this variety. In the VIII Circle, some 7,500 setts of improved varieties were introduced and these have been grown under improved cultural methods. It is difficult in this Circle to get setts at the right time so a small seed farm has been established with J. 247 and it is hoped that this will lead to the spread of this variety.

226. In the III Circle, an effort was made to give a special demonstration of improved methods of growing cane and this was carried out successfully at Hospet where the ryots were shown that both the quantity and the quality of their jaggery could be improved if care was taken.

In all districts where cane is grown attention has been paid to improved cultural methods, such as reduction of seed-rate, line planting, preliminary deep cultivation with a heavy plough, and the use of green and other manures and satisfactory progress is being made. In the I Circle, at least 1,300 acres were line planted this year.

227. A great deal of work has been done in past years to demonstrate the advantages of the Sindewahe furnace and it has now been almost universally adopted and this piece of work may be looked upon as practically finished. In last year's report I called attention to the success which had been attained in the Chittoor district. This year it was only necessary for demonstrators to inspect the furnaces erected by the ryots and correct small mistakes and our attention was concentrated on the Chingleput and South Arcot districts where 100 furnaces were erected for ryots. In the same way the adoption of this furnace, big pans and improved mills, have become almost universal

on the West Coast and we are now devoting special attention to the Mappilla ryots who have been given a Mappilla demonstrator to show them these improvements.

228. A number of mill tests have been carried out with the different machines now on the market. The price of the Chattanooga mill has unfortunately been raised and this has reduced its sales. Ryots who own two roller mills have been encouraged to fit a third roller and they have been urged to pay more attention to keeping the bearings and mill parts clean and this ensures more efficient working.

(c) Cotton.

229. The main work with this crop is to distribute the improved varieties evolved at the cotton breeding stations and to arrange for supplies of pure seed. Demonstrations are also given with improved methods of cultivation, such as drill sowing and intercultivation with cattle-drawn implements, as well as better methods of picking and co-operative ginning and marketing.

There is a large and growing demand for seed of our new strains and the difficulty of meeting it lies in the fact that the ryot is apt to lose his own seed by selling his produce as kapas. This is mixed in the ginneries and seed obtained from that source is very apt to be mixed.

230. *Seed farms.*—As explained in former reports, the department has organized a system of seed farms to overcome this difficulty. Under this system, selected ryots are given seed free of cost on the understanding that they will cultivate the cotton on the lines laid down by the department and keep it pure. At harvest time two plans are followed, either the department buys the kapas outright, gins it, sells the lint, and retains the seed ; or the department helps the ryots to gin their kapas co-operatively and sell the lint, and merely buys the seed from them. This latter method is the better, as the ryots themselves then get the benefits of market prices and such profit as there may be. In order to encourage the ryots to grow cotton under seed farm conditions and to keep them out of the hands of the money-lender the department gives

advances to meet cultivation expenses and pays a bonus of Rs. 2 per pothi over the market value for seed. This is a good system and it results in no loss to Government as there is no trouble in recovering advances made. This system has now been in existence for a number of years. It is a sort of co-operation and the ryots are now being led to form co-operative societies for the purpose of producing seed and marketing pure cotton. In time they should look to these societies for advances, and with this end in view the advances given by the department are gradually being reduced. This will set money free to open seed farms in new localities where the system is not known, and in time it is hoped to supply the demand for the whole Presidency.

231. In the VIII Circle, two important cottons are dealt with, Cambodia and Karunganni, the first centred round Tiruppur and Avanashi, and the latter round Palladam, Udamalpet, and Coimbatore.

During 1926–27 superior strains of Cambodia were grown on an area of 1,047 acres by 11 units consisting of 148 ryots in the Avanashi and Tiruppur areas and two of these units were registered as cotton seed societies under the Co-operative Department. From this area 869,588 lb. of kapas were co-operatively ginned and 197,812 lb. of lint was obtained which fetched Rs. 95,880. The seed, amounting to 364,375 lb., was purchased by the department at the usual premium. The ryots were able to sell their lint under this system at Rs. 240 to 243 per candy while the market rate was Rs. 230 and thus make an increased profit of Rs. 10 to Rs. 13 per candy. The seed and advance originally given were recovered at the time of sale.

In the current year, the 1927–28 crop, 1,005 acres of strain 295 have been placed under seed farm conditions and 25,125 lb. of seed given out. The advances to help with cultivation expenses have been reduced to Rs. 9,880. The season has not been good and about 450 lb. of kapas per acre is expected.

232. In 1926–27 there were 933 acres of Karunganni cotton under seed farm conditions in this Circle, of which 7 acres had to be rejected. 179,867 lb. of kapas was obtained which yielded 58,170 lb. of lint and

112,250 lb. of seed. A premium of Rs. 8 per candy was got for the lint.

In the present season the Karunganni seed farms have been concentrated round Udamalpet and 850 acres have been put down. Owing to shortage of rain the yield will be low and only 250 lb. of kapas per acre is expected.

233. During the season with the help of seed farms and other agencies, 352,821 lb. of Cambodia seed and 107,018 lb. of Karunganni seed were distributed for sowing in the circle and 7,167 lb. sent to other circles. This was sufficient to sow 23,150 acres. The total area under these strains was, however, greater than this as many ryots had their own seed and merchants also stocked it. These transactions resulted in a profit to Government of Rs. 2,144.

234. In strain No. 440 the department has evolved an exceedingly vigorous Cambodia cotton able to withstand the attacks of black arm and stem weevil and able to extract moisture from the soil when other cottons fail to do so. It is a week later than No. 295 and it will probably come out 40 to 50 per cent. ahead of Co. 1 and will replace these older strains. Infact, it represents a decided advance in the production of new strains. If only the ryots will sow it early, by September 15th at the latest even if they had to irrigate to do so, and would religiously uproot all cotton on the 1st June every year, with this new strain there is no reason why the yields of kapas should not range from 1,000 to 1,250 lb. per acre instead of from 500 to 750 lb. as at present. On the Cotton Breeding Station the time of sowing experiments have yielded results which are to say the least striking. From the plots sown on 1st September a yield of 1,100 lb. of kapas per acre was obtained, while from the plots sown on 1st October the yield was only 150 lb. per acre.

235. In the VI Circle, there were 304 acres of cotton seed farms under the new conditions under which the department purchase seed only, and 125 under the old conditions under which the department purchase the kapas. From the former, 52,483 lb. of seed was obtained and from the latter 32,984 lb. of kapas was purchased yielding 10,690 lb. of lint and 21,172 lb. of seed. The total quantity of seed obtained and

distributed was 73,655 lb. These transactions were conducted with a profit to Government of Rs. 319.

236. Only two seed unions functioned during the year. That at Edasaval sold 26,860 lb. of seed and that at Sevalarpatti 11,233 lb. If purchasing firms can be induced to encourage these unions the old ones can be revived.

237. In the III Circle, in view of the failure of the crop last year owing to drought Government gave a special grant of Rs. 20,500 for the purchase of pure seed with permission to sell it to poor ryots on six months' credit. Kumpta seed was purchased by the department as being the nearest to N-25 cotton. 278,950 lb. of this seed, sufficient to sow 40,000 acres was distributed. The season was again bad and yields will be low.

I regret to say that all the seed purchased could not be distributed, partly because local merchants imported Dharwar-American seed as cattle food and then sold it for seed, and partly because out of 1,500 bags stocked at Bellary at the instance of the Deputy Registrar of Co-operative Societies only 775 bags were sold because the village co-operative societies which had placed orders for it failed to take delivery.

238. *H-15.* Only 129,452 acres of this strain were sown this year as compared with 154,980 acres last year mainly due to seed shortage.

H-1. This is a new strain which has been evolved by the Department on the Hagari Experiment Station. After exhaustive tests spread over seven years it has been proved better than H-25 by 15 per cent. It will now be distributed and this year 4,311 acres were established under seed farm conditions and there are about 6,500 acres of it in all. In all cases the yield was better than from H-25. 175 bales of lint were sold at auction and fetched Rs. 255-6-8 per candy when the local market was at Rs. 231-10-8.

N-14. The area under this strain was reduced as expected. It grows well only in years with good rainfall and last year it suffered very badly. This year there were 11,000 acres sown with it, and it has yielded better than Gadag which will probably make it more popular and the area sown next year will be greater.

Four hundred and thirty bales of last year's crop sold with a premium of Rs. 20 to Rs. 35 per candy. Messrs. Binny & Co., have however, agreed to pay a premium of Rs. 40 for this year's crop.

The following table will serve to indicate the steady increase of work with this crop done by the department :—

Circle.	Variety.	Area sown in acres.				Seed distributed in lb.	
		1924-25.	1925-26.	1926-27.	1927-28.	1924-25.	1925-26.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VIII	Cambodia ...	12,255	10,975	15,554	17,781	245,090	219,500
	Karunganni...	1,062	5,190	4,764	5,351	21,250	51,908
III	H-25	179,569	167,963	154,906	129,453	111,327	136,285
	N-14	20,180	12,300	17,730	10,000	112,000	78,400
	H-62	...	45	1,068	6,453	...	...
	M-274	...	...	356	540	...	...
	Kumpta ...	...	...	...	40,000	...	..
VI	Karunganni	6,318	6,108	4,700	8,051	63,175	61,080
	Total ...	218,384	202,581	199,078	217,629	552,842	547,173

Circle.	Variety.	Seed distributed in lb.		Area of seed Farm in acres.			
		1926 27.	1927-28.	1924-25.	1925-26.	1926-27.	1927-28.
		(9)	(10)	(11)	(12)	(13)	(14)
VIII	Cambodia	311,182	375,623	963	1,151	1,047	1,005
	Karunganni	95,379	107,018	..	813	926	850
III	H-25 ...	232,364	72,433	...	...	..	...
	N-14 ...	119,200	89,402	...	...	...	...
	H-62 ..	..	...	.	.	1,068	4,113
	M-274 ..	...	...		...	...	...
	Kumpta ...	...	378,750	...	..	...	...
VI	Karunganni...	47,721	80,508	355	318	429	782
	Total ...	805,846	1,103,734	1,318	2,282	3,470	6,948

239. *Drill sowing.*—Concurrently with the distribution of seed of improved strains the practice of sowing cotton in lines with country seed drills of the Ceded districts type and using a blade harrow for intercultivating the crop has been introduced and demonstrated, trained coolies being used for the purpose. At the same time, the ryots were shown how to make these implements. This method of cultivation is gradually finding favour among the black soil ryots and the total area thus sown amounted to 450 acres in the VIII Circle.

An improved type of drill has been designed to make the work easier.

In the VI Circle where drill sowing has been known for a long time, 17,250 acres were under the improved method, of which 15,525 were drilled by the ryots without departmental help. This is a great advance on 1919 when there were only 7,513 acres drill sown but the progress is disappointingly slow.

(d) Coconuts.

240. The department continued its demonstration work with coconuts to show the West Coast ryots that this crop can be successfully grown under a dry system of cultivation. It is the usual practice to water coconut seedlings during the hot weather, but the Department has shown that this is quite unnecessary provided that deep ploughing is done in the first instance and that the land is bunded to catch all the showers and preserve the soil, and that the land is kept constantly cultivated and a soil mulch maintained in the hot weather so as to conserve the soil moisture. This system allows coconuts to be grown on bare hill tops and where water cannot be obtained.

241. Two hundred and ninety-eight demonstration plots have been laid down to show the ryots this method of cultivating coconuts extending along a distance of 300 miles from Kanjicod to Baindur. Some of these are on a big scale but most are small plots, and many are situated in the compounds of rest houses, taluk offices, etc., and the money for their upkeep is found by public bodies. Trees in several of the plots planted in 1924 have already begun to flower. That they will flower and bear early under this system of cultivation has already been proved on our coconut stations at Nileshwar and Pilicode where the following results have been obtained :—

—	Nileshwar.		Pilicode.	
Year planted	1918	1919	1918	1919
Percentage trees now in bearing.	84	76	61	57
Nuts harvested to date ...	4,829	926	241	124

242. As a result of these demonstrations a great demand for good selected seed nuts and seedlings has sprung up and during the year 5,056 of the former and 8,019 of the latter have been sold. Arrangements are being made this year to raise large nurseries to supply the public with good plants. The growers are also gradually beginning to realise the good effects of intercultivating existing gardens and the practice is spreading.

243. Improved methods of cultivation were also introduced in the V Circle and 2,795 seed nuts and 140 seedlings obtained from the West Coast were distributed to the ryots. 130 acres were intercultivated in this circle as a result of departmental propaganda.

(e) Potatoes.

244. The time has now come when the department is in a position to undertake intensive propaganda work with this crop and teach growers some of the lessons which have been learned on the experiment station at Nanjanad, but little can be done in this direction until staff is provided. If this work is to be undertaken the Nilgiris must be converted into a circle like those on the plains and demonstrational staff provided. At present we have only one demonstrator to undertake the whole work on the hills. A few demonstration plots have been conducted and seed farms established. By means of these and the experiment station, 1,112 maunds of seed potatoes were distributed during the year, but this does not nearly meet the demand.

245. During the year demonstration plots were started among the Todas in connexion with the Toda Amelioration Scheme and these have met with surprising success. This year, 400 maunds of seed has been reserved and distributed among the Todas, but this is all that can be done until we are provided with adequate staff. It has been impossible on this account to give any demonstration with improved implements or methods of cultivation, but jamabandi camps have been attended by the officers of the department and lectures delivered.

(*f*) *Dry grains.*

246. Despite a bad season H. 22 ragi was found to do better than the local variety in the taluks of Kollegal and Hosur and 1,250 lb. of seed were obtained from the Mysore Agricultural Department, to whom my thanks are due for their courtesy and help, to meet the growing demand for seed of this strain. More than 2,000 lb. of seed of periamanjal and chinnamanjal cholam were supplied to ryots in the Coimbatore and Salem districts.

T. 8 ragi is gaining popularity at Markapur, Cuddapah, and Kudligi, and 1,903 lb. of seed was distributed as compared with 571 lb. in the previous year and the area sown with this improved strain was 2,445 acres, an increase of some 55 per cent.

247. T. 1 jonna, which was selected to suit the Bellary District, was sown over an area of 5,427 acres and 13,098 lb. of seed was distributed. It gave a better yield than the local strain, but the season was unfortunately unfavourable so that yields were low.

T. 6 jonna, a yellow variety suitable to the Kurnool and Cuddapah districts, was sown over 1,140 acres and 5,710 lb. of seed was distributed.

(*g*) *Groundnuts.*

248. This is a most important industrial crop and the area under groundnuts is increasing annually and it is in some places replacing cereals and even other industrial crops like cotton and sugar. It is an easy crop to grow and gives quick returns. Attempts are being made to introduce improved varieties to the attention of ryots and improved methods of cultivation and harvesting, but our efforts have been sadly hampered this year by the unfavourable season. Some progress has been made, however, and the bunch variety is becoming popular and as a result of our demonstrations the ryots are beginning to use an iron plough for the preliminary cultivation and are learning that it gives them a bigger crop and they are also beginning to learn to harvest the crop with a plough, a practice which results in a recovery of a bigger percentage of the crop and a reduction in cost of lifting it. In many places it is the local practice to broadcast this crop,

but at the instance of the department an improved method of dibbling it behind a plough is being adopted. This gives a better germination. In the V Circle, 150 acres were sown in this way during the year.

(*h*) *Fodder crops.*

249. A series of bad seasons has served to bring home to the ryots the necessity of increasing the fodder supply by raising special crops for the cattle and the demand for seed is on the increase. In the Gudiyāttam Taluk, for example, 250 acres were under fodder crops and in the Chittoor District the practice has become common. There is a steadily growing demand for slips of guinea and elephant grass and in the VIII Circle, 7,000 slips of the former and 10,000 slips of the latter were supplied to ryots. 179 lb. of Kolukattai grass seed were also distributed in this circle.

In the hills, *Paspalum* grass is spreading and in time it should materially increase the fodder supply round Ootacamund and Coonoor. *Kikuyu* grass is spreading rapidly on the Nanjanad Experiment Station and it has been introduced into the Government gardens at Ootacamund and Sim's Park at Coonoor. It promises to be a useful fodder and is beginning to attract the attention of the public.

250. *Silage.*—Demonstrations of silage making have been given wherever possible. There appear to be excellent facilities for the use of silage on the West Coast where large quantities of hill grass are available and where there is always a shortage of fodder in the hot weather. A number of pits have been laid down with this material and where they have been opened the results have been satisfactory though the wastage has been on the high side. A special demonstration cooly has been trained for the purpose of this work. At Mudabidri, the Raja has fed 20 head of cattle daily with silage from a demonstration silage pit.

251. Four demonstrations were given in Coimbatore and Salem districts. In the former area ragi straw, available in the north-east monsoon when it is not considered of much value, was used and the pits were opened at the end of two or three months and the silage was found to be excellent and the cattle ate it readily. In Salem, fodder cholam was the material

used and a successful demonstration was given on Mr. K. T. Paul's estate and in the Central Jail.

(*i*) *Miscellaneous.*

252. In South Kanara, *modan* paddy is becoming more and more popular and the area under this crop is increasing. The usual practice is to lower the level of the dry land and convert it into single crop land, known as *bettu*, and then lower it still further and turn it into two-crop land, known as *majalu*. The Agricultural Department has demonstrated the fact that equally paying crops such as chillies, sweet potato, and tapioca, can be grown on the dry lands with the help of the monsoon rains without going to the enormous expense of lowering them and the practice is gradually spreading, especially round the experiment station at Taliparamba where the demonstration has been conducted. Now one sees all the hill sides in this area bunded up and under dry land cultivation where twenty years ago there was nothing but scrub jungle and waste land.

253. The price of pepper has been very high of late years and this has stimulated interest in this crop and old and neglected gardens are being renovated and there has been a big demand for cuttings from our station at Taliparamba which has been met as far as possible.

254. *Fruit.*—There is a fairly large area under citrus fruit and mangoes in different parts of the Presidency, but beyond demonstrating the benefits of intercultivation of the gardens with an iron plough and the use of green manures and bone-meal and emphasising the necessity for clean cultivation to control diseases, the department has, for lack of staff, been able to devote little attention to these crops. It is felt that in the present state of our finance and resources they should be concentrated on the more important food and industrial crops. Even in the hills, where fruit experiment stations exist, there is no staff to undertake demonstration and propaganda work.

255. A small experimental fruit orchard was opened a few years ago at Taliparamba and some of the trees planted out have made good growth and

this has attracted the attention of the cultivators. Seven fruit gardens have been started under departmental advice and guidance and 56 graft mangoes and 13,862 pine-apple suckers have been supplied to applicants. Three hundred and forty-six grafted fruit trees and 573 seedlings were distributed from the Pomological Station at Coonoor, which is an advance on last year's sales, while 991 plants were sold from the gardens at Burliar and Kallar as compared with 195 last year and it looks as if fruit-growing had received an impetus.

256. *Tobacco.*—The area under this crop in the Guntūr District is on the increase, but heavy rains caused the crop to be small. The high prices obtained last year caused a great impetus to be given to the cultivation of virginian strains and this was also increased owing to the fact that the heavy November rains destroyed many of the chilli fields and these were replaced with tobacco. Seedlings were largely obtained from the Imperial Leaf Tobacco Development Company. The area under exotic tobaccos is estimated at 25,000 acres. A demonstration of the use of artificial fertilizers with this crop as a supplement to cattle manure resulted in an increased profit of Rs. 20 per acre.

F.—Agricultural implements.

257. *Ploughs.*—There are many reasons why the yield of crops in India is low. One is poor cultivation with a primitive type of plough which is very light and which only breaks up 3 or 4 inches of the surface soil and does not turn it over. It is the custom to plough and cross plough with this implement anything from twice to fifty times in order to pulverise the soil and bring it to a fine tilth. The operation is not only slow, but costly, and it entirely fails to deal with deep-rooted weeds which are serious competitors of crops in some districts.

258. It is quite feasible to use an iron plough which removes many of the limitations of the country plough. The lighter iron ploughs on sale are not heavier than the country wooden implements, and they can easily be drawn by a small pair of animals. The use of heavier iron ploughs which can also be worked with a single pair makes deep ploughing possible and this

is of great advantage in dealing with weeds and in improving drainage. The main value of iron ploughs lies in the saving of time and labour.

259. Over 2,800 ploughing demonstrations with iron ploughs were given during the year and despite the fact that the season has not been a good one a fair number have been sold. There was a change of agency for the sale of ploughs towards the end of the year and during this time it was difficult to get spare parts. A more satisfactory arrangement has now been made and it is hoped that during the coming year more ploughs will be sold on this account. The ryots still have a tendency to choose the cheaper makes of plough irrespective of the real needs of their soil. The quality of the implement now supplied does not appear to be so good as in former years and there is a great opportunity for any firm which will put a reliable plough on the market. It must be light and strong and above all things it must be cheap. During the year, 2,253 ploughs were sold as a result of propaganda work as compared with 2,025 in the previous year.

The sale of spare parts is a good indication of the extent to which these ploughs are being actually used and 3,496 have been sold during the year. We can safely say that about 2,000 new ploughs are purchased by ryots each year and there must now be a very large number at work in the Presidency.

260. *Other implements.*—A great part of the time of the district officers and maistris is taken up in demonstrating the use of iron ploughs, the working of roll-easy-mhote wheels, the junior hoe, the seed drill, buck-scrapers, and the chattanooga sugarcane mill, and a few of these improved implements are in use, but a machine must be very cheap to appeal to the ryot. Roll-easy-mhote wheels, which reduce friction and enable more power to be utilized in actually lifting water, are beginning to be popular and 217 were sold as compared with 161 last year. Hand chaff-cutters are also beginning to be used and 54 were sold this year and 44 last year. As noted last year, there appears to be scope for co-operative societies to purchase the bigger and more expensive implements, such as a victory plough for instance, and hire them out to their members. There is always a demand for our

implements on hire from the experiment stations, but they can only be spared at rare intervals.

261. Improved sugarcane mills were demonstrated in many places and touch has been kept with manufacturing firms and in one case suggestions have been made for an improvement in design. Firms have been kept informed of the merits of their respective mills as a result of milling trials. Thus the local trade has been kept informed of the position and this should result in the reduction in prices.

The introduction of all forms of improved agricultural implements is slow and uphill work; but steady progress is being made. Ten years ago, very few iron ploughs and three-roller cane-crushing mills were in use, while now large numbers are to be seen. There is undoubtedly still a long way to go, but patience is essential. Until simple implements have been popularized, there is practically no field for large power-driven machinery. The price of such machines is against them, and in most cases they are not suited to the simple needs of the ryot with his small holding.

262. *Research Engineer.*—What is needed is to improve existing implements with which the ryot is familiar and I am happy to say that a whole-time Research Engineer has been appointed to take up this work. We have long desired to see this appointment made. A suitable man has been found to fill the post who is a good mechanic and at the same time a farmer so that he knows what an implement should do and the needs of the cultivator. He is expected to take up his duties in August 1928.

G.—Manures.

(*a*) *Green manures.*

263. One of the major items of demonstrational and propaganda work to which the department have devoted special attention for many years is the use of green manures for paddy, sugarcane, and other crops. Our efforts have met with considerable success and very large areas are now under green manures of various kinds. Of late years, steps have been taken to induce the ryots who grow these crops to apply

bone-meal when they plough them in. In the I Circle particularly the use of green manure and bone-meal supplemented with cattle manure has been found the cheapest way in which to maintain the fertility of the soil. The method costs very little and it ensures a profit of at least Rs. 15 per acre. In this circle the area under this system of manuring has been doubled during the year. The crops usually advocated for this purpose are dhaincha, kolinji, sunnhemp, and indigo, depending on the particular locality, and, in limited areas, grams. There are probably other plants equally suitable, more especially as it is probably organic bulk which is required and not actual nitrogen content, and a start has been made to examine the possibilities of common weeds which can be easily grown and controlled.

264. In every circle special attention has been paid to the green-manure problem and it is part of the regular routine work of the demonstrators to push it and distribute seed. As in the case of paddy and cotton the difficulty is to arrange for an adequate supply of seed, but every source is being exploited. There is scope here for co-operative societies or even private firms and individuals to arrange for the collection of seed for subsequent sale.

265. The following is a brief account of the progress which has been made with this work in the different circles. It has already been mentioned that the area under green dressings has been doubled in the I Circle. In the Pennar delta and the light soils of Rēpalle the spread of kolinji, or vempali as it is called there, is only limited by the seed supply. On the whole some 19,000 acres are under this crop in the Nellore and Guntūr districts. In the Kistna where the practice is not so well known demonstrations have resulted in a heavy demand for seed and some 600 acres were sown during the year. The scope for dhaincha in this circle is limited, but it has been introduced on the saline lands in the Bandar Taluk. The simplest cure for saline lands is to grow heavy crops of dhaincha on them and plough these in with or without phosphate. The use of *pillipesara* as a combined fodder and green dressing has been introduced in Gudivāda and Tenali taluks.

266. In the III Circle, special attention was paid to this work in the Cuddapah, Prodattur, and Markapur areas. In former years indigo seeth was available, but now this industry has vanished, the lands are becoming saline for lack of organic matter. Green manures are the remedy, but there is a difficulty in growing them on account of lack of irrigation water in time and uncertain rains. Despite this a larger quantity of green manure seeds were disposed of this year than ever before.

267. In the IV Circle, 28,211 lb. of seed was distributed which is a small advance over last year, but the season was most unfavourable for green dressing crops. Wild indigo is becoming self sown. A little seed was obtained in the circle itself but most of it had to be got outside.

268. Green manures are widely used in the V Circle and 65,781 lb. of seed were distributed by the department and 55,064 lb. were purchased by ryots from other agencies. This circle is able to supply seed to other circles and 64,387 lb. were thus supplied departmentally and 82,000 lb. by merchants.

269. In the VI Circle, large areas of self sown kolinji and dhaincha are to be seen and the practice is wide spread.

270. In the VII Circle, green manures give very good results in the sandy soils along the coasts but it is difficult to obtain sufficient seed to meet the local demand and ryots are being encouraged to collect their own seed.

271. In the VIII Circle, green manuring has taken a strong hold, especially in taluks like Gobichettipalaiyam and Attur, and it is impossible to meet the full demand for seed despite attempts to raise it under seed farm conditions. The difficulty is that the crop is required for ploughing in and ryots are reluctant to leave it for seed and forego some other crop.

On the whole, over 93 tons of green manure seed of different kinds were distributed by the department during the year.

(b) Indigenous manures.

272. It has been stated above that an effort is being made to teach the ryots to apply bone-meal with green

manure. Our soils surveys have shown that the majority of the soils in this Presidency are deficient in phosphates and bone-meal is cheap and easy to apply and the fermentation of the green leaf renders it quickly available. Even if for lack of water the benefit is not felt in the year of application it is obtained in succeeding years and there is a marked residual effect.

273. In the I Circle, while oil-cakes are available to the ryots practically at their doors, bone-meal is difficult to get and the only crushing plant is that at the experiment station at Anakapalle and this was out of action till the end of the year.

274. In order to meet the demand which has been created as a result of departmental propaganda and demonstration arrangements were made to stock bone-meal at our depots, and 13¼ tons were sold. This is well above the average of past years. In the IV Circle bone-meal is being made by an individual at Ramapuram in the Chittoor district and also by the Tindivanam Co-operative Society, and it is widely sold by Messrs. Parry & Co., and is thus easily obtainable.

275. Now that firms have opened depots all over the Presidency for the sale of manures it is unnecessary for the department to stock them in their depots and this has been given up except in special cases where for some reason or other the firms have not opened depots. All the department do now is to tell ryots where they can buy manures and the demonstrators have more time to devote to their demonstration plots and propaganda work. It is thus impossible to say how much bone-meal has been sold during the year, but it must have been considerably over 200 tons.

276. On the West Coast, the use of fish manure is well known, the difficulty is to get it. There has been a shortage of late years due to small catches of fish and the high export price. This year catches of mackerel were good and much of this was turned into guano and found a ready sale.

277. A great many demonstrations and much propaganda are devoted to trying to induce the ryots to take more care in the preservation of their cattle manure and to use either the loose box or the dry earth method, but advance in this direction is slow and

disappointing. Persistant propaganda is necessary. Cases are known where the amount of farm-yard manure has been trebled under the improved methods advocated by the department and if such methods were widely adopted and consistently practised the ultimate gain to the country would be colossal. A number of demonstrations have been given with methods of making synthetic farm yard manure out of waste products and some of these have been very successful.

(c) Artificial manures.

278. There are large areas where green dressings cannot be grown and in such places there appears to be scope for the use of artificial manures to supplement organics. Owing to the extensive propaganda work now being done by Nitram, Limited, and other firms such artificials are easy to obtain and their price has been so much reduced of late years that they are rapidly coming within the reach of the ryots' purse. Sulphate of Ammonia, in combination with phosphate, appears to be particularly promising and to return quite substantial profits on crops like paddy and sugarcane and possibly others.

279. The very ease and cheapness with which artificials can be obtained and the success which they have given has introduced a peculiar difficulty from the point of view of the Agricultural Department. In the first place, there is a distinct danger that the ryots will use these fertilizers by themselves and neglect the absolute need for a basal dressing of organic manure which is necessary not only to maintain the food value of the resulting grain crop, but also to maintain the physical texture of the soil. Supplying firms are loyally co-operating with the department in trying to impress upon the ryots that artificials should be used only to supplement organic manure, but they cannot be expected to refuse to sell their wares unless this method of applying them is adopted.

280. A bulletin has been published during the year dealing in simple language with the manurial problem in general and emphasising this danger and we can only hope it will be read widely. Another difficulty is this. There are now a large and increasing number of artificial fertilisers on the

market and competing firms are vieing with one another to sell them, consequently the ryots are apt to be confused in their choice of them. The Agricultural Department are unfortunately not yet in a position to give definite advice on the point though it is recognized that it is their duty to do so. We have not yet had time or facilities for testing them all out under field conditions. This problem is now engaging my very earnest attention and I hope very shortly to lay before Government a definite scheme for undertaking these all important trials.

Meanwhile very large quantities of artificials have been sold in the Presidency.

281. Sulphate of ammonia and superphosphate when used to supplement farm-yard manure, the latter being reduced to half the usual quantity, have in many places given substantial profits which are beyond dispute and sulphate of ammonia and nitrate of soda are being increasingly used as top dressings for paddy nurseries with good results, more especially in light soils where the growth of seedlings is normally slow and where the late receipt of water makes it necessary to force them on.

282. This system of manuring has met with most marked success in the Tanjore delta and 700 tons of sulphate of ammonia and 742 tons of superphosphate were sold in the V Circle alone. It is impossible to say exactly what quantities of artificial fertilizers have been sold to ryots in the Presidency during the year, but it is a very large quantity and far more than has been sold for many years. Thus Messrs. Brunner Mond & Co. inform me that their sales of sulphate of ammonia amounted to 3,131 tons from March 1927 to February 1928. In addition to this large quantities must have been sold by firms like Messrs. Parry & Co., and the Chilean Nitrate Committee, and others. This is a good sign and is to be encourged despite the dangers indicated above.

VII.—AGRICULTURAL ENGINEERING.

283. The Agricultural College estate is so large that it takes the whole time of the Assistant Agricultural Engineer to look after its upkeep, to carry out repairs to bungalows and buildings, and to keep the

oil-engines, pumping plant, gas plant, electric plant, and roads in proper order and it leaves him no time at all for research work. It has already been mentioned that sanction has been obtained for a Research Engineer and research work on implements which is badly needed will now be undertaken. Messrs. Hilson and Munro during the year have invented an improved guntaka of simple design which should find a ready sale with the ryots and steps are being taken to have it made.

284. Owing to the new teaching college and the increased number of students our gas consumption has increased very much of late years. This year, 370,550 c.ft. were manufactured at a cost of Rs. 10-3-0 per 1,000 c.ft. which is slightly less than last year. Despite the erection of a third generator last year the plant will probably have to be still further enlarged in order to meet our requirements. New plates have been put in the electric plant and it was run for 860 hours at a cost of Rs. 839. The water pumping plant supplied a minimum of 59,437 gallons and a maximum of 73,182 gallons per day irrespective of irrigation. A refrigerating plant was erected in the dairy. The workshop executed orders to the value of Rs. 7,597. A new machine shop was erected during the year and it will be equipped by the Research Engineer.

VIII.—PUBLICATIONS AND SUPPLY OF INFORMATION.

285. The undermentioned leaflets and bulletins were published during the year 1927-28 :—

Number.	Subject.	Author.	Languages in which published.	Number of copies.	Price.
	Leaflets.				RS. A. P.
46	A note on varieties of paddy grown in the Samalkota Experiment Station.	Mr. A.C. Edmonds, Deputy Director, I Circle.	English ...	200	Free.
47	How to use crab traps in paddy fields.	M.R.Ry. K. Venkatarama Ayyar, Assistant Paddy Specialist, Adutural.	English ... 5,000 Tamil .. ... 12,000 Telugu ... 4,000 Malayalam ... 2,000 Kanarese ... 2,000		Do.

Number.	Subject.	Author	Languages in which published.	Number of copies.	Price.
	Leaflets—cont.				RS. A. P.
48	A note on the Anakapalli Station.	.....	Telugu ...	1,500	Free.
	Bulletins.				
88	Statement of history of certain crops from sowing to harvest and describing their vicissitudes under adverse conditions.	.....	English ...	1,000	0 2 0
89	The conduct of Field Experiments.	Messrs. R. O. Iliffe, Paddy Specialist, and B. Viswanath, Government Agricultural Chemist.	Do. ...	1,000	1 4 0
90	The Manurial Problem and its Solution.	Mr. R. D. Anstead, Director of Agriculture.	Do. ...	10,000	0 2 0

286. The year book of the Agricultural Department for 1926 was published during the year.

287. The fourth edition of Wood's Note Book of Agricultural Facts and Figures is now under reprint.

288. The Villagers' Calendar for 1927–28 was published as usual in English and the vernaculars. Eighty-two thousand and fifty-eight calendars were printed as shown below for sale and distribution:—

English	... 6,658
Tamil	... 29,500
Telugu	... 37,800
Malayalam	... 5,600
Kanarese	... 2,500
Total	... 82,058

289. The Monthly Digest continues to be issued in English and the vernaculars and it is widely circulated.

290. The officers of the department contributed the following papers to the Indian Science Congress at Calcutta in January 1928:—

(1) A Preliminary Note on a Successful Treatment for the Jasmine Bug.

(2) Life History and Habits of Chonocephalus depressus.

(3) Notes on the Life History and Control for Tetroda histeroides.

(4) A Novel pest on Tobacco—Stibaropus tabulatus.

(5) Life History of Cyphocera Varia-Tachinid parasite of Spodoptera.

(6) The Occurrence and Inheritance of Bristle-tipped Spikelets in Setaria italica.

The undermentioned papers were also issued during the year from the different sections for publication:—

(1) Field trials with the top-bottom ratio.
(2) Leaf-spot disease of safflower.
(3) Leaf-spot and blight disease of onions.
(4) Foot-rot and wilt of antirrhinums.

IX.—ACCOUNTS.

291. The receipts and expenditure for the year and the corresponding figures for the previous year are given below :—

	1926-27. RS.	1927-28. RS.
Expenditure	16,58,140	17,59,529
Receipts	2,66,707	2,89,172
Net expenditure	13,91,433	14,70,357

The increase in expenditure in the current year as compared with the expenditure in the previous year is mainly due to:—

(i) the development of the cattle farms and the cotton and paddy breeding stations,

(ii) allotment of special grant of Rs. 30,500 for purchasing pure cotton seeds for sale to ryots in the Ceded Districts on six months' credit, necessitated by the failure of the season last year, and

(iii) the participation of the department in the All-India Agricultural Industrial Khaddar and Arts Exhibition. The increase in receipts is caused largely by the recovery of the cost of seeds from the ryots of the Ceded Districts.

X.—STATISTICS.

292. *Annual Season and Crop Report.*—The Government of India prescribed in 1901 the annual publication of the season and crop report as a connected account of each year's agricultural conditions *as soon as possible after the close of the agricultural year*, on the ground that the character of the seasons and crops would affect very greatly administration in all its branches. It had not, however, been found possible to publish it on or even within a reasonable period from, the prescribed date (1st October) owing to the very late receipt of returns from districts. Special instructions were issued to Collectors for the prompt despatch of the returns, and in consequence, my report for 1926–27 was issued on the 2nd December 1927, three months earlier than in the previous year. The local Government directed that the prescribed size of the report, viz., 20 pages, should not be exceeded. Hence my report was reduced to 4 pages of narrative and 14 pages of statements, as against 25 pages of narrative, 33 pages of statements, and four pages of graphs in the report of the previous year, without at the same time sacrificing the usefulness of the report and without omitting the important statistics, the statements for which had to be remodelled and arranged after great trouble for easy reading and ready reference.

293. During the year the Board of Revenue issued, at the instance of the Government, instructions to Collectors to deal adequately in their season and crop reports with the conditions of the agricultural population in general and its indebtedness in particular and to furnish any information available regarding wages and the state of the labour market so far as it would affect the agricultural labourers.

294. *Forecasts.*—The areas estimated in the crop forecasts in 1926–27 differed from the actuals by 0·6 per cent for sugarcane, 1 per cent for paddy, 2 per cent for indigo, 3 per cent for gingelly, 4 per cent for cotton and 5 per cent for groundnut and castor. The estimates were therefore reasonably correct.

295. The forecast returns received from tahsildars gave more satisfactory information than in the previous years about the areas under the different varieties of cotton in the central districts and the

south. An illustrated leaflet in Tamil has been published for guidance of karnams setting forth in clear language the distinguishable characteristics of each variety of cotton at various stages of growth.

296. The forecast returns received from tahsildars in Guntūr, Kurnool, Bellary, and Anantapur do not yet show properly the area under (1) Cotton pure and (2) Cotton mixed. It will take some time for the change of procedure to be carried out properly.

297. At the request of the President of the International Institute of Agriculture, Rome, forecast reports on cotton were cabled to him at his cost in the year under review.

298. Under the orders of the Government of India intermediate monthly reports on forecast crops have been instituted. They are in addition to the regular forecasts and it was desired that they should give (*a*) a brief summary of weather conditions since the preceding regular forecast and their effect on the crop and (*b*) any resultant deviation expressed as a percentage from the estimate of condition in the preceding regular forecast. The reports are expected to be based on weather reports and expert opinions of agricultural officers. Twenty-four reports have to be issued in the year. The reports issued during the year contain information only on point (*a*) above. It has not been found possible to furnish information on point (*b*) in the absence of returns from taluks. To enable the Deputy Directors of Agriculture to furnish me with useful information for my intermediate reports, the Board issued instructions to Collectors to supply the Deputy Directors of Agriculture on every Monday with extracts from the weekly season reports of rainfall figures relating to the several rain-recording stations in their districts.

299. *Crop-cutting experiments.*—No crop-cutting experiments were conducted in the Presidency during the quinquennium ending 1926–27 for want of money and staff.

300. *Village accounts.*—One of the proposals in connexion with the simplification of village accounts was that it would be enough for statistical purposes if the karnam limited the record of details of areas under

different crops to wet plots and estimated the corresponding areas in the case of dry lands in the same way as he did in respect of all classes of land on the West Coast and Hills and in all non-Government villages. A report was sent to the Board on the subject pointing out the objections to the proposal. The proposal will not reduce the number of karnams. It might lessen their work to a slight extent but at the sacrifice of efficiency and quality. At any rate, it will result in reducing considerably the value of the figures of area and yield published both in the forecast and in the season and crop reports.

301. *Weekly cotton mill and press returns.*—These returns continue to be published and distributed as before. The progressive figures in the return run from the 1st February to the 31st January of next year.

302. A statement is also published each month, along with the cotton press return for the first week, showing the exports from each port with countries of destination and the imports into each port together with the places of export.

303. No progress was made in the matter of getting monthly returns from the railways showing the movements of cotton along their lines.

304. *Cotton markets.*—No progress was made with the question of undertaking legislation for the establishment of cotton markets in the Presidency on the lines of the Berar market.

305. *Finance of the cotton crop.*—At the request of the Indian Central Cotton Committee, the investigation into the finance of the cotton crop in the Northerns and Westerns area was continued in the year with the help of the grants made by the Committee. An Assistant Director of Agriculture and an Agricultural Demonstrator have been engaged on the work since December.

306. *The Provincial Cotton Committee.*—No meeting was held this year. The members of the Local Cotton Committees retired by efflux of time and the members were nominated this year.

307. *Miscellaneous.*—In the matter of watering groundnuts, the Chamber of Commerce, Madras, passed the following resolution which was communicated to

the Agricultural Adviser to the Government of India and he was requested to forward it to the Indian Trade Commissioner, London, with an expression of hope that he would be able to move in the direction indicated :—

"In the opinion of the Madras Chamber, the watering of groundnuts is deliberately effected *after* decortication for the purpose of making weight. Most exported groundnuts are machine decorticated and there is no necessity therefore to introduce water at any stage of their preparation. The Chamber considers that the remedy for the evil complained of is entirely in the hands of continental buyers themselves who should resolutely refuse to buy such adulterated goods except at much reduced rates."

308. Mr. J. Van Gelderon, Director of the Statistical Department of the Netherlands, East Indies Government, visited India with the object of obtaining information regarding the methods of compiling statistics. He was given every facility in this work.

309. Mr. V. N. Visvanatha Rao, the Statistical Assistant to the Director of Agriculture was a member of the Committee appointed in connexion with the scheme of instituting a Department of Statistics attached to the Economics Department of the Madras University.

310. Mr. V. N. Visvanatha Rao, the Statistical Assistant reverted to the Revenue Department on the 28th March 1928 after more than seven years as the Statistical Assistant. His loss will be severely felt in this office and I should like to take this opportunity of expressing my deep appreciation of the excellent work he has done in this section. The accuracy of our statistics is entirely due to his unfailing energy and enthusiasm.

XI.—PROGRAMME OF WORK FOR 1928-29.

311. In accordance with G.O. Mis. No. 1085, dated 16th August 1922 the programme of work for 1928-29 is included in this report. The broad outlines of this programme are indicated below.

312. *Experiment stations.*—The main lines of work will be along those adopted in the past and recorded in this report and the reports on the experiment

stations themselves. The usual varietal, cultural, and manurial experiments will be carried on with reference to the crops of the locality. As far as space is available, attention will be particularly devoted to manurial problems involving the use of artificial fertilizers and the possibility of using synthetic farmyard manure. A few series of experiments will be started to test some of the new fertilizers now on the market. At Anakapalle, where the new extension is now laid out, attention will be devoted to manurial experiments and the trial of nursery cane. At Samalkota the system of 'oodu' cultivation will be investigated and also improved methods of raising fodder and green manure. At Palūr, a new set of manurial experiments with sugarcane will be started.

313. *Paddy.*—At Coimbatore, three main lines of work will be undertaken as in the past, (1) improvement and spread of local types, some of which may be found suitable for other tracts, (2) study of character and inheritance and the harnessing of academic investigation to economic purposes, (3) study of types for tracts not yet served by the sub-stations. The search for strains resistant to *Piricularia* will be continued as well as the manurial trials with chilean nitrate.

314. *Co.* 5 will be re-examined for chaff production. The results of *Co.* 6 and *Co.* 7 recently released will be watched. The histological study of the paddy plant will be continued.

315. At Āduturai the regular programme will be continued and trials will be made with synthetic farmyard manure.

316. At Maruteru, buildings will be finished and mass selection and single plant selections begun last year will be continued. A special study will be made of green manures and their place in the cropping system and the *udu* system will be studied.

317. At Pattambi, the buildings and lay out will be completed and the start made with soil uniformity tests and single plant selections this year will be pressed forward.

318. *Cotton.*—This work will follow the following lines genetics, the examination of a cross between

Cambodia No. 440 and Isham; isolation of pure strains; a manurial experiment with irrigated cotton will be started; the effect of early sowing will be studied and a beginning will be made to determine the amount of irrigation water required by Cambodia cotton.

319. *Millets.*—Study of the mode of inheritance of sorghum, ragi, and setaria. Single plant selection to improve yield of periamanjal cholam of Coimbatore, *tella jonna* of Bellary, and *patsa jonna* of Nandyal. A black soil breeding station in the Adōni area will probably be started.

320. *Botany.*—Survey of weeds round Āduturai, Hagari, Anakapalle, and Kasaragod, and study and survey of fodder grasses of the Presidency. Botanical survey in Ganjām, Nellore, Cuddapah, and the Nilgiris.

321. *Mycology.*—Special attention will be devoted to problems in connexion with piricularia of paddy, mosaic of sugarcane, diseases of betelvine, and rhizoctonia of groundnut, cotton wilt, and mildew of chillies.

322. *Entomology.*—Special attention will be devoted to problems in connexion with paddy stemborer, control of coconut caterpillar, hairy caterpillar campaign, spodoptera campaign, and work on mango hoppers, fruit flies, and moths, pollu disease, grass-hoppers will be done. Special attention will be paid to the outbreak of Icerya scale in the Nilgiris.

323. *Chemistry.*—Soil surveys will be continued, and the following problems will receive special attention, synthetic farm-yard manure, effect of manures on the quality of the crop, utilization of mineral phosphates, and control of soil moisture at Hagari.

324. *Livestock.*—The breeding policy at present in force will be pursued and cross-breeding work will be continued. As many bulls will be distributed for stud purposes as possible. More attention will be devoted to poultry in the hope of starting a cottage industry. The Ongole cattle survey will be completed in the Palnad, Nellore, and Kistna districts. Animal nutrition work will be continued in collaboration with the Imperial Physiological Chemist and begun at Coimbatore, when the question of the value of local rough ages as a maintenance ration will be examined.

325. *District work.*—This will be continued and developed along the usual lines and as many demonstration plots as possible will be opened. Work in collaboration with the co-operative department will continue as in the past, endeavours being made to work in the closest possible touch with this department and to take all the advantage we can of their organization. Special attention will be devoted to the establishment of seed farms in an endeavour to meet the growing demand for paddy, sugarcane, and green manure seeds.

326. In all circles special attention will continue to be devoted to the preparation of silage and synthetic farm-yard manure.

327. Special lines of work which will receive attention in the various circles are indicated below :—

II. In addition to the regular work in progress attention will be paid to the introduction of swamp paddies, deep cultivation for turmeric, the introduction of J. 247 cane, cure of Thrips attacking chillies, and the proper use of artificial manures.

III. Cotton improvement work will be continued, but H. 1 will replace H. 25. Improvement of sugarcane cultivation and jaggery making will be a special feature at Hospet. Reclamation of saline lands will be attended to.

IV. New demonstration areas will be started with special reference to the needs of the small ryots and special attention will be paid to the introduction of fodder crops and the establishment of seed farms.

V. Special attention will be devoted to seed farms and seed supply, new varieties of tobacco will be tried, and two new sub-circles will be opened in the Udayarpalaiyam and Perambalur taluks.

VI. The main lines of work will be cotton improvement, improvement of sugarcane cultivation and jaggery making, and the introduction of fodder crops.

VII. Attention will be paid to the making of synthetic farm-yard manure and silage, and coconut, sugarcane, and paddy work will be continued.

VIII. Distribution of improved strains of Cambodia and Karunganni cotton, and co-operative ginning

and seed production. Drill sowing, green manure extension, improved cultivation methods for sugarcane, extension of fodder crops, and use of iron ploughs, and improved furnaces and sugar mills.

328. *Agricultural education.*—The Degree Course will be continued at the Agricultural College, Coimbatore, forty new students being admitted. Teaching will be intensified and the time-table revised, and special lectures will be delivered, and the subject of agricultural economics will be given special attention. New agricultural middle schools will be started at Kalahasti and Usilampatti, and possibly in Tanjore.

I have the honour to be,
Sir,
Your most obedient servant,
RUDOLPH D. ANSTEAD,
Director of Agriculture.

DIVISION INTO AGRICULTURAL CHARGES

I Ganjam, Vizagapatam, East Godavari and West Godavari
II Kistna, Guntur and Nellore
III Kurnool, Bellary, Anantapur and Cuddapah
IV Chittoor, North Arcot, Chingleput and South Arcot
V Tanjore and Trichinopoly
VI Madura, Ramnad and Tinnevelly
VII Malabar and South Kanara
VIII Salem, Coimbatore and the Nilgiris

MAP OF THE MADRAS PRESIDENCY

Scale of Miles 50 0 50 100 Miles

Showing

1 The division into Agricultural charges
2 the location of the Agricultural stations &
3 the distribution of the main crops in each Agricultural charge.

NOTE:—(1) The charge of each Deputy Director of Agriculture is indicated by Roman figures.

(2) The separation of one Agricultural charge from another or from an Indian State is shown thus. —·—·—·—

(3) The total cultivated area in each Deputy Director's charge is represented by a circle drawn to scale. The figure entered against each crop in the circle represents the percentage of the area under it to the total cultivated area.

(4) The head quarters of Deputy Directors in charge of each circle are represented. ●

(5) Agricultural Experiment stations. ●

(6) Agricultural Middle Schools. ■

(7) The head quarters of Agricultural Demonstrators. ●

Helio-Zinco., Survey Office, Madras. 1926.

opened at Kālahasti and Usilampatti will produce as good results as the school at Taliparamba.

4. The fundamental problems underlying crop pests and diseases and the improvement of existing crops by hybridization and selection continued to be studied by experts at Coimbatore and their discoveries tested in the 31 experimental stations of the Presidency. The enormous possibilities of hybridization and selection are being steadily pushed forward in the four paddy breeding stations at Coimbatore, Aduthurai, Maruteru and Pattambi, the last of which was opened this year, the ultimate aim being the evolution of a strain which will be resistant to the fungus pericularia commonly known as blast disease. Government note with interest the recognition by the agricultural classes of the superiority of the strains evolved by the department as evidenced by the increase in the demand and supply of seeds of improved strains, the supply during the year being 170 tons against 131 last year. As the nutritive value of grains grown under different methods of manuring and cultivation is as important as the yield and outturn, it is proposed to study this under the guidance of Lt.-Col. McCarrison, Director of the Deficiency Disease Inquiry, and the necessary buildings and funds have been provided, and Government hope that this investigation will have a far-reaching effect on the agricultural policy in India. Research work on cotton proceeded on the lines of previous years, particular attention, however, being paid to rainfed cotton. The startling results of early sowing resulting in four times the yield of late sowing which has been discovered this year will, it is hoped, be further investigated and ere long demonstrated to ryots, and Government are pleased to note that during the year under review both the quantity of seeds supplied and the area sown with them have increased by 20 per cent of last year's figures.

5. Experiments on sugarcane, dry grains, betel vine, coconut, potatoes and groundnut proceeded on normal lines, and steady progress is recorded except in the case of groundnut, attempts at evolving and introducing improved strains of which were hampered by the adverse character of the season. Government consider that closer attention is desirable in the case of these crops grown in dry and precarious tracts as the struggle for livelihood is hardest among the ryots of such tracts.

6. Work on fodder crops continued on the usual lines, attention being paid to silage making. As the question of fodder is a very serious problem to India especially in hot weather, Government consider that the enormous possibilities of silage and the ensiling of the many kinds of suitable material available and addition of cheap materials to make silage food more palatable offer a wide field for closer investigation.

7. The four cattle stations at Hosūr, Coimbatore, Chintaladēvi and Guntūr continued to work successfully with the object of producing bulls of the best type for distribution in the Presidency and a new scheme was begun this year of placing Government bulls at stud at veterinary hospitals and under district boards. Government consider that the question of limiting issue of breeding bulls to selected areas to raise the quality of stock in those areas and placing the improved bulls of those areas at the disposal of district boards should be investigated.

8. The Mycological and Entomological sections continued to be devoted to the fungoid and parasitic causes of plant diseases, and though the department has utilized to the full the benefits of the resources at its command Government note that appreciable progress has yet to be made in the effective tackling of the blast disease of paddy, boll rot and seedling blight of cotton and the wilt disease of groundnut and betel vine as well as the coconut caterpillar. In this the department was much handicapped for want of a Physiological Botanist, and now that the Central Committee have offered a better scale of pay for the post of Botanist it is expected that suitable candidates will be forthcoming soon to tackle the diseases of cotton.

9. Demonstration work proceeded on the usual lines of establishment of demonstration plots on the ryots' lands as well as taking part in exhibitions. The motor exhibition lorries recently sanctioned will, it is hoped, be of great assistance to the department in educating ryots in the most out-of-the-way villages in improved methods of cultivation.

10. Government note with satisfaction that the Agricultural and Co-operative departments worked in harmony during the year and that the agricultural loan and sale societies are working successfully with the object of supplying to the public pure seeds of improved evolved strains produced under departmental

supervision and hope that this kind of demonstration on co-operative principles will develop appreciably during the current year.

11. Government note that, though special attention has been paid to the green manure problem and conservation of farmyard manure, the department is not yet in a position to give definite advice in regard to the economic use of fertilizers and trust that particular attention will be paid to this aspect of the manuring problem during the current year.

12. The popularity of the improved agricultural implements continued to be on the increase and it is hoped that with the recent appointment of an Agricultural Engineer, rapid strides will be made in the invention of new and improvement of existing agricultural implements and machinery.

13. The programme of work drawn up for the year 1928–29 which is mainly a continuation of work commenced in the past is approved.

14. The Government congratulate Mr. Anstead on his able and conscientious administration of the department during the year, and for utilizing to the best advantage of the agricultural classes the benefits of the resources at his command.

(By order of the Government, Ministry of Development)

A. McG. C. TAMPOE,
Secretary to Government.

To the Director of Agriculture.
" Director of Civil Veterinary Department.
" Registrar of Co-operative Societies.
" Law (Education) Department.
" Law (General) Department.
" Public Department.
" Accountant General.
" Agricultural Adviser to the Government of India (with C.L.).
" Government of India, Department of Education, Health and Lands (with C.L.).

Editors' Table.