

Indian Central Cotton
Committee 36 - Annual Report
1957

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**INDIAN
CENTRAL COTTON
COMMITTEE**

**THIRTY-SIXTH
ANNUAL REPORT**

1957

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**THIRTY-SIXTH
ANNUAL REPORT**

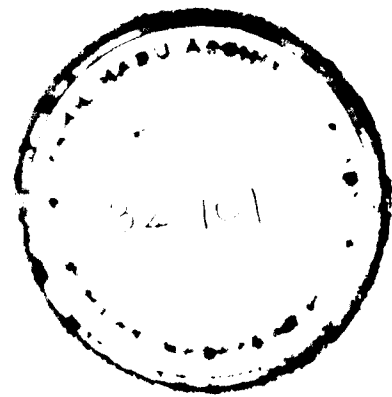
of the

**INDIAN
CENTRAL COTTON
COMMITTEE**

for the year ended
31st August,
1957.

PRICE Rs. 3/-

X-100-1000



**75th MEETING OF
THE INDIAN CENTRAL COTTON COMMITTEE
(Held in March, 1957)**



Facing the Camera—From left to right:—

Shri D. C. Kothari, Shri Madanmohan R. Ruia, Shri Chunilal B. Mehta,
Shri R. G. Saraiya, Shri Chimanlal B. Parikh (Vice-President),
Dr. M. S. Randhawa, D.Sc., F.N.I., I.C.S., (President), Dr. B. L. Sethi,
(Secretary).

Back to the Camera—Reporter.

CONTENTS

	Page
CHAPTER I	
<i>General</i>	1-6
CHAPTER II	
<i>Cotton Statistics</i>	7-24
(i) Areas and Production	7
(ii) Staple length of Indian cotton	8
(iii) Improvement in the yield per acre	9
(iv) Statistics of cotton pressed	10
(v) Imports	11
(vi) Mill consumption	11
(vii) Demand for various types of cotton in India	12
(viii) Exports	13
(ix) Statistics of stocks of cotton held in the country	14
(x) Supply and distribution of cotton	14
(xi) Cotton prices	15
(xii) Supply of monthly reports on Indian cotton to the International Cotton Advisory Committee, Washington	18
(xiii) Improvement of cotton forecasts	18
(xiv) Crop estimating survey on cotton	18
(xv) Cost of production surveys on cotton	21
(xvi) Extra-factory consumption of cotton	22
(xvii) Scheme for assessing the extent of accuracy of the statistics of cotton ginned and pressed	22
(xviii) Prices and arrivals of <i>kapas</i> in the up-country markets	22
(xix) Publications	23
CHAPTER III	
<i>Research</i>	25-65
Technological Research	26
Agricultural Research	28
(a) Fundamental Research	28
(1) Genetics and General Botany	28
(2) Physiology	28
(i) Scheme for cotton physiological research, Indore	28
(ii) Scheme for cotton physiological research, Dharwar	30
(iii) Scheme for cotton physiological research, Mysore	31
(iv) Co-ordinated crop weather scheme	32
(3) Agronomy	32
(4) Statistics	34
(b) Applied Research	35
<i>Bombay :—</i>	
(i) Scheme for cotton breeding in Khandesh	35
(ii) Scheme for improvement of Mathia cotton	36
(iii) Scheme for Interspecific Hybridisation in cottons at Surat	36
(iv) Scheme for simple manurial experiments on cultivators' fields in Bombay State	37
(v) Scheme for production of Hybrid seed	38
(vi) Cotton Wilt Breeding Scheme, Poona	38
(vii) Scheme for breeding <i>arboreum (desi)</i> cotton at Akola	40
(viii) Scheme for breeding American cotton at Achalpur	40
(ix) Scheme for the study of Agronomy of long staple American cotton at Amravati	41
(x) Scheme for improvement of cotton in Parbhani district	41
(xi) Scheme for improvement of cotton in Aurangabad and Bhir districts	42

Mysore:—

- | | |
|--|----|
| (i) Scheme for breeding long staple American cotton in Mysore State | 43 |
| (ii) Scheme for breeding Cambodia cotton in Bellary district of Mysore State | 44 |
| (iii) Scheme for improvement of Westerns cotton in Mysore State | 45 |
| (iv) Scheme for improvement of Dharwar-American cotton | 45 |
| (v) Scheme for improvement of Kumpta cotton at Bagalkot | 46 |
| (vi) Scheme for breeding American cotton resistant to Blackarm disease | 47 |
| (vii) Scheme for cultivation of Perennial cottons at Dharwar | 48 |

Punjab:—

- | | |
|--|----|
| (i) Scheme for improvement of cotton in South Eastern districts of Punjab | 48 |
| (ii) Scheme for breeding extra long staple cotton in Punjab | 49 |
| (iii) Scheme for breeding American cotton suitable for introduction in Central and Sub-montane districts of Punjab | 50 |
| (iv) Scheme for cotton manurial trials in Punjab | 50 |
| (v) Scheme for the study of Agronomy of American cotton in Punjab | 51 |

Madras:—

- | | |
|---|----|
| (i) Scheme for improvement of long staple American cotton as a winter crop in Central districts and Sea-Island cotton in West Coast of Madras State | 51 |
| (ii) Scheme for production of long staple cotton in Madras State | 52 |
| (iii) Scheme for breeding unirrigated Cambodia cotton in Madras State | 53 |
| (iv) Scheme for improvement of Tinnevely and Karunganni cottons in Madras State | 53 |
| (v) Scheme for the evolution of an early variety of cotton suitable for cultivation as an off-seasonal crop in the rice fallows | 54 |

Andhra:—

- | | |
|---|----|
| (i) Scheme for improvement of White Northern cotton in Andhra State | 54 |
| (ii) Scheme for breeding Cambodia cotton at Nandyal in Andhra State | 55 |
| (iii) Scheme for evolution of white linted cotton for Cocanadas tract in Andhra State | 55 |

Rajasthan:—

- | | |
|--|----|
| (i) Scheme for improvement of cotton in Mewar | 56 |
| (ii) Scheme for improvement of cotton in Kotah-Bundi area in Rajasthan | 57 |

Madhya Pradesh:—

- | | |
|---|----|
| (i) Institute of Plant Industry, Indore | 58 |
| (ii) Scheme for improvement of Nimar cotton (Khargone) | 59 |
| (iii) Long Staple American cotton breeding scheme, Badnawar | 60 |
| (iv) Scheme for surveying cotton areas in Malwa | 61 |

Uttar Pradesh:—

- | | |
|--|----|
| (i) Scheme for improvement of cotton in Western and Central districts of Uttar Pradesh | 61 |
| (ii) Scheme for improvement of cotton in Rohilkhand Tarai area in Uttar Pradesh | 62 |

Assam:—

- | | |
|--|----|
| Scheme for improvement of Hill cotton in Assam | 63 |
|--|----|

Orissa:—

- | | |
|---|----|
| Scheme for research on cotton in Orissa | 64 |
|---|----|

All-India:—

- | | |
|--|----|
| Scheme for the development and improvement of Sea-Island cotton in different States of India | 64 |
|--|----|

CHAPTER IV

- | | |
|---|-------|
| Extension work in the States | 66-94 |
|---|-------|

Bombay:—

- | | |
|---|----|
| (i) Scheme for multiplication and distribution of Pratap cotton seed in Saurashtra | 66 |
| (ii) Scheme for multiplication and distribution of Kalyan cotton seed in Saurashtra Region | 67 |
| (iii) Scheme for multiplication and distribution of superior long staple cottons in Saurashtra Region | 69 |
| (iv) Scheme for multiplication and distribution of 197-3 cotton seed in Khandesh tract of Bombay State | 69 |
| (v) Scheme for multiplication and distribution of 2087 cotton seed in Surat tract of Bombay State | 71 |
| (vi) Scheme for multiplication and distribution of Vijay cotton seed in Middle Gujarat | 72 |
| (vii) Scheme for multiplication and distribution of Kalyan cotton seed in Wagad tract of Bombay State | 73 |
| (viii) Scheme for distribution and marketing of H.420 in Bombay State | 75 |
| (ix) Scheme for distribution and marketing of Buri 0394 cotton in Vidarbha | 76 |
| (x) Scheme for seed distribution and marketing of improved variety of cotton No. 91 in Nagpur-Wardha tract | 77 |
| (xi) Scheme for seed distribution and marketing of M.5A (Malini) cotton in Chikhli taluka of Buldana district | 78 |
| (xii) Scheme for multiplication and distribution of Gaorani 12 cotton seed in Bombay State | 79 |
| (xiii) Scheme for establishment of Gaorani 6 cotton seed multiplication farms at Bhainsa and Nanded in Bombay State | 80 |
| (xiv) Scheme for multiplication and distribution of 2204 (Daulat) cotton seed in Parbhani district of Bombay State | 82 |

Madhya Pradesh:—

- | | |
|--|----|
| Scheme for multiplication and distribution of D-48-154 (Maljari) seed in Nimar tract of Madhya Pradesh | 82 |
|--|----|

Madras:—

- | | |
|---|----|
| (i) Combined scheme for multiplication and distribution of K.2 and Co.4/B.40 cotton seeds in Madras State | 83 |
| (ii) Scheme for multiplication and distribution of M.U.1 cotton seed in winter cropped area of Madras State | 85 |
| (iii) Scheme for multiplication and distribution of K.5 cotton seed in Madras State | 85 |

Punjab:—

- | | |
|---|----|
| (i) Scheme for multiplication and distribution of 320F American cotton in Ferozepur, Ludhiana, Jullundur and Amritsar districts of Punjab State | 86 |
| (ii) Scheme for multiplication and distribution of pure seed of H.14 American cotton in South Eastern districts of Punjab State | 88 |
| (iii) Scheme for multiplication and distribution of American cotton seed in Punjab (erstwhile Pepsu) | 89 |

Rajasthan:—

- | | |
|---|----|
| Scheme for multiplication and distribution of Indore-1 cotton seed in Rajasthan | 90 |
|---|----|

Uttar Pradesh :—

Scheme for seed distribution and extension of improved cotton 35/1 in Uttar Pradesh	91
---	----

Mysore :—

Scheme for multiplication and distribution of Jayadhar and Laxmi cottons in Karnatak	92
--	----

CHAPTER V

<i>Progress in the introduction of improved varieties of cotton</i>	95-104
Andhra Pradesh	95
Bombay	96
Madhya Pradesh	99
Madras	100
Mysore	101
Punjab	102
Rajasthan	102
Uttar Pradesh	103

CHAPTER VI

<i>Cotton Marketing, Legislation and other protective measures</i>	105-112
(i) Cotton Import Policy	105
(ii) Cotton Export Policy	105
(iii) Control on Prices, Trade and Distribution	106
(iv) Revision of Hedge Contract	106
(v) Regulated Cotton Markets	106
(vi) Legislation to maintain purity of cotton and other protective measures	107
(a) Cotton Transport Act	108
(b) Cotton Control Act	108
(c) Cotton Ginning and Pressing Factories Act	110
(vii) Agmarking	112
(viii) Cotton Baling Hoops	112
(ix) Other requirements of Cotton Ginning and Pressing Factories	112

CHAPTER VII

<i>Grow More Cotton' CAMPAIGN</i>	113-119
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APPENDICES

(I) Members of the Indian Central Cotton Committee	120
(II) Sub-Committees	123
(III) Statement of Receipts and Expenditure for the year ended 31st March, 1957	129

INDIAN CENTRAL COTTON COMMITTEE

ANNUAL REPORT

CHAPTER I

GENERAL

This is the thirty-sixth Annual Report, covering the period 1st September, 1956, to 31st August, 1957.

The Indian Central Cotton Committee was established by the Government of India in 1921, in pursuance of the recommendations of the Indian Cotton Committee of 1917-18. During the first two years, the Committee was a purely advisory body to Government on matters connected with cotton. In 1923, however, the Committee was incorporated under the Indian Cotton Cess Act and provided with separate funds to enable it to undertake work for the improvement of the growing, marketing and manufacture of cotton in India. These funds are derived from the levy of a cess on all cottons consumed in mills in India or exported from Indian ports. After the passing of this Act, the cess was collected for the first three years at the rate of annas four for every bale of Indian cotton consumed in Indian mills or exported and thereafter upto the 9th September, 1948, at the rate of annas two per bale.

During the years preceding the World War II, the annual income of the Committee from this source was about Rs. 7 lakhs. Subsequently, however, owing to the heavy decline in exports during the War, the receipts from the Cotton Cess dropped considerably and the income of the Committee was further reduced by the partition of the country in August, 1947. This loss of income was made good to some extent by grants given by the Government of India from the Cotton Fund, which had been built up from the proceeds of the levy of an additional duty of one anna per lb. on all imports of raw cotton. In order to ensure an adequate income to the Committee for carrying out its work and policy effectively, two successive amendments to the Indian Cotton Cess Act, were effected in 1947 and 1948, whereby the cess was made leviable on all cotton consumed in Indian mills or exported from India, with effect from the 15th August, 1947 and the rate of cess was raised from two annas per bale to four annas per bale from the 10th September, 1948. Further from the 1st April, 1951, the provisions of the Indian Cotton Cess Act

were extended to Part B States as well; they were previously applicable to Parts A and C States only.

During the thirty-six years of its existence, the Indian Central Cotton Committee has provided a common meeting ground for all sections of the cotton industry and the Agricultural Departments of the cotton growing States in India, at which the cotton problems of the country have been discussed and measures for dealing with them suggested. In the discharge of its functions, the Committee has always adhered to its original principle, viz., *that the cotton grower's interest must be paramount in all matters considered by it.*

The first task of the Committee was to initiate a well-directed and co-ordinated effort for the improvement of cotton in India from every aspect, including the improvement of the race of the plant by scientific breeding. Grants were made to the Departments of Agriculture in the various cotton growing States for specific investigations on cotton in which improvement of the variety was naturally given a high priority. It has been the general policy of the Committee to supplement and not to supplant the work of the State Departments of Agriculture, and though, as a matter of convenience, certain lines of demarcation have been laid down regarding the investigations which the Committee considers most appropriate for its grants, assistance as a general rule, is given for studies and extension work that are most needed.

A list of members of the Committee indicating the various interests represented by them, as on the 31st August, 1957, is given in Appendix I*. The names of members of the various Sub-Committees are shown in Appendix II†. The functions of these Sub-Committees have been described in earlier reports of the Committee. Under the Indian Cotton Cess Rules, members, other than *ex-officio* members, hold office for three years, and one-third of their number retire every year in rotation. The term of office of additional members appointed by the Central Government under Section 4(x) of the Indian Cotton Cess Act is three years or such shorter period as may be specified in the notification appointing them.

During the year under review, Dr. B. L. Sethi, continued to hold the post of Secretary of the Committee while the posts of the Deputy Secretary and Assistant Secretary were held by Sarvashri K. Dharmarajulu and T. T. Paulose, respectively.

The total receipts of the Committee since its inception in 1923, to the 31st March, 1957, amounted to Rs. 3,98,76,953-11-8 of which Rs. 2,98,82,187-14-5 represent collections from the Cotton Cess and miscellaneous receipts

* page 120

† page 123



and the remainder are special grants from the Government of India from the Fund for the benefit of cotton growers. The receipts during the financial year 1956-57 amounted to Rs. 23,69,576-13-0, the total expenditure being Rs. 16,83,561-9-6. A statement of receipts and payments for the year ending 31st March, 1957 is given in Appendix III*.

Dr. M. S. Randhawa (President), Shri Chimanlal B. Parikh (Vice-President), Shri R. G. Saraiya, Dr. B. N. Uppal, Shri A. S. Desai and the Secretary represented the Committee on the Board of Governors of the Institute of Plant Industry, Indore, during the financial year ending 31st March, 1957.

During the year under report, Shri Chimanlal B. Parikh represented the Committee on the Indian Council of Agricultural Research till the 31st March, 1957 and Shri Madanmohan R. Ruia from the 1st April, 1957. In addition, Dr. B. L. Sethi also represented the Committee on the Indian Council of Agricultural Research and its Advisory Board. Shri Chunilal B. Mehta continued as the Committee's representative on the Administrative Council of the Empire Cotton Growing Corporation during the period under review, while Mr. A. P. Darlow continued as an alternative member till the 31st March, 1957. From the 1st April, 1957, onwards Mr. C. S. Barrett represented the Committee as alternative member. Under Article 51 of the Articles of Association of the East India Cotton Association, the Indian Central Cotton Committee is entitled to nominate from amongst its growers' representatives, three persons, not having dealings in forward contracts, as Directors of the Association. Sarvashri S. K. Wankhede, N. S. Patil and A. S. Desai worked in this capacity till the 31st March, 1957 and Kunwar Kushal Singh from the 1st April, 1957, onwards.

Three meetings of the Committee were held during the year under report, half-yearly meeting in September, 1956 and the annual meeting in March, 1957. The third meeting was the half-yearly meeting held in July, 1957. All the three meetings were presided over by Dr. M. S. Randhawa, D.Sc., F.N.I., I.C.S., Vice-President, Indian Council of Agricultural Research.

One of the important subjects considered at the meeting held in September, 1956, related to the establishment of Regional Research Stations for work on the three crops, namely cotton, oilseeds and millets in collaboration with the Indian Central Oilseeds Committee and the Indian Council of Agricultural Research. The establishment of 9 main stations and 8 sub-stations at an estimated total expenditure of Rs. 72 lakhs, as recommended by the Special Sub-Committee which considered this question, was approved. Further, the Committee recommended that the production of harsh short staple cottons should be encouraged in the States of Assam,

* Page 129

Tripura, Rajasthan, Andhra and the sub-montane areas of the Punjab, as these constituted a potential foreign exchange earner. The Committee also reviewed the cotton legislation enacted in the different States and appointed a Sub-Committee with the Vice-President as Chairman to examine the working of the various Acts and to suggest ways and means for the stricter implementation of these measures with a view to eliminating the prevalent malpractices in cotton ginning and trade and to make available cottons of standard purity.

The Committee felt that there was a great disparity between the official and trade estimates of the cotton crop and, with a view to examining this question thoroughly, appointed a Sub-Committee with the Agricultural Commissioner as Chairman, whose terms of reference were (i) to review the results of crop-estimating surveys by random sampling method now in operation in the various States, (ii) to review the present methods of forecasting the crop, (iii) to study various factors involved in the estimation of actual crop and (iv) to suggest ways and means of effecting improvements in the accuracy of all cotton statistics. The recommendations of the Special Sub-Committee were approved by the Committee in March, 1957 (For details, Chapter II Statistics may be seen).

Another important decision taken by the Committee at this meeting was the raising of the target of cotton production to be achieved by the end of the Second Five Year Plan period from 58.6 lakh bales to 65 lakh bales.

The Committee also decided that the question of award of prizes to cotton breeders to encourage the evolution of long and extra long staple cottons should be considered and in this connection appointed a Sub-Committee with the Agricultural Commissioner with the Government of India as Chairman, Director of Agriculture, Bombay State, Director, Technological Laboratory, Dr. S. M. Sikka and the Secretary as members.

At its meeting held in March, 1957, the Committee approved of the State-wise break-up of the revised target of production of 65 lakh bales. On the basis of reorganised States, Bombay accounts for 45% of the target while the share of the States of Punjab, Mysore, Madhya Pradesh and Madras is 20, 10, 9 and 7% respectively.

Another important step taken by the Committee at this meeting was the sanctioning of a comprehensive scheme for the development of Sea-Island cotton in the States of Kerala, Mysore and Assam under a Special Officer. This scheme aims at a systematic development and large scale cultivation of the Sea-Island cotton variety "Andrews" 1-3/16" in staple in the above three States. Preliminary experiments conducted so far show that the variety has

been found suitable for cultivation in these areas. The successful completion of lint valued at about 30.38 crores of the extension of this superior long staple variety to about 3 lakh acres by the end of the Second Five Year Plan period, producing about 2.25 lakh bales of this scheme is expected to result in rupees.

Another important decision taken at this meeting concerned the co-ordination of work of the Committee's Technological Laboratory with that of several Textile Research Institutes established in the country under the auspices of Millowners' Associations. It was felt that there was need for such co-ordination and a Special Sub-Committee was appointed for the purpose. The Committee also approved of the recommendations made by the Special Sub-Committee on cotton legislations that powers for enforcing the legislations regarding cotton should vest in the State Directors of Agriculture and that a Liaison Officer of Class I grade be appointed for a period of 2 years to assist them in the successful enforcement of the various legislations. The Special Sub-Committee recommended several amendments in these legislations.

The Committee at its meeting held in July, 1957, considered the subject relating to the fixation of floor and ceiling prices for cotton. After a considerable discussion, the Committee reiterated the recommendation of the Local Sub-Committee to raise the floor and ceiling prices of Jarila 25/32" Fine by Rs. 105/- and Rs. 50/- respectively and suitably for other varieties. After a lengthy debate on the Indian Cotton Contract, the Committee reaffirmed the recommendation made by the Local Sub-Committee for providing in the bye-laws of the East India Cotton Association, Bombay, for safeguards and margins if prices tended towards the floor when faced with a large crop as contemplated under the Second Plan. In view of the rapid increase in the production of cotton textiles and the important role played by cotton, the Committee recommended that effective steps should be taken by the State Governments to achieve earlier the target of production. At this meeting the Committee also decided to constitute a Special Sub-Committee with the Chief Commissioner of Tripura as the Chairman and the Directors of Agriculture of the States of Assam, Tripura and Manipur as members for co-ordinating the developmental work in respect of Comilla and Sea-Island cottons for which these States were suitable.

The question of the fixation of floor prices for short staple cotton for which such prices were not fixed before, was also considered by the Committee in July, 1957. With a view to protecting the growers of these cottons against undue fall in prices, the Committee recommended that floor prices for these cottons might be fixed and the Government of India addressed in the matter.

The Committee at its meeting in July, 1957, considered yet another question, viz., the fixation of higher premiums for saw ginned Punjab American cotton over the corresponding roller ginned types. It was felt that the present premium of Rs. 20 and 30 respectively for Punjab American L.S.S. and 216F saw ginned cotton were not sufficient to cover the working cost and loss incurred by way of lower ginning percentage. Although a sum of Rs. 50/- was recommended by the Committee earlier, it was decided that the premiums with some adjustments made by the Cotton Adviser might be accepted. The Government of India have been addressed in the matter.

The Committee's Technological Laboratory at Matunga, Bombay, continued to render valuable service to cotton breeders, the cotton trade and the textile industry by providing facilities for the assessment of the fibre properties and spinning qualities of improved cottons. Proposals for remodeling and expansion of the Laboratory have been accepted for inclusion in the Second Five Year Plan and a sum of Rs. 15 lakhs has been sanctioned by the Government of India for the purpose.

CHAPTER II

COTTON STATISTICS

At present, India has the largest area under cotton cultivation in the world. As regards cotton production, however, it takes the third place after U.S.A. and U.S.S.R. The cotton acreage and production in India in 1956-57 constituted 26% and 11% respectively of the corresponding world totals. Bombay, Punjab, Madhya Pradesh, Madras, Mysore, Rajasthan and Andhra Pradesh are the principal cotton growing States in India.

(i) Area and Production

During 1956-57, the area and production of cotton in India were 19.8 million acres and 4.7 million bales against 20.0 million acres and 4.0 million bales respectively in the previous season. The State-wise distribution is as under :—

(Official estimates)

States	Area (Thousand acres)		Production (Thousand bales of 392 lbs. each)	
	1956-57	1955-56 (Revised)	1956-57	1955-56 (Revised)
Andhra Pradesh	1,005	1,031	135	131
Assam	35	38	9	9
Bihar	7	11	1	2
Bombay	10,833	10,858	2,176	1,921
Kerala	22	22	10	10
Madhya Pradesh	2,185	2,425	653	403
Madras	1,204	1,160	358	335
Mysore	2,403	2,388	358	363*
Orissa	23	24	2	2
Punjab	1,415	1,253	800	605
Rajasthan	542	604	167	184†
Uttar Pradesh	147	141	46	29
West Bengal	(a)	(a)	(b)	(b)
Delhi	1	1	(b)	(b)
Himachal Pradesh	1	1	(b)	(b)
Tripura	20	21	8	7
Total	19,843	19,978	4,723	4,001

* Below 500 acres. † Below 500 bales.

It will be seen that there has been a fall in acreage in the States of Madhya Pradesh and Rajasthan, largely due to unfavourable weather conditions at the time of sowing, while this has been offset to some extent by increases in the States of Madras and Punjab. As regards production, there has been a substantial increase, mainly in the States of Bombay, Madhya Pradesh and Punjab largely due to better seasonal conditions which prevailed during the growing period of the crop, despite reduced estimates of the crop in Gujarat as a result of frost damage. The trade estimate of the crop for the season was around 5.08 million bales against 4.64 million bales in 1955-56.

The area and production of cotton according to varieties during the last two seasons are as under :—

Name of variety	Area (Thousand acres)		Production (Thousand bales of 392 lbs. each)	
	1956-57	1955-56 (Revised)	1956-57	1955-56 Revised
Bengals	868	931	320	306
Americans	3,838	4,023	1,397	1,095
Jarila (including Virnar 197/3)	3,180	3,217	739	428
H. 420 (including Verum, No. 91 and others)	762	159	163	20
Oomras	1,910	2,282	340	260
Hyderabad-Gaorani	1,730	1,799	189	173
Malvi	1,183	1,394	283	223
Broach-Vijaya	1,506	1,343	340	445
Surti Suyog	710	695	169	219
Dholleras	2,088	2,104	408	487
Southerns	2,013	1,972	358	329
Comillas	55	59	17	16
Total	19,843	19,978	4,723	4,001

(ii) Staple length of Indian cotton

The Committee publishes annually a report on the staple length of Indian Cotton Crop, based on the final all-India Cotton Crop estimates issued by the Directorate of Economics & Statistics, New Delhi and on special information regarding improved varieties supplied by the State Departments of Agriculture. The report indicates the production, staple length, colour,

feel, blow room loss percentage, spinning capacity, etc. of the different varieties of cotton. It also shows the tracts where each variety is grown and the trade estimates of production of each. The approximate distribution of cotton crop for 1956-57 into different staple length groups with the corresponding figures for the previous two seasons is shown below :—

	Cotton Production (Thousand bales of 392 lbs. each)					
	1956-57*	%	1955-56*	%	1954-55	%
Superior long staple (1" and above)	300	6	305	8	117	3
Long staple (7/8" to 31/32")	1,600	34	1,272	31	1,412	33
Superior medium staple (13/16" to 27/32")	1,300	28	1,217	30	1,215	29
Medium staple (below 13/16" & above 11/16")	710	15	564	14	693	16
Short staple (11/16" and below)	813	17	662	17	790	19
	4,723	100	4,020	100	4,227	100

* Provisional

It will be seen that the proportion of long, medium and short staple cottons to the total production in 1956-57 was 40, 43 and 17% against 39, 44 and 17% respectively in the previous year. The production of long and medium staple cottons increased from 1.6 and 1.8 million bales in 1955-56 to 1.9 and 2.0 million bales respectively in the year under report.

(iii) Improvement in the yield per acre

Cotton in India is mostly grown under rainfed conditions and yields vary enormously from tract to tract and from year to year depending on the seasonal conditions. In irrigated tracts of the Punjab and Madras, yield per acre of cotton (lint) varies from 200 to 250 lbs., while in the dry tracts, it ranges between 60 and 100 lbs. per acre. The question of increasing the yield per acre has been under constant attention of the Indian Central Cotton Committee and the following measures are being adopted for the purpose :—

- (i) Distribution of seed of improved varieties
- (ii) Application of manure
- (iii) Extension of irrigation facilities wherever possible
- (iv) Adoption of improved cultural practices such as line sowing, proper spacing, right time of sowing, etc.
- (v) Control of insect pests and diseases
- (vi) Inter-cropping of cotton with other crops.

Vigorous propaganda for these measures continued to be carried on under the cotton extension schemes financed by the Government of India.

The following table shows the figures of yield per acre based on the estimate of actual crop during the six year period ending 1956-57 :—

Yield per acre of cotton

Year (1st September to 31st August)	Area (Thousand acres)	Actual Crop (Thousand bales of 392 lbs. each)	Yield per acre (lbs.)
1951-52	16,198	3,761	91
1952-53	15,693	3,667	92
1953-54	17,182	4,573	104
1954-55	18,684	5,292	112
1955-56	19,978	4,463	80
Average-1951-56	17,547	4,351	97
1956-57	19,843	5,121 *	101

* Estimated

The low yield during 1955-56 was due to unfavourable weather conditions which prevailed during the later period of the crop growth.

(iv) Statistics of cotton pressed

During 1956-57, the figures of cotton pressed in the re-organised States are shown below :—

Re-organised State	Cotton pressed (Bales of 392 lbs. each)
Andhra Pradesh	72,675
Assam	3,654
* Bombay	1,507,935
* Madhya Pradesh (Madhya Bharat only)	277,247
Madras	136,185
Punjab	718,573
Uttar Pradesh	7,620
West Bengal	10,240
* Mysore	53,762
Rajasthan	137,268
Grand Total	2925,159

* Figures for merged areas are not available

Corresponding State-wise details for 1955-56 are not available

(v) Imports

During the year, imports were restricted to cotton stapling 1.1/16" and above. Cotton of staple length 1.1/16" to 1.1/8" is imported largely from East Africa and U.S.A. while cotton of 1.3/16" and above in staple is imported mainly from Egypt, Sudan and Peru. During the year under report, the imports aggregated to 6.07 lakh bales against 6.10 lakh bales in the previous year. The imports of cotton from foreign countries during the last 3 seasons are as follows :—

Imports of cotton
(Thousand bales of 392 lbs. each)

Countries	1956-57	1955-56	1954-55
Egypt	53	214	143
Sudan	69	130	19
East Africa	115	234	287
U. S. A.	352	10	93
Peru	18	4	7
Others		18	5
Total	607	610	614

(vi) Mill consumption

The Committee publishes monthly figures of mill consumption of Indian and foreign cotton for general information. These are based on the returns furnished by mills under the Indian Cotton Cess Act, 1923. The mill consumption of Indian and foreign cotton during the last 3 seasons is indicated in the following statement :—

Mill consumption of cotton
(Thousand bales of 392 lbs. each)

	1956-57	1955-56	1954-55
Indian ...	4,648	4,326	4,124
Foreign ...	569	614	646
Total	5,217	4,940	4,770

The mills situated in the cotton growing areas generally consume large quantities of loose (ginned but unpressed) cotton. The consumption in Indian mills of such cotton during 1956-57 was 3.37 lakh bales against 3.39 lakh bales in the previous year. The statewise distribution is as under :—

Mill consumption of loose (unpressed) cotton

(Thousand bales of 392 lbs. each)

States	1956-57	1955-56	1954-55
Madras	220	211	205
Bombay	46	49	46
Andhra	19	16	13
Rajasthan	16	15	13
Mysore	14	21	21
Madhya Pradesh	14	9	15
Others	9	18	46
Total	337	339	359

Besides, about 80,000 Ambar Charkhas were reported to be in operation in the different States during 1956-57 and some 55,000 bales utilised by these charkhas during that season.

(vii) Demand for various types of cotton in India

Statistics of receipts of cotton

Statistics of receipts of cotton at mills classified by varieties are collected by the Committee at the end of each cotton season on a voluntary basis from mills and published for general information. The receipts of Indian and foreign cotton during the year 1956-57 were 40.9 lakh bales and 5.9 lakh bales respectively against 41.2 lakh bales and 6.4 lakh bales in the previous season. The percentages of long, medium and short staple cottons were 43, 47 and 10. The figures of receipt of foreign cotton in 1956-57 classified according to countries of origin with corresponding figures

for the previous two seasons are given below:—

Country of origin	Receipts at Mills (Thousand bales of 392 lbs. each)		
	1956-57	1955-56	1954-55
Pakistan	—	—	4
Egypt	58	194	169
Sudan	66	142	78
East Africa	142	257	261
America (U. S. A., Peru etc.)	316	15	134
Others	12	31	11
Total	594	639	657

(viii) Exports

Exports of Indian cotton are subject to quota allotment and the policy of the Government of India regarding exports is dealt with separately in Chapter VI of this report. During the year, cotton of staple length upto and including 3/4", was allowed for export. However, due to scarcity of Indian cotton, export was barred with effect from 31st March, 1957. The varieties exported during the year were Bengal Deshi, Oomras, Dholleras, Assam-Comillas, Cocanadas, Kalyan, Jarilla, Virnar, Vijaya, etc. The statement below shows the figures of exports of Indian cotton to different countries during the last three seasons. A separate statistical leaflet showing cotton exported during the year according to varieties is published by the Committee compiled from voluntary returns received from exporters.

Countries	Quantity Exported (Thousand bales of 392 lbs. each)		
	1956-57	1955-56	1954-55
United Kingdom	21	65	46
United States of America	28	4	18
Europe	30	103	77
Japan	171	340	135
China (Including Hongkong)	34	97	40
Others	15	3	3
Total...	299	612	319

(ix) Statistics of stocks of cotton held in the country

Statistics of cotton held by the mills at the end of each season and those held by the trade are collected on a voluntary basis through the co-operation of State authorities and trade bodies. Such statistics in the States of Bombay, Madhya Pradesh, Uttar Pradesh and Punjab are collected on a statutory basis. The figures of stocks of Indian and foreign cotton held by the mills and the trade on the 31st August, 1957 with corresponding figures for the previous two seasons are shown in the statement below:—

STOCKS OF COTTON HELD BY THE MILLS AND THE TRADE
(YEAR ENDING 31ST AUGUST)

(Thousand bales of 392 lbs. each)

	1957*	1956	1955
		MILLS	
Indian Cotton	1,130	1,408	1,443
Foreign Cotton	220	205	179
Total	1,350	1,613	1,622
		TRADE	
Indian Cotton	510	367	990
Foreign Cotton	90	70	80
Total	600	437	1,070
Grand Total	1,950	2,692	2,050

* Provisional

(x) Supply and distribution of cotton

The position regarding supply and distribution of Indian and foreign cotton classified according to the different staple length groups is indicated in the table below:—

SUPPLY AND DISTRIBUTION OF COTTON 1956-57

(Lakh bales of 392 lbs. each)

	Long staple	Medium staple	Short staple	Total
A. Supply				
1. Carryover on 31-8-1956				
(a) with mills				
Indian cotton	6.3	7.3	0.6	14.2
Foreign cotton	2.0	—	—	2.0
(b) with trade				
Indian cotton	1.1	1.3	1.3	3.7
Foreign cotton	0.7	—	—	0.7
Total	10.1	8.6	1.9	20.6
2. Production	20.5	22.0	8.7	51.2
3. Imports	6.1	—	—	6.1
TOTAL SUPPLY	36.7	30.6	10.6	77.9
B. Distribution				
4. Mill consumption				
Indian cotton	20.8	23.1	2.6	46.5
Foreign cotton	5.7	—	—	5.7
5. Ambar Charkha	—	0.5	—	0.5
6. Exports	—	0.3	2.7	3.0
7. Extra factory consumption	—	0.4	2.3	2.7
TOTAL DISTRIBUTION	26.5	24.3	7.6	58.4
C. Carryover on 31-8-1957				
(a) with mills				
Indian cotton	5.4	5.4	0.5	11.3
Foreign cotton	2.2	—	—	2.2
(b) with trade				
Indian cotton	1.7	0.9	2.5	5.1
Foreign cotton	0.9	—	—	0.9
Total	10.2	6.3	3.0	19.5

(xi) Cotton prices

Control on cotton prices was continued during 1956-57 and the minimum and maximum prices for the different varieties remained the same as for the previous season.

Futures trading in cotton during the year continued in the Bombay market with two hedge contracts, one with Jarila 25/32" Fine and the other

with Vijay 27/32" Fine, as basis. On the 3rd September, 1956, Jarila March, 1957 delivery opened at Rs. 679/- and steadily moved up to Rs. 697/- on the 26th September, mainly due to announcement of export quota, good demand in ready cotton by mills and reported expansion of textile production. On reports of good weather, credit curtailments by the Reserve Bank on cloth, restriction on the minimum stocks of cloth to be held by mills and wholesale dealers, values diminished to Rs. 677/- on the 29th September. After opening at Rs. 675/- on the 1st October, there was a decline in the values practically throughout the month and prices dropped to Rs. 636/- on the 26th, due to reports of good weather, expectation of a bumper crop and absence of announcement of export quota. Reports of better offtake in cloth market, heavy rains in Khandesh and Berar tracts and tense situation in West Asia flared up the market and the contract advanced to Rs. 665½ on the 31st October. The contract opened at Rs. 665/- on the 1st November and the downward trend noticed in the previous month continued in November also. The prices dropped to Rs. 629½ on the 26th and closed at Rs. 638½ on the 30th November. In December, 1956 the prices further declined to Rs. 618½ on the 28th and closed at Rs. 624½ on the 31st December. From January 1957, the prices indicated an upward tendency and after opening at Rs. 626/- on the 2nd January, rose to Rs. 681/- on the 28th mainly due to call fixing by mills, complaints regarding quality of the crop and consequent scarcity of tenderable varieties, active demand by spinners, firm up-country advices, encouraging reports from cloth market and consistent short coverings. On heavy long liquidation and reports of increase of ½% in the bank rate, prices sharply dropped to Rs. 657/- on the 31st January. During the months of February and March, the upward trend in prices continued and the values rose to Rs. 738½ on the 28th February and Rs. 820/- on the 25th March due to removal of credit restrictions on textiles, fall in arrivals at terminal markets, short covering, announcement of export quota of 2 lakh bales of cotton, reports of cold wave in Saurashtra and Gujerat and encouraging trends in mills consumption.

Trading in Fine M. G. Jarila 25/32" for May, 1957 delivery started on the 25th February, 1957 at Rs. 679/- and rose to Rs. 684/- on the 28th after receding to Rs. 672/-. After opening at Rs. 684½ on the 1st March, with minor fluctuations prices rose to Rs. 696/- on the 18th and to Rs. 718/- on the 27th. The Textile Commissioner's notification regarding requisitioning of cotton brought forth nervous liquidation and the contract sharply declined to Rs. 710/- on the 30th and closed steady the same day at Rs. 712/-. The contract opened at Rs. 702/- on the 2nd April and dropped to Rs. 690½ on the 5th on apprehensions of imposition of heavy margins, coupled with liquidation by up-country interests. Strong statistical position, increasing mill consumption, scaling down of the crop estimates and shortage of tenderable cottons, firmed up the market and the May delivery spurted to Rs. 758/-

on the 17th. Thereafter on doubling the rates of deposits by the Forward Market Commission, coupled with the announcements of imports of 70,000 bales from the sterling area, prices fell to Rs. 732/- on the 22nd and further dropped to Rs. 693/- on the 30th April after the Forward Market Commission's direction to enforce deposits at the rate of Rs. 200/- per bale in respect of outstanding purchases in Jarila May Contract. The delivery opened at Rs. 712/- on the 18th May and after fluctuating within narrow limits till the 13th, sharply declined to Rs. 688 on the 15th, on fears of heavy taxation, increase in excise duties on cloth and on prospects of large imports of U.S.A. cotton under the Indo-U.S. Aid Agreement. At lower levels on short covering and scattered trade support values again firmed up to Rs. 710/- on the 18th. On the 20th May, the Forward Market Commission decided that trading in Jarila May, 1957, delivery was detrimental to the public interest and announced the rate of Rs. 715/- prevailing on the 23rd as the closing trading rate and 24th May as the date for the closing of every hedge contract.

The trading in Fine Vijay Contracts April, 1957, delivery commenced on the 18th June, 1956, in the previous year. Prices during the season under review followed generally, trend in the Jarila contract. The Contract opened at Rs. 825½ on the 18th June, 1956, declined to Rs. 719½ on the 26th December, 1956, rose to Rs. 918/- on the 16th April, 1957 and matured at Rs. 955/-, the rate fixed by the Board on the due date. Vijay June, 1957 delivery, opened at Rs. 795/- on the 25th February, 1957 and touched the lowest level at Rs. 791/- on the 4th March and highest at Rs. 882/- on the 17th April, 1957.

For the 1957-58 season, the hedge Contract was revised and only one Contract viz., Indian Cotton Contract was established, with Moglai Jarila 25/32" as the basis.

Trading in the new contract March, 1958 delivery commenced on the 23rd June, 1957, at Rs. 690/- and after moving within narrow limits prices firmed up to Rs. 702/- on the 29th due to tight statistical position and likely delay in the starting of the next working season. In July, 1957, the prices of the contract fluctuated between Rs. 704/- to 723½. On the 2nd August, the Contract opened at Rs. 708/- and on report of satisfactory rainfall in all cotton growing centres, fairly larger crop prospects and Reserve Bank's move to tighten bank credit on food grains and other cash crops, upset sentiment and prices sharply fell to Rs. 668½ on the 30th. Renewed support and on heavy short covering and on rumours of reduction of excise duty on cloth, the prices rose to Rs. 678½ on the 31st August and closed steady the same day at Rs. 676½.

(xii) Supply of monthly reports on Indian cotton to the International Cotton Advisory Committee, Washington

The supply of monthly reports on cotton to the International Cotton Advisory Committee, Washington was continued during the year. The reports covered items such as stocks, imports, consumption, exports, crop estimates, pressing and prices of cotton, production of Rayon yarn and Cotton cloth, exports of cotton piece goods and Government policy affecting raw cotton and cotton manufacturers as announced by the Government from time to time.

(xiii) Improvement of cotton forecasts

The official estimates of cotton production in India have generally been lower than those arrived at on the basis of the data regarding cotton utilised, which were available at the end of each season. It was realised that the random sampling crop cutting technique would yield the most reliable estimates of production. Till such time as these surveys were instituted in all the States, it was considered essential that a method should be evolved for effecting some improvement during the interim period and accordingly the Directorate of Economics and Statistics convened on the 20th June, 1957 a conference of the representatives of the Ministries concerned and officers to consider the matter. It was recommended that the Indian Central Cotton Committee Formula II provided the best estimate of the actual crop and the official estimates should be adjusted by a correction factor based on the relationship of the Indian Central Cotton Committee Formula II estimates and the official estimates of the previous seasons. This has been accepted by the Committee and the Government of India and is being followed commencing with the final official forecast relating to the 1956-57 season.

During the year under report, the official estimates of cotton crop of the 1954-55 and 1955-56 seasons were examined for their accuracy with reference to actual data of utilisation, etc.

The actual crop during the two seasons was estimated at 53.30 lakh bales and 44.63 lakh bales against the respective official estimates of 42.98 and 39.98 lakh bales. Thus, the official estimates were under-estimated to the extent of 18.8% and 10.4% respectively.

(xiv) Crop estimating surveys on cotton

During the year under report, crop estimating surveys on cotton were in operation in the former States of Bombay and Madhya Pradesh as an annual routine and in Rajasthan in the initial stages. Due to the reorganisa-

tion of States, the surveys were extended by the Government of Bombay to the merged areas. Similarly, the Karnatak region of the former Bombay State, comprising the districts of Dharwar, Belgaum and Bijapur merged in the Mysore State and the crop estimating surveys were continued in this region by the Mysore State Government.

The work done under these surveys is indicated below:—

BOMBAY STATE.

(i) **Gujarat and Deccan divisions:** The scheme is in operation in these divisions since 1946-47. During 1956-57, the survey covered 99.8% of the total area under cotton in these divisions. The average yield of *kapas* in the two divisions was estimated at 227 lbs. (Gujarat division 214 lbs. and Deccan division 261 lbs.) per acre with a sampling error of 2.3%. The total production of cotton lint in the two divisions was estimated at 866,000 bales with a standard error of 20,000 bales.

(ii) **Saurashtra division:** The survey in this division covered 99% of the total area under cotton. The average yield per acre of *kapas* was estimated at 289.6 lbs. with a standard error of 5.0% and the total production of cotton lint at 369,000 bales with a marginal error of 18,000 bales.

(iii) **Kutch division:** The survey was conducted in this division for the first time during 1956-57 season, covering 99% of the total area under cotton. The average yield per acre was estimated at 440.5 lbs. of *kapas* per acre with a standard error of 10.5% and the total production of cotton lint at 57,000 bales with a standard error of 6,000 bales.

(iv) **Vidarbha division:** The report on the survey conducted in this division was not available for examination.

RAJASTHAN: The survey has been in operation in this State since the 1953-54 season. During 1956-57, the survey covered an area of 479,568 acres or 88.43% of the total area under cotton in the State. The average yield per acre of *kapas* was estimated as 339.2 lbs. with a sampling error of 6.6% and the total production of cotton lint at 167,000 bales.

MYSORE: During 1956-57, the survey was conducted in the three districts of the State, viz., Dharwar, Belgaum and Bijapur, covering almost the entire area under cotton in that region. The average yield of *kapas* per acre was estimated at 132.1 lbs. with a standard error of 4.9% and the total production of cotton lint at 149,000 bales with a standard error of 7,300 bales.

The Indian Central Cotton Committee has stressed the importance of these surveys being conducted in all the major cotton growing States in India, and offered to finance such surveys fully for a period of five years subject to the States concerned undertaking to continue them at their own expense after the five year period. In this connection, the Government of Madras have agreed to conduct the surveys at their own cost. The proposals received from some other States were forwarded to the Directorate of National Sample Survey under the Cabinet Secretariat, for scrutiny. That Directorate have formulated a co-ordinated scheme for conducting these surveys on the principal non-food crops including cotton in the States of Andhra Pradesh, Madhya Pradesh, Mysore, Punjab, Rajasthan and Uttar Pradesh. The detailed proposals in so far as they related to surveys on cotton were considered and approved by the Indian Central Cotton Committee at its meeting held in March, 1957, for a period of five years and the Government of India have sanctioned, in the first instance, for a period of two years at an estimated cost to the Committee of Rs. 79,220/-. The surveys are proposed to be implemented from the 1957-58 season.

The Committee at its meeting held in September, 1956, while considering the reports on these surveys conducted in the States of Bombay, Rajasthan and former Madhya Pradesh during the 1955-56 season observed that there was persistent disparity between the official and trade estimates of cotton. The Committee felt that unless the entire work of crop estimating surveys was put on a sound basis and tackled in a scientific manner, it would not be possible to get reliable statistics. The Committee, therefore, appointed a Special Sub-Committee to review the results of these surveys and the present method of forecasting the crop in the various States by studying the various factors involved in the estimation of the actual crop and to suggest ways and means of effecting improvements in the accuracy of all cotton statistics. The Special Sub-Committee which met in New Delhi in March, 1957, was of the opinion that these surveys were the only method by which reliable estimates of production could be obtained. It was felt that, supervision of the field work should be strengthened to ensure the reliability of the results. It was recommended that adequate provision should be made for some special staff to supervise the field work in addition to the existing departmental staff which was considered inadequate. It was, therefore, proposed that, as such special staff would also be necessary for similar surveys on oilseeds, the staff proposed for work on cotton, could with advantage be utilized for work on oilseeds, the expenditure being shared jointly by the Indian Central Cotton Committee and the Indian Central Oilseeds Committee.

The Indian Central Cotton Committee at its meeting held in March, 1957, accepted these proposals and approved of the appointment of special

staff for this purpose for a period of two years, the cost being shared equally by the Indian Central Cotton Committee and the Indian Central Oilseeds Committee. The total cost of the special staff was estimated at Rs. 121,560/-, the share of this Committee being Rs. 60,780/-. The Government of India have sanctioned this proposal.

(xv) Cost of production surveys on cotton

A pilot survey for estimating the cost of production of cotton and its rotation crops was conducted under the joint auspices of the Indian Central Cotton Committee, the Indian Central Oilseeds Committee and the Indian Council of Agricultural Research, in the Akola district of the former Madhya Pradesh during 1952-53, with a view to evolving a suitable sampling and operational technique by studying cotton, jowar and ground-nut crops in a representative sample of holdings and fields selected randomly and determining the various physical components of the cost of production of these crops and their money value by employing the method of objective measurement. The results of the survey demonstrated the feasibility of conducting such enquiries on a large scale and securing reliable data. The Indian Central Cotton Committee at its meeting held in February, 1955, considered the detailed report on the survey and accepted in principle the importance of undertaking a co-ordinated scheme for estimating the cost of production of cotton and its rotation crops in the major cotton growing tracts in India for a period of three years under the joint auspices of the Indian Central Cotton Committee, the Indian Central Oilseeds Committee and the Indian Council of Agricultural Research.

The detailed proposals for the co-ordinated scheme formulated by the Statistical Adviser, Indian Council of Agricultural Research, New Delhi, were considered and approved by the Indian Central Cotton Committee at its meeting held in March, 1957. The scheme is proposed to be conducted for a period of three years in four zones, viz., the Punjab, the Gujarat, the black cotton zone of Bombay State and the *rabi* cotton zone of Karnatak. The cost of the scheme, estimated at about Rs. 13 lakhs is proposed to be shared by the Indian Central Cotton Committee, the Indian Central Oilseeds Committee and the Indian Council of Agricultural Research in the ratio of 2:2:1.

(xvi) Extra factory consumption of cotton

Surveys for estimating the extra-factory consumption of cotton, approved by the Committee in July, 1954 were put into operation in the States of Hyderabad and Punjab in March, 1956, and in Madras State in July, 1956. The final reports from the States of former Hyderabad and Madras were considered and approved by the Committee at its meetings held in March and July 1957 respectively. On the basis of the results of the surveys, the extra-factory consumption of cotton in the Madras and former Hyderabad States are estimated at 6,519 bales and 16,383 bales of lint respectively. The report of the survey conducted in the Punjab is awaited.

(xvii) Scheme for assessing the extent of accuracy of the statistics of cotton ginned and pressed

The scheme for conducting a sample survey to assess the extent of accuracy of the statistics of cotton ginned and pressed in the Bombay State, which was approved by the Committee could not be implemented during 1956-57, due to non-availability of experienced staff. Meanwhile, on account of reorganisation, the scheme has been revised to cover the entire area of the new Bombay State. The expenditure on the revised scheme is estimated at Rs. 16,000/- and it is proposed to be put into operation during the 1957-58 season.

(xviii) Prices and arrivals of kapas in the up-country markets

Data relating to the prices and arrivals of *kapas* in the up-country markets were collected as usual during the year under report, from selected market committees, on a voluntary basis. Consolidated weekly statements and monthly reviews were prepared from the data collected and issued to those interested. A quarterly summary of the prices and arrivals was also published in the Committee's Indian Cotton Growing Review. A bulletin reviewing the prices of cotton seed of different varieties of cotton at the various markets and another reviewing the prices and arrivals of *kapas* at up-country markets were also published during the year.

The following table indicates the range of *kapas* prices and the total arrivals of certain selected varieties of cotton in some important markets during the 1956-57 season :—

Name of market	Name of variety	Total arrivals of <i>kapas</i> during the season (in candies of 784 lbs. each.)	Prices range of <i>kapas</i> during the season (in Rupees per candy.)
Bijapur	Jarila	6,651	240- 1 to 321- 2
Amravati	"	18,795	255- 0 to 283- 0
Pulgaon	"	5,045	252- 0 to 310- 0
Jalna	"	32,316	262- 9 to 303- 0
Dhulia	Virnar (197/3)	30,643	225-10 to 312- 3
Shirpur	"	21,567	227- 8 to 395-13
Malkapur	"	41,031	318- 8 to 391- 3
Amravati	H. 420	5,277	260- 0 to 300- 0
Akola	"	20,890	241- 0 to 343- 5
Amravati	M. P. Cambodia	8,528	255- 0 to 280- 0
Amravati	Buri 0394	29,497	262- 0 to 350- 0
Akola	Oomras	14,424	231- 0 to 333- 5
Nanded	Gaorani- 6	34,408	236- 7 to 307- 4
Latur	Gaorani-12	9,810	236-13 to 292-10
Dhansura	Vijay	12,420	384- 7 to 423-14
Dabhoi	"	27,856	417- 5 to 425- 2
Nargund	Jayadhar	6,420	224- 0 to 310- 5
Bijapur	"	18,829	248- 8 to 278- 7
Gadag	Laxmi	13,491	245- 0 to 353-13
Raichur	"	818	276- 0 to 332- 9
Adoni	"	18,137	296- 0 to 413- 4
Tirupur	Southern Cambodia	58,391	294-14 to 375-14
Virudhunagar	Karunganni	20,960	212-14 to 308- 0
Dhol	170-Co. 2	641	320-10 to 334-13
Dhansura	134-Co.2-M	8,278	372- 1 to 433-10
Abohar	Punjab Desi	10,358	288- 9 to 327- 4
Moga	"	10,988	262- 2 to 321- 4
Barnala	"	23,569	250-14 to 288- 4
Sunam	"	21,852	251-12 to 296- 0
Abohar	320F	89,671	310- 5 to 361- 0
Giddarbaha	"	35,827	313-12 to 356- 4
Kotkapura	"	33,902	300- 2 to 346- 7
Hissar	216	3,824	282-10 to 325- 1
Hansi	"	26,907	283- 4 to 320- 1
Abohar	L. S. S.	...	311- 6 to 361- 0
Adoni	Mungari	3,262	250- 8 to 293- 4*
Bellary	"	...	180- 0 to 224- 8**

* Good quality. **Inferior quality.

(xix) Publications

The following Statistical Publications were issued during the year :—

- (i) Statistical Leaflet No. 1 (23rd issue 1955-56) entitled 'Report on the staple length of the Indian Cotton Crop of the 1955-56 Season.
- (ii) Statistical Leaflet No. 3 (23rd issue 1955-56) entitled 'Receipts at Mills in the Indian Union of raw cottons classified by varieties, 1955-56 season'.

- (iii) Statistical Leaflet No. 4 (23rd issue — 1955-56) entitled "Exports by sea of Indian raw cotton classified by varieties, 1955-56 season."
- (iv) Statistical Leaflet No.5 (16th issue — 1954-55) entitled "Report on the accuracy of the all-India cotton forecast of 1954-55 season".
- (v) Kapas Price Bulletin (5th issue — 1955-56) entitled "A study of the prices and arrivals of kapas in the up-country markets during 1955-56".
- (vi) Bulletin on cotton seed prices in India (3rd issue — 1955-56) entitled "Prices of cotton seed at up-country markets classified by varieties — 1956-56"

CHAPTER III

RESEARCH

Advances in the knowledge of technology not only increases the scope of the use of raw materials but also demand higher standards in the basic qualities of these materials so as to answer specific needs of the manufacturing industry. On the other hand, the agriculturist, who is responsible for the production, is primarily interested in a particular variety to the extent it brings him a better monetary return. A scientific approach to the problem of cotton improvement needs therefore, to satisfy the twin requirements of higher production and better quality than what is obtained in any particular tract. The attainment of the objectives is sought to be achieved through a programme of intensive research.

The spinning performance of any particular cotton variety depends upon, certain fibre characters, such as its staple length, strength, fineness etc. Similarly, the yield of cotton would depend upon, apart from agro-climatic conditions, the ginning outturn, lint index and total productivity of flowers and bolls. The basic principle underlying the research programme for evolving improved varieties, suitable for the different tracts, has been, either a search for the presence of variability in each of these characters and by a process of selection and sifting, obtain a combination of economic characters answering the requirements of both the cultivators and the manufacturers, or to bring about a synthesis of characters by deliberate hybridisation of the desirable parents. Furthermore, the question of acclimatisation of exotic types under Indian conditions has also been attempted, a more recent illustration of which has been the selection of the S. I. cotton variety 'Andrews' which under the agro-climatic complex of the West Coast of India has fared exceedingly well.

Selection in indigenous populations of Asiatic and American types had yielded high dividends in the past in the form of strains which owing to their superiority over local bulks, proved more remunerative, while in the more recent years extensive hybridisation of different parents has been resorted to. The successful evolution of the Indo-Americans which involve both Asiatic as well as American varieties, and the Madras Cambodia Uganda strains involving Madras Cambodia and Uganda parents are instances in point. A common experience at all the cotton research stations in India regarding the use of exotic parents is that the characters for which they have been bred in their native lands, have been observed to break down under Indian conditions. Thus U.4/4 evolved in Uganda for high jassid resistance

proved to be highly susceptible to jassid under Indian conditions. It was, therefore, only utilised as a donor parent in hybrid combinations. This emphasises the need for undertaking research to bring about the best combination of their characters for the evolution of improved strains suitable for each individual cotton tract in the sub-continent. The Committee's policy is directed in the main to carrying out such research—fundamental and applied.

The improvement of the best varieties of cotton recorded under the various schemes functioning in the States, indicates the measure of success achieved in bringing about the desirable combination of characters intended for each tract.

TECHNOLOGICAL RESEARCH

The primary function of the Committee's Technological Laboratory is the testing, by fibre measurements and actual spinning trials of new varieties of cotton prior to their introduction into cultivation and at as early a date as possible in the plant breeder's work.

The Laboratory continued to render valuable service to cotton breeders in their efforts to evolve new strains of cotton. This has been of the greatest value in assisting the cotton breeder to reduce his selections to a manageable size at a relatively early stage and in indicating which strains of cotton are worth putting through extensive field trials with a view to introducing for general cultivation.

The facilities available at the Technological Laboratory were also availed of by the cotton trade and the textile industry. The various activities of the Laboratory are enumerated below:—

The total number of samples received for various tests during the year was 3,808, which was 3% more than in the previous year and as many as 907 reports of various categories were issued thereon. The testing of trade varieties and standard cottons and the publication of the results on these in the Technological Bulletins was continued. The additional information embodied in these bulletins was in respect of the ginning percentage of the trade varieties as well as micronnaire and Pressley Strength Index values. Over 36 trade varieties were also arranged to be tested under normal mill conditions with a view to assessing their general spinning capacity.

The Testing House of the Laboratory received a total number of 1,104 samples for various tests. Some of the tests were of a special nature, such as, effectiveness of using antiseptic along with sizing material against

fungus or mildew attack, waterproof packing paper for exporting textiles, union fabrics for determination of their components, etc., etc.

The research work undertaken at the Laboratory includes investigations on ginning and pre-cleaning, on fibre properties, chemical problems, spinning and yarn characteristics etc.

With a view to assisting the ginning industry, technological leaflets, describing the settings and speeds for the pre-cleaning and ginning machines to give the maximum output with least power consumption and best lint quality are issued after thorough experimentation at the Laboratory. During the year two such leaflets on Kalyan and Jayadhar cottons describing the settings and the speeds for the pre-cleaning and ginning machines were issued.

The apparatus for determination of rigidity of fibre bundles in which torsional oscillation method is employed was devised in the Laboratory and tests for fibre bundle rigidity were in progress.

The experiments on the relationship between the micronnaire fineness and the fibre-weight per unit length obtained by weighing whole fibres was written up and presented for discussion at the Seventh Conference on Cotton Growing Problems in India. Similar study on the relationship between the single thread strength and the chief fibre properties was completed and written up for publication.

In regard to the micro-sample spinning technique developed at the Laboratory, attempts were made to determine the highest standard count by micro-spinning method and to compare it with the value obtained by bulk (10 lb.) sample spinning. Furthermore, an attempt to utilise the micro-spinning technique to a smaller quantity of lint, viz., 30 gms. was made.

Experiments were also under way to compare the results of spinning tests obtained with the new patented miniature spinning plant, the present micro-spinning technique on the one hand and the full scale spinning on the other.

Determination of fibre maturity by dye absorption method was standardised for use at the cotton breeding stations.

Work was in progress on the investigation on the mercerisability of Indian cottons.

The oil-content of more than 200 different varieties of cotton seeds was estimated by solvent extraction and reports of these made available to the cotton breeders to help in the selection of a strain with higher oil-content.

AGRICULTURAL RESEARCH

A. FUNDAMENTAL RESEARCH

The agricultural research work on cotton of fundamental nature was conducted largely at the Institute of Plant Industry, Indore and that on interspecific hybridisation carried out chiefly at Surat in Bombay State. The work done during the year under review is enumerated below:—

1. GENETICS AND GENERAL BOTANY

The inheritance studies on cotton were continued during the season on the various characters of cotton plant and the chief indications obtained are summarised below:—

(i) **Inheritance of lint and fuzz colour in Upland cotton, with special reference to the phenotype khaki lint/green fuzz.**

The F_1 and back-cross segregations showed that khaki lint/green fuzz is independent of the gene controlling green lint/green fuzz. Preliminary data on F_2 s of crosses with other phenotypes indicated that it is allelic to the duplicate khaki lint/khaki fuzz.

(ii) **Seed fuzz intensity and spot size in Asiatic cottons.** The F_2 data on seed fuzz intensity and spot size in Asiatic cottons were compiled and the full interpretations will be reported in the next report.

(iii) **Transference of *anomalum* lint genes to cultivated Asiatic cottons with the use of single and double recessive lintless types.** It was found that the wild *G. anomalum*, though having lint hairs only 10 mm. long, carried the normal linted alleles of li_a , li_b , li_c , and li_d against which it had been tested so far. Transference of the L— Li_d chromosome segment has proceeded to the 2nd backcross stage. First backcrosses of ($li_a li_d \times G. anomalum$) F_1 to li_a , li_d have also been secured. F_1 s and backcrosses with li_e and li_f are being procured.

2. PHYSIOLOGY

(i) **Scheme for cotton physiological research, Indore.**—The effects of application of trace elements on the growth and yield of cotton and the rotational crops and the role played by these substances in plant metabolism were investigated at Indore under this scheme which was put into operation on 1-3-1944. This scheme terminated on the 28th February 1957.

The work in this scheme was an outcome of the investigations undertaken in the scheme for Cotton Physiological Research operated in the

Punjab from the 15th March, 1935 to the 31st March, 1944. The present scheme commenced functioning from the 1st March, 1944, with a part of the cost being met by the then Sind Government. However, with the partition of the country in 1947, the main part of the work done in the scheme in the Punjab and Sind terminated. Since then the work was started at Indore, Surat, Mewar and Dharwar, where physiological problems on long staple cottons were investigated.

A few of the outstanding results of practical value obtained under the scheme are mentioned below:—

1. It was found that red-leaf disease prevalent in Sind-American cottons in Sind could be remedied and yield increases ranging from two to four maunds of seed cotton per acre obtained by the application of ammonium sulphate.

2. In South Gujerat (Surat) the optimum spacing for obtaining maximum yields was determined to be 6' x 2'. Application of nitrogen up to 75 lb. per acre proved beneficial.

3. Spraying of Dhar 43 cotton with aqueous solution of α -naphthalene acetic acid at 10 p.p.m. during the square period resulted in yield increases ranging from 25 to 50%.

4. In Malwa tract, maximum yields were obtained with the adoption of early sowing, close spacing and manuring with nitrogen. The optimum sowing time was from the 25th May to the 10th June in water-logged lands and from the 1st to the 20th June in well drained soils. The optimum spacing was found to be half square foot per plant, i.e., 9" x 8" or 12" x 6".

5. Results from experiments conducted for four years in Mewar (Rajasthan) dispelled the popular belief that *desi* cottons yielded higher than Americans and it was found that it was more profitable to grow Americans in place of *desi*. Pre- or post-monsoon irrigations were observed to increase the yields of American cottons three to four times.

6. Deficiencies of Potash and Phosphate were found to be the main reason for the lack of response to nitrogen and the low yields of Egyptian cottons in the Mysore State. When nitrogen was supplemented with application of 100 lbs. of P_2O_5 and 100 lbs. of K_2O , an increased yield of 200 to 300 lbs. of seed cotton per acre was obtained.

7. Application of chromium, zinc and manganese increased the growth significantly in the Malwa tract but the level at which they gave response was found to be uneconomical in its practical application.

8. Experiments on pre-soaking seeds in nutrient salts indicated that while the major elements, viz., potassium, phosphorous and nitrogen penetrated the testa and embryo only to a very small extent, minor elements like chromium, copper and manganese penetrated the testa and embryo to a considerable degree. This method may prove of some practical value if the viability of the seed is not affected adversely.

(ii) **Scheme for cotton physiological research, Dharwar.**—The scheme was sanctioned by the Committee in February, 1949, and put into operation on 11th August, 1951. The object of the scheme is to study the cotton plant under Bombay-Karnatak conditions, and to apply the knowledge gained for increasing the yields and acreage under finer types of cotton. The work of the scheme is being conducted at 2 centres, viz., Dharwar and Gadag.

With a view to study the effect of application of different combinations of nitrogen, phosphate and potash fertilizers on the growth and yield of cotton, a complex experiment involving 27 combinations of N, P and K with three levels of Nitrogen as main plots were conducted at Dharwar and Gadag. The doses of fertilisers used were 0 lb., 20 lb., and 40 lb. N, 0 lb., 150 lb., and 300 lb. P, 0 lb., 100 lb., and 200 lb. K, per acre. The data obtained from a study of the dry weight, flower and boll number and boll weight indicated that nitrogen and phosphate and their combinations improved these characters while potash proved ineffective. These results, however, will have to be studied in the light of the results of chemical analysis of the different plant parts yet to be done. The cause for the lack of response to potash is also to be investigated.

The experiment designed to study the effect of application of chemical hormones on the growth and yield of Laxmi cotton was repeated at Dharwar and Gadag with five hormones viz., 2,4-D, IAA, NAA, TIBA and Nemy AA. The results obtained at Dharwar indicated that none of the hormones had any beneficial effect on dry weight per plant, flower and boll production, setting percentage or yield under Karnatak conditions. The trials at Gadag were vitiated due to insect attack.

The results obtained from another experiment undertaken during the year indicated that burning jowar stubbles or straw in the cotton field at the rate of 460 maunds per acre resulted in a significant yield increase of 100 lbs. seed cotton per acre.

From chemical analyses of the leaves, stems, bolls and fruiting parts of the crop from an experiment conducted during 1955-56 season at Gadag to study the relations between the uptake of nitrogen, phosphoric acid and potash by the cotton plant, it was found that the cotton crop, on an average,

absorbed about 30 lbs. of N, 95 lbs. of P_2O_5 and 30 lbs. of K from the soil under unmanured condition. With the application of Nitrogen, there was not only an increase in the absorption of Nitrogen by about 8 to 9 lbs. per acre but it also resulted in an equivalent quantity increased absorption of potash from the soil. The view now held that the increase in the yield resulting from nitrogen application is partly due to the increased absorption of potash is, therefore, corroborated. It requires to be determined at what dose of nitrogen the soil will be unable to supply the required quantity of potash and addition of potash becomes necessary for beneficial effects. With regard to phosphate, however, there was not much appreciable increase in the absorption of phosphoric acid when nitrogen was added indicating that phosphoric acid was not in a readily available form. It was found that the application of potash not only depressed the uptake of that element but also that of nitrogen and phosphorous. When phosphoric acid was combined with potash the uptake of all the nutrients was found to become normal.

(iii) **Scheme for cotton physiological research, Mysore.**—This scheme was sanctioned by the Committee at its meeting in February, 1949, and put into operation on the 16th May, 1952. The object of the scheme is to investigate the causes of low yields of Egyptian cottons under Mysore conditions.

The results of trials conducted in the past indicated that deficiencies in respect of phosphate and potash were responsible for the low yields of Egyptian cottons in the area and that when these two nutrients were applied, there was a significant increase in yield levels. The trials undertaken during 1956-57 at the V.C. and Babbur Farms supported the above finding.

It was found that, though the general level of yield was poor owing to receipt of heavy rains and incidence of *black-arm* attack during the year, the combination of 50 lbs. of N and 150 lbs. each of P_2O_5 and K gave the highest yield of 458 lbs. per acre compared to 237 lbs. of the control at the V.C. Farm. The most economical dose was, however, found to be 50 lbs. of N and 100 lbs. each of P_2O_5 and K, which combination recorded an yield of 442 lbs. during the year. The yield increase due to the above treatments resulted from increased flower and boll production and not from an improvement in the setting percentage. Similar experiments at the Babbur Farm were vitiated due to *black-arm* attack and heavy rains but it was noticed that for the first time, significant increase was obtained in yield by the application of nitrogen (in one experiment out of 10 conducted so far). It was found that there was no increase in the concentration of potash in the leaves by the application of nitrogen indicating the insufficiency of that mineral in the soil. An acre of Egyptian cotton crop under irrigated conditions was estimated to absorb from the soil about 186 lbs. of N, 90 lbs. of P_2O_5 and 186 lbs. of K_2O , the quantities being variable depending on crop growth conditioned by the season.

For winter season the optimum sowing time at Babbur was found to be from the end of October to 10th November and in summer the first fortnight of April constituted the best time of sowing. At V.C. Farm the optimum sowing time was the first week of November.

(iv) **Co-ordinated crop weather scheme:**—The scheme was sanctioned by the Committee in August, 1946, and put into operation on the 21st September, 1947. Its object is to study the effect of climatic factors on plant growth, crop yield and the incidence of pests and diseases over a series of years at selected experimental farms according to a common plan and to publish the results for general information.

Increased number of Meteorological Observatories continued to function at agricultural stations during the year. These Observatories worked under the technical guidance of the Director of Agricultural Meteorology, who issued technical instructions with full details of meteorological, climatological and crop observations including the incidence of pests and diseases to be recorded under the scheme. The crop observations under the scheme were recorded on random sampling basis according to the sampling technique developed specially for the purpose at Poona.

Systematic measurements of evapo-transpiration were made at the Central Agricultural Meteorological Observatory, Poona, using the volumetric, the gravimetric and the turbulence methods. The object was to develop a suitable technique for the determination of water requirement of crops.

As dew is an important secondary source of moisture for the crops, particularly in arid regions, the measurement of dew was done at Poona on a routine basis. The data collected so far shows that at Poona dew deposition is maximum (about 3 mms.) at a height of about 50 cms. during the month of October, although the number of nights of dew-fall is slightly more in November than in October.

A study of the Crop-Weather data collected during the year 1955-56 showed that due to unseasonal excessive rain-fall at the time of commencement of flowering, the yield of *kapas* was greatly depressed at Nagpur, Akola, Jalgaon and Parbhani.

3. AGRONOMY

(i) Varietal response to manuring:

It was found that there was a definite response to the application of nitrogenous fertilizers in the case of both *desi* and American cotton varieties and with an increase in the doses of N there was a corresponding increase in the

yield of *kapas*. The 90 lbs. N dose on an average gave 50% and 100% extra yield over the control in case of *desi* and American varieties respectively. The *desi* varieties studied were Bhoj, Maljari and 197-3 while the American varieties included Indore 1, Indore 2 and B. 48-72. The response was more in plots which had received a basal dressing of compost.

(ii) Two Course Rotation:

Trails were carried out to study the economics of a two years' rotation when *Mung*, *Jowar*, *Tuer* and Groundnut were grown during *Kharif* and Gram and Linseed in *Rabi* followed by *desi* cotton in the next *Kharif* season. It was found that the highest income was obtained from *Tuer* followed by Cotton.

(iii) Residual effect on Cotton of mixed cropping of Wheat and Gram, with and without manuring:

Wheat and Gram were grown alone and mixed in different proportions, viz $\frac{3}{4} : \frac{1}{4}$; $\frac{1}{2} : \frac{1}{2}$; $\frac{1}{4} : \frac{3}{4}$ of Wheat and Gram respectively in 1955-56. Farm Compost at the rate of 40 lbs. N per acre and Superphosphate at the rate of 40 lbs. P_2O_5 per acre singly and in combination were applied to the field before these crops were sown in *Rabi* season and followed by Cotton in 1956-57 *Kharif* season. The yield of *kapas* was maximum from the residual effect of N and P_2O_5 in combination. It did not differ significantly between no manure and either Superphosphate and Farm Compost plots. The yield of *kapas* after Gram alone was significantly the highest and after Wheat alone the lowest.

(iv) Residual effect on Cotton of the manures applied to preceding crops of Jowar, Tuer and Groundnut:

Cotton crop was sown after Jowar, *Tuer* and Groundnut, sown in the previous season. These were manured with Ammonium Sulphate at 20 lbs. N per acre and Superphosphate at 20 lbs. P_2O_5 per acre singly, in combination with and without a basal dressing of Farm Compost at 40 lbs. N per acre. Cotton after Groundnut gave significantly higher yield of *kapas* as compared to that obtained when grown after either Jowar or *Tuer*. There was no residual effect on cotton crop of N and P_2O_5 application to the previous crops. The basal dressing of Farm Compost given to previous crops had numerically given higher yield of *kapas* compared to that of plots without basal dressing but this increase was not significant.

(v) Efficacy of New fertilizers on Cotton:

Four nitrogenous fertilizers, viz., Ammonium Sulphate Nitrate, Ammonium Sulphate, Ammonium Chloride and Urea were applied to *desi*

Cotton(Bhoj) at 0, 30, 60 and 90 lbs. N per acre just before sowing. The results showed that Ammonium Chloride gave significantly the highest yield of *kapas* compared to that of other 3 fertilizers which did not differ significantly amongst themselves. Except for Ammonium Chloride which increased the yield of *kapas* with the corresponding increase in the dose of N, the responses of the graded doses of N from other fertilizers were not according to expectation.

(vi) Pre-monsoon and monsoon sowings of Cotton with different seed rates:

This experiment was carried out to study the effect of different seed rates, viz., 10, 20, 30 and 40 lbs. per acre on the yield of *kapas* of *desi* Cotton (Bhoj), when sown prior to and during the onset of the monsoon. The results showed that pre-monsoon sown crop gave significantly higher yield of *kapas* than monsoon sown plots. Differences in the yield of *kapas* amongst the different seed rates of either sowings were not significant. Though number of plants varied in plots of different seed rates, as expected, it did not contribute to difference in yield of *kapas* as the rate of increase in yield of *kapas* with the increase in plant population was not significant.

4. STATISTICS

(1) **Response to selection:** The selection experiment started in the year 1940-41 was continued during the season under report. The experimental material consisted of *arboreum* cotton crosses made between superior and inferior types of parents with regard to staple length. From F₄ generation onwards only six crosses, out of 99 made, were continued upto F generation and thereafter only four were continued. The results obtained on halo length indicated that the high lines of crosses still continued to respond to selection.

(2) **Response surface for cotton yields:** This study was continued for the data of cotton yields collected from the co-ordinated cotton-manurial trials which were conducted at various research stations located in the black-cotton soil tract of peninsular India from 1943-44 to 1947-48. In the previous year, response plans were fitted to the yield data by the method of multiple regression equation in which the independent variates were taken as (1) dose of nitrogen, (2) its square, (3) yield of no-manure treatments, (4) its square and (5) the product of dose of nitrogen and no-manure yield. In the season under report, the multiple regression equations were fitted by taking the same variates but grouping stations into two groups, viz., (1) Deccan plateau and (2) Madras State. The multiple regression equation with the above five independent variates could account for about 85 to 92 percent variation in the yield of cotton crop obtained with the application of 20 to 100 lbs. N per acre. The expected yields calculated, from the multiple

regression equations were, however, not according to the expectation as they did not follow the law of diminishing returns. Further investigations are in progress.

(3) Analysis of data collected from long-term-rotational trial:

(a) Simple correlation coefficients between the nitrogen percent in grain and the seed weight of grain samples of wheat and jowar crops, collected from the plots under continuous system of manuring, were calculated for nine (1947-48 to 1955-56) seasons. The correlation between the two characters was negative in 8 out of nine seasons for wheat crop. In Jowar crop, however, no such association was observed between the two characters.

(b) The economics of three and four-course rotation were worked out and it was observed that the newly introduced four-course rotation of jowar-groundnut-cotton-wheat was more profitable to the extent of 25 percent, compared to the old rotation of Jowar-Cotton-Wheat.

(4) Meteorological studies: These studies, started last year for investigating the trends in the maximum temperature recorded from 1st of March to 30th of June of every year from 1931 to 1954, were continued. In the season under report fifth degree polynomial curves were fitted to the five constants of the same curve fitted to the three-day totals of maximum temperature. The fit was satisfactory for the average temperature, cubic and fourth degree coefficients. It was observed that the maximum temperature increased significantly by 0.09° F. per day per year. The rate of increase also changed significantly per day with the passage of time.

B. APPLIED RESEARCH

Applied research work under the Committee is essentially concerned with the evolution of improved varieties for the different tracts as also the study of better cultivation methods. As such, it has necessarily to be conducted in the respective tracts. A brief account of the work during the year is given below:—

BOMBAY

1. **Scheme for cotton breeding in Khandesh.**— The scheme was started in April, 1948, its objective being (a) to test extensively the strain 197-3, now called Virnar, in the district, (b) to improve the staple of 197-3, by crossing it with the fine long staple *arboreum* varieties and (c) to study secondary selections in Jarila for producing better strains.

With the evolution of the strain Virnar which has been found to be suitable to the Khandesh tract, the object of the scheme has been re-orientated

as to evolve a strain superior to Virnar in economic characters especially in fibre length, fibre fineness and resistance to wilt.

In trial conducted during the year, strain Y1, once again recorded a superior performance in fibre characters compared to Virnar. In yield, however, the former was only equal to Virnar. In a set of village trials conducted, the new strain recorded an average acre yield of 629 lbs. of seed cotton compared to 640 lbs. of Virnar. In mill tests, however, strain Y1 yielded stronger yarns than those of Virnar and its lint was valued at Rs. 10/- more per *candy* over that of Virnar. Other promising material isolated in the scheme consisted of three new cultures possessing higher yield than Virnar obtained in a large scale yield trial conducted on three Government farms and derivatives of crosses involving Coimbatore *arboreums*, Virnar and Gaorani selections obtained in the Minor Yield Trials and Progeny Row Tests.

2. Scheme for improvement of Mathio cotton.— This scheme was started in June, 1937. The object of the scheme was to improve Mathio mixture in respect of yield, ginning percentage and quality and to test at Amreli the early strains of Wagad evolved at Viramgam with a view to replacing the inferior Mathio by early *herbaceums*.

As a result of the work done during the first fifteen years of the scheme, a superior spinning and high yielding strain Pratap was evolved to replace the Mathio mixture. At present, the work is concentrated in effecting further improvement over Pratap in respect of all economic characters.

The work towards this objective has resulted in the isolation of a strain known as "C.J. 73", derived from a cross between C. 520 and Jarila. This was tested in large scale trials with Pratap and Mathio as controls during the past six years and its overall superiority over Pratap was evident from the average performance of the two strains for the past 6 years on the Agricultural Research Station, Amreli, where C.J. 73 recorded a mean yield of 533 lbs. seed cotton, 35% ginning and 35's H.S.C. compared to the respective values of 473 lbs., 34% and 26's of Pratap. Since 1954-55, six mill tests have also been carried out on these two strains and, on an average, lint of C.J. 73 was valued at Rs. 751/- per *candy* while that of Pratap was valued at Rs. 733/-.

3. Scheme for Interspecific Hybridisation in cottons at Surat.—The Scheme has been in operation since 1938, at Surat. The objects of the Scheme are:—

- (i) To explore the possibilities of obtaining from crosses between Asiatic and American cottons fully fertile types combining superior qualities

of fibre with requisite yield, ginning outturn and adaptability to growth conditions in India;

- (ii) Evolving long linted types from crosses and back-crosses between *hirsutum* and *barbadense* types;
- (iii) Exploitation of hybrid vigour for commercial cultivation of extra long staple cotton;
- (iv) Exploitation of wild species of cotton for transferring useful genes to cultivated varieties.

As a result of research work done so far three promising Indo-American strains, viz., 170-Co2 (1-1/16" to 1-1/8"), 134-Co2-M (1-3/16") and 68 x 22 (1-1/16") have been obtained. These strains were under trial under various soil and climatic conditions in the Bombay State, particularly Gujarat. From the results, it appeared that strain 170-Co2 (Deviraj) would be suitable in black and deep *goradu* soils as it yielded on an average as good as improved *herbaceum* strains 2087 and Vijay. 134-Co2-M (Devitej) was found to be promising in sandy and well drained soils of the Ahmedabad, Sabarkantha and part of Kaira district. From the district trials conducted during the year in Gujarat, it was found that strain *Deviraj* yielded as much as or better than the local improved *herbaceum* strains when supplemented by irrigations. The extra long staple strain, *Devitej* fared well in higher and well-drained soils particularly of Sabarkantha district. Among the other extra long staple strains under trial, notable performance in respect of yield was recorded by the three jassid and *blackarm* resistant strains, viz., I-S-C-67, 68-G-4 and 134-Co2-M21 giving significantly higher yield than the strain *Devitej*. Of the three, strain I-S-C-67 was particularly promising as it recorded yield equal to the improved *herbaceum* strain, Vijalpa.

Other breeding material studied during the year consisted of a large number of selections synthesised from a wide range of parents and comprised of *inter se* crosses, annual-perennial crosses, *hirsutum-barbadense* crosses, crosses involving wild cottons, and crosses with early maturing cultures. Some of the progenies from these crosses have been found to manifest high degree of resistance to jassids and *blackarm*, good fibre strength and fineness and high productivity. The material is being subjected to further breeding tests.

4. Scheme for simple manurial experiments on cultivators' fields in Bombay State.—This scheme was sanctioned by the Committee at its meeting held in September, 1950 and put into operation on the 15th May, 1954.

The object of the scheme is to study the effect of fertilizers on the

yield of cotton on the cultivators' fields in the three cotton growing tracts of Karnatak, Gujerat and Maharashtra of Mysore and Bombay States.

The experiments during the year were conducted on variety 2087 in Surat, Virnar in East Khandesh and Laxmi and Jayadhar in Dharwar. Manurial treatments, as in the previous year, consisted of three levels of N, viz., 0, 20 lbs. and 40 lbs., one of P at 20 lbs. P_{20} , one of K at 40 lbs. K_{40} per acre and their combinations. The six treatments were N0, N1, N2, N1P, N2P and N2PK.

The results from these trials indicated that there was good response to manurial application in both Surat and East Khandesh districts. In Surat, application of ammonium sulphate alone was the most profitable, the increase in yields of seed cotton due to 20 lbs. and 40 lbs. N being 69 lbs. and 114 lbs. per acre or 23.2 and 38.3 per cent respectively. In East Khandesh, unlike last year, all the fertiliser applications proved to be economical. Especially high response was obtained with the full combination of 40 lbs. N, 20 lbs. P_{20} and 40 lbs. K the increase in yield being 219 lbs. of *kapas* per acre or 67.6% over no-manure. Significant increase of 78 lbs. and 118 lbs. of seed cotton per acre were also obtained with the application of ammonium sulphate alone at 20 lbs. and 40 lbs. N per acre, respectively.

5. Scheme for production of hybrid seed.—The scheme was approved by the Committee at its meeting held in February, 1955, and put into operation during the season 1954-55.

The object of the scheme is to encourage the production of hybrid seed by giving a subsidy of Rs. 5/- per lb. of seed produced.

The hybrid crop was affected to some extent during the year due to heavy rains and the cold wave during February in Gujarat. As a result of this the opening of bolls was defective. The hybrid crop also suffered from boll worm, aphid and jassid attack.

During the year, an area of about 838 acres was covered by hybrid cotton as against 545 acres during the previous year. It is estimated that about 1,200 lbs. of hybrid seed will be produced during 1956-57 by the cultivators and 46 lbs. on the Government farm at Surat. Thus the total quantity of hybrid seed produced would be about 1,246 lbs. against a total quantity of 1,110 lbs. produced in 1955-56.

6. Cotton Wilt Breeding Scheme, Poona.—This scheme was sanctioned by the Committee in August, 1936, and put into operation on the 1st April, 1937. The objects of the scheme are :—

- (i) To evolve 100 per cent wilt resistant types of cotton for Bombay and Mysore States where the soil dwelling fungus persists causing serious losses if resistant varieties of cotton are not grown,
- (ii) To carry out fundamental research work on root-rot of cotton and to adopt suitable technique for testing cotton against root-rot,
- (iii) to investigate *anthracnose* and leaf-spots of cotton and devise some suitable control measures.

The main indications obtained during the year from the trials on wilt-resistance are as follows:—

(1) All the 16 bulk progenies of strains 98-41 and Digvijay were found to be highly resistant to wilt, the mortality ranging from 0.0 to 7.3%.

(2) Fifteen cultures of strain Vijalpa displayed high resistance to wilt, the mortality not exceeding 4.2%.

(3) Four progenies derived from crosses involving Madras *arboreum*, Virnar and Dhulia 2 selections, showed a high degree of resistance.

(4) Of the old material from Parbhani, progenies of five selections viz., 4661, 4582, 4166, 4314 and 3729 were found to be highly resistant, the mortality not exceeding 10%.

(5) In the material from Nanded, progenies of three selections viz., 688, 1422 and 1494 were found to have become homozygous for wilt resistance. Besides, these cultures also possessed desirable economic characters.

(6) Resistant material was also obtained in the material procured from Raichur Sub-Section.

Regarding work on *root-rot* of cotton, a method was devised to test the susceptibility of different cotton varieties to the causative organism viz., *Macrophomina phaseoli* by artificial inoculation. Work on testing for resistance based on this new method is proposed to be undertaken during the next season.

Trials directed towards exploring methods of controlling *anthracnose* conducted on Virnar cotton indicated that delinting of seed with commercial sulphuric acid effectively controlled the external seed-borne infection.

7. Scheme for breeding arboreum (desi) cotton at Akola.— This scheme was started in April, 1953. The objects of the scheme are (i) to isolate strains superior to H. 420 possessing a staple length of 13/16" to 14/16", a ginning outturn of 37% and a spinning capacity of 30's counts and (ii) to evolve for the drier parts of Madhya Pradesh, a variety capable of yielding more than local *Jadi* with a ginning percentage of 40, staple length of 13/16" and capable of spinning over 25's counts.

The results obtained in the Strains Tests conducted during the year at all the four centres viz., Akola, Yeotmal, Nagpur and Buldana indicated that some of the strains possessed desirable ginning percentage ranging from 37.7 to 43.1 and halo length from 20.6 to 22 m.m. At Buldana, 5 strains, viz., II 101, No. 315, II 24, A.K.72 and A.K.20 were found to be particularly promising with ginning percentage ranging from 41.2 to 44.0 and halo length from 21.1 to 22.2 mms. Seven varieties were tested at all the centres in the Preliminary Varietal Trial and it was found that strains AK.277 and B.IIA at Akola, AK.235 and AK.277 at Buldana and AK.235 at Nagpur and Yeotmal recorded values even exceeding the targets set for the scheme. On the basis of the average performance of the various varieties during the past 4 seasons, strains AK.277, AK.235, B.IIA, and 83 appeared to be the most promising and are proposed to be tested in Main Strains Trial during the next season. Of the six new strains tested in the Varietal Trial, strain 13-A was found to be the most suitable for all the centres while strain B.12A appeared to be promising at Akola, and Buldana, and strain No. 16 at Yeotmal and Nagpur.

8. Scheme for breeding American cotton at Achalpur.—This scheme was started in April, 1953. The objects of the scheme are (a) to evolve strains better than B.0394 and 0396 which have a staple from 7/8th to 15/16th inch and ginning percentage of 33 and are capable of spinning upto 40's H. S. C. and (b) to evolve new improved disease and jassid resistant strain either by selection or hybridisation for different tracts with ginning percentage of 33 to 35 and spinning performance of 40's H. S. C.

Two Strains Tests were carried out during the season. In Strains Test I, 15 strains at Achalpur, 9 at Yeotmal, 22 at Nagpur and 4 at Buldana were found promising with ginning percentage ranging from 33.4 to 40.5 and halo length from 22.4 to 26.8 mms. In Strains Test II, 19 strains at both the centres, Achalpur and Yeotmal, were found promising with a range of ginning percentage from 35.5 to 41.0 and halo length from 22.5 to 27.0 mms. The best six viz., 371, 461, 463, 468, 493 and 14 are being tried in major yield test. On the average of the results obtained during the last three years in the Preliminary Varietal Trial, strains R.426, B.45 and Y.20 were found to be promising. A sub-strain of B.0394 named, J.0394, was also found to be

jassid-resistant. On the basis of average results obtained in the Varietal Trial during the past three years at all the four centres, strain 147 was found to be significantly superior to the control, B.0394, in respect of ginning percentage and halo length while being equal in yield, whereas, Variety 0296-7 proved to be superior to B. 0394 in yield and ginning percentage while being equal in halo-length.

9. Scheme for the study of Agronomy of long staple American cotton at Amravati.— This scheme which was put into operation on the 1st March, 1954, aims at studying the agronomy of long staple American cotton for obtaining the maximum *kapas* yield.

During the year under report, experiments involving the study of the effect of spacings, sowing dates, post-monsoon irrigations, application of nitrogen and methods of sowings on the yield and other characters of Buri 0394 and Strain No. 91, were undertaken. The results obtained confirmed the previous findings that pre-monsoon sowing was more advantageous than normal sowing, the former recording a yield of 1168 lbs. of seed cotton per acre against 648 lbs. only per acre in the latter. The crop had not benefitted by the post-monsoon irrigations as no increases in yield or ginning outturn resulted therefrom.

Unlike last year, the increase in yield obtained during the year due to the application of nitrogen was not significant. The response to 40 lbs. N was 19.1% over 0 lb. N and this dose was found to be the most economical. Study of the economics of manuring revealed that application of 40 lbs. N. resulted in a net increased return of Rs. 23/- per acre in the case of the variety No. 91 and Rs. 46/- in the case of Buri 0394. However, with increasing amount of nitrogen, it was found that ginning outturn and fibre length tended to show a decrease. Adoption of narrow spacings of 18" x 9" for type No. 91 and 2' x 1' for Buri 0394 respectively, resulted in significantly higher yields than wider spacings. This was also in conformity with the results of the previous season. In general, the combination of pre-monsoon sowing, adoption of a spacing of 2' x 1' and application of 40 lbs. N/acre with no post-monsoon irrigation was found to be the best treatment to obtain optimum yields from Buri 0394.

10. Scheme for improvement of cotton in Parbhani district.—This is an offshoot of the scheme for improvement of cotton of Oomras tract in the former Hyderabad State. It was put into operation in April, 1947.

The original objects of the scheme were (a) production of wilt resistant and high ginning strain from Gaorani 12 or other basic material suitable for entire Parbhani district, if possible, (b) maintenance of improved *hirsutum*

strains bred for *Ghat* area of Aurangabad district and (c) study of wilt resistance under field conditions at Parbhani and under optimum conditions of temperature and infection at Poona. As these objects were achieved with the evolution of the improved strain 'Daulat' (2204), the objects have been reorientated to evolve by selection and hybridisation a strain superior to Daulat (2204) in fibre length, ginning percentage, boll size and wilt resistance.

Of the Gaorani strains, Gaorani 6 and Gaorani 12 which were extensively cultivated in the eastern and western portions respectively of the Gaorani Protected Area, Gaorani 12 owing to its failure in 1953-54 became unpopular. In consequence, the area under Gaorani 12 went down and the need for a strain superior to Gaorani 12 became obvious. As a result of the work conducted since 1941 in the Committee's scheme, another improved strain "2204" now named "Daulat" having all the desirable qualities and superior to Gaorani 12, was released and soon gained popularity in the Parbhani taluka. Since the year 1954-55, the work of the scheme has been directed towards evolving strains superior to "Daulat". As a result of work done so far, six strains, viz., 4166, 4822, 5018, 5169, 5243 and 5274 have been found to be promising.

In the district trials conducted during the year with these varieties, the high yielding type 4166, which is a selection from bulk Gaorani, proved to be the most promising recording, on an average, 23% and 10% higher yield than strain Daulat and the local, respectively, in five trials. Among the four strains tested in the Varietal Trial, strain 4826 was found to record higher lint yield than strain Daulat and the local with a spinning capacity equal to Daulat. Encouraging results were also given by strain 4166 which recorded higher yield than Daulat during the season consistent with its high yield level during the past five seasons also. This strain also manifested a high degree of wilt-resistance recording a mortality of 8.3% under controlled conditions at Poona. It is, however, late maturing and slightly inferior to Daulat in spinning performance. Promising material in respect of yield, fibre length and wilt-resistance, has also been isolated in the Strain Trials and Preliminary Varietal Trials.

11. Scheme for improvement of cotton in Aurangabad and Bhir districts.—This scheme which was put into operation on the 2nd May, 1952, aims at evolving wilt resistant, high yielding and high ginning strains of *indicum* or Verum type capable of spinning 20's to 24's counts, suitable for cultivation in the Bhir districts and plains of Aurangabad district of Hyderabad State.

Of the three improved varieties viz., 3591, 2513 and N.1422 subjected to district trials in the Aurangabad and Bhir districts along with Gaorani 12,

197-3 and the local as controls, the variety 3591 recorded the highest yield of *kapas* at Karanpura in Aurangabad district while all the three improved strains and Gaorani 12 gave significantly higher yield than the local and 197-3 at Sillod.

In the Varietal Trial conducted with the above three strains together with another strain viz., 4829 with local and 197-3 as controls, all the four improved varieties were found to be better than 197-3 though on a par with the local in respect of yield. The four strains were also found to gin 4% more than the local. The two most promising strains viz., 3591 and 4829 were adjudged suitable for spinning 25's and 26's respectively compared to 19's of 197-3 and 8's of the local. They would therefore appear to be distinct improvements over the existing strains.

Of the 8 varieties of Gaorani 12 parentage tested in the Preliminary Varietal Trial the strain 4822 recorded numerically the highest yield of *kapas* and lint though the yield differences were not statistically significant. All the other varieties were also noticed to be better than local in respect of lint yield due to their superior ginning outturn. The small seeded strain, viz., B.211 recorded the highest ginning percentage of 44.

Trials were also conducted with 36 high ginning and fairly wilt resistant strains in the Main Strain tests and among these, four strains gave significantly higher yields than local and 197-3. In the micro-spinning tests all the strains were found to be superior to local while 11 strains yielded stronger yarns than 197-3.

All the varieties included in the major field trials were tested for wilt resistance in wilt sick soil and 11 strains were found to be resistant to the disease under field conditions.

MYSORE

1. Scheme for breeding long staple American cotton in Mysore State.—This scheme which is an off-shoot of the Mysore (Doddahathi) cotton scheme was sanctioned by the Committee in January, 1944 and put into operation in November, 1944. The objects of the scheme are (i) the acclimatisation and breeding of Egyptian and Sea Island cottons, (ii) the testing, in large scale trials of Mysore-American strains evolved under the Doddahathi Scheme, (iii) the evolving of strains of Upland American cottons superior to those already under cultivation and resistant to *red-leaf* disease and the evolution of short duration cottons which can be fitted in for rotation in rice fallows.

Prior to the inception of the present scheme, an improved strain of Mysore-American cotton known as M.A.II had been evolved which possessed

a staple of 7/8" and gave 30% ginning outturn. Subsequent work done under the scheme has resulted in the evolution of a superior strain M.A.V. which now covers almost all the rainfed areas growing Upland cotton in the State.

The present work under the scheme is directed towards the evolution of strains superior to M.A.V., particularly in respect of fibre-properties and resistance to *red-leaf* disease.

During the year under report, comparative trials with M.A.5 and Laxmi cotton were conducted on the cultivators' fields in fifteen selected villages in the talukas of Honnali, Harihar and Davangere representing both black and red soils. From the data obtained during the current year as well as during the past three seasons, it was found that Laxmi cotton was more suitable for black soils while M.A.5 was better suited to red soils. However, M.A.5 comes up equally well like Laxmi cotton in black soils also during years of lesser rainfall during the period of growth.

Of the six homozygous strains tested along with strains MU-1 and MU-2 on the research station in large replicated trials against M.A.5 as control, one strain, *viz.*, 19-1, recorded significantly higher yield than M.A.V., but its ginning outturn was lower than that of M.A.V. Five strains possessed longer fibre also than M.A.V. In earliness all the strains were superior to M.A.V.

Trials with short duration cotton strains in the rice fallows were conducted for the third year at the Agricultural Research Station, Mandya, and for the second year at Hiriyur. The varieties tested were H.14, LL.29, 320F, 23F, 216F and Coker. Of these, H.14 recorded the highest acre yield at both the stations, the respective figures being 550 lbs. at Mandya and 821 lbs. at Hiriyur. The yield levels of paddy crop following cotton were found to be about the same as that following paddy indicating thereby that the paddy yields were not at all affected by the cultivation of cotton during the off-season.

2. Scheme for breeding Cambodia cotton in Bellary district of Mysore State.— This scheme was put into operation in April, 1945. The object of the scheme is two fold, (i) to evolve a long staple American cotton suitable for an irrigated *rabi* crop of the Tungabhadra Project area and (ii) to evolve a type suitable for the rainfed tracts not served by the project. The work of the first is located at Siruguppa and that of the second at Hagari.

The breeding work done so far in the scheme has resulted in the isolation of types resistant to jassids and *blackarm* which are the chief obstacles

in raising a successful crop of American cotton under irrigated conditions. In addition, high yielding types have also been isolated in the scheme. A very large number of hybrid progenies have been built up which are awaiting further critical study. The two outstanding strains obtained under the scheme are 5110, derived from the cross (M.A.2 x 6113-F.1 x H.A.11 x H.A.11 x 2196-4) and 5216 derived from cross (2196-4 x M.A.2 x 6113-F.1 x H.A.11 x M.A.2 x 2196-4) which have been found to combine all the desirable economic characters. Trials with these two strains are proposed to be undertaken on the cultivators' fields.

3. Scheme for improvement of Westerns cotton in Mysore State.— This scheme was put into operation in June, 1949 with the object of evolving an early maturing cotton with a staple of 13/16" and over, ginning 33 per cent, capable of spinning 30's warp counts and having a lower waste percentage.

Western-1 cotton, the strain now under distribution in the tract, was evolved at the Agricultural Research Station, Hagari, by pure line selection and has been in general cultivation from 1930 onwards. Although it marked a substantial improvement over both the 'Jowari' cotton (unselected Westerns) and the previous strain H.25 from which it was isolated in respect of quality and ginning outturn, it continued to suffer in years of deficient rainfall and recorded low yields, fall in staple length and increased wastiness in the processing stages. As a result of research work done towards the evolution of a strain superior to it, two strains *viz.*, 4282 and 3870-IV-I are now on hand which combine better ginning and staple qualities, as compared to Westerns-1. In yield, they stand equal to W-1 and further work is based on improving the yield without losing the other qualities.

4. Scheme for improvement of Dharwar-American cotton.— This scheme, which was started in April, 1942, terminated on the 3rd April, 1957. The object of the original scheme was to improve the Dharwar-American cotton grown in the Kannada districts of the former Bombay State, the adjoining areas of Madras, Hyderabad and Mysore States. This was sought to be achieved by development, either by selection or hybridisation of an early maturing type which was superior to Gadag 1, in respect of yield, staple length and ginning percentage, and, at the same time, more resistant to '*red-leaf*' blight. The work was done at Gadag, where conditions of soil, climate, rainfall, etc., were suitable for the cultivation of *hirsutum* cottons.

The history of the improvement of cotton in Bombay-Karnatak dates as far back as 1842 when the East India Company introduced, for the first time, the cultivation of Upland cottons known as Dharwar-American. The attempts made by the Department of Agriculture to improve this bulk Upland

cotton resulted in the isolation of a strain known as Gadag 1 which, however, proved to be late maturing and susceptible to *red-leaf* blight. The work under the scheme started with the hybrid material derived from the cross Gadag-1 x Co.2 (Madras Cambodia strain). As a result of selections made, a strain, subsequently named 'Laxmi' was found to be decidedly superior in all respects to Gadag-1. It was released for general cultivation in 1950. The popularity of Laxmi cotton was rather phenomenal for it not only proved suitable for the Gadag area, but its cultivation even extended beyond the frontier of the then Bombay State, in parts of Hyderabad comprising Raichur and Gulbarga districts and parts of the then composite Madras State—Bellary, Cuddapah and Kurnool districts.

With this extensive cultivation of Laxmi, there has been a gradual spread of the maladies, *viz.*, *blackarm* and *red-leaf* to which it was susceptible. It became increasingly evident that if American cotton cultivation were to be successful in this tract, which is purely rainfed and subject to erratic precipitation, it was essential that a strain of *hirsutum* cotton, superior in its degree of resistance to the two diseases coupled with other economic characters for which Laxmi has been reputed, was evolved.

With this object in view, a very large number of crosses had been effected with other long staple *hirsutum* types, reputed for their economic characters. Side by side with the creation of hybrid material, attempts were also made to study the suitability of the Indo-American types evolved at Surat. A search for other *hirsutum* types possessing the requisite qualities desired in the superior strain to replace Laxmi was made at the same time. This having proved futile, greater stress was laid on the testing of Indo-American strains for their behaviour in this tract and to the detailed study of the hybrid material created.

Further exploitation of the available breeding material and the synthesis of new material for the evolution of a strain superior to Laxmi cotton is being undertaken in a new scheme sanctioned by the Committee in 1956.

5. Scheme for improvement of Kumpta cotton at Bagalkot.— This scheme was sanctioned by the Committee at its meeting held in October, 1948 and put into operation with effect from the July, 1951. The object of the scheme is to build up a strain equal to Jayadhar in wilt resistance and ginning outturn and superior to it in earliness, yield and other requisite fibre qualities.

Out of a total of 15 strains tested during the year with Jayadhar as control, three, *viz.* 77-2, 15-3-6 and 28-2-2 were found to be promising. From a study of a large number of extra-state *herbaceum* and *arboreum* types

during the year, ten *herbaceum* types were found to be markedly superior to Jayadhar in all the economic characters. The *arboreum* types, though recorded superior ginning out-turn, proved to be inferior to Jayadhar in respect of other characters. Out of the 15 strains studied in the Strains Test, three, *viz.*, 77-7, 15-3-6, and 28-2-2 were found to be promising for more than one attribute when compared to Jayadhar. Of the promising strains tested in the Preliminary Strains Test, four were found to possess high yield combined with desirable fibre properties.

In agronomic trials conducted during the year, August sowings were found to record the maximum yields. In another experiment soaking of seeds in water prior to sowing was found to have no influence on yield.

6. Scheme for breeding of American cotton resistant to Blackarm disease.— This scheme was started at Dharwar in November, 1953. The object of the scheme is to breed *black-arm* resistant cottons mainly for Bombay-Karnatak, where *black-arm* is a very serious disease effecting American cottons.

During the year, 33 exotic varieties obtained from Sudan, U. S. A., Tanganyika, Ceylon, U.S.S.R. and Nayasland were tested in non-replicated plots against Laxmi cotton as control, but all of them proved to be highly susceptible to *black-arm* and yielded little produce. They had, therefore, to be discarded. In a Preliminary Yield Trial conducted with the three promising cultures, *viz.* XAB5, 170-Co.2-22 and 125-Co.2-18-2 with strain Laxmi as control, strain XAB5 recorded significantly better yield than the control, while all the three cultures registered high degree of resistance to *black-arm* combined with desirable halo length. Further confirmatory trials are to be laid out with these cultures.

Further, a total of 250 selections made from the interspecific bulks, *viz.*, 170-Co.2, 125-Co.2, 125-Co.2-18, 134 CW, 134-Co.2 CW and BC 134 CW-3-1-7 and also from other types like Jinja, XAB5, 2196-4 and Co.4-B.40 were tested along with Laxmi as control in non-replicated plots. The results have been very promising and it was found that while a majority of the cultures maintained their high resistance status, a good number of them also combined higher yield levels than Laxmi with all the desirable fibre characters as those of Laxmi. The four selections from 170-Co.2, 125-Co.2-18-2-4 and strain 2196 were found to be particularly promising.

In addition to these, a large number of hybrid progenies have been tested for their *black-arm* resistance and economic characters and promising material has been sifted for further trial.

7. Scheme for cultivation of Perennial cotton at Dharwar:—This scheme was approved by the Committee and came into operation at Dharwar in April, 1951. The scheme has for its object (i) the production of *intra-hirsutum* and *hirsutum-barbadense* hybrids suitable either for growing as such or by budding on perennial stocks (ii) the evolution of a pure breeding perennial type resistant to pests and diseases and (iii) the production of inter-Asiatic perennial hybrids possessing satisfactory fibre length and strength for hand-spinning purposes.

From the experience gained in the past, it was realised that perennial cottons could be grown in grass and waste lands, as also in backyards, in bungalow compounds, etc. and the produce utilised for extra-factory consumption.

Out of the ten F_1 's involving Asiatic parents studied during the year as first year ratoon, two, viz., G-6 x BC-1-2 and Gajjar white x BC-1-2 appeared to be promising. Among the F_1 's between exotic types, good yields were recorded by crosses involving Quebradinho, Moco, MCU2, 170-Co.2, XAB-5, 2196-BK, Y.S. 134 C.W. and 125-Co.2-18. A few F_1 's of crosses between Jayadhar and some *blackarm* resistant types were also studied during the year as 3rd year ratoons and it was found that the F_1 of cross between Jayadhar and 2196-BK recorded the highest yield.

Attempts were also made during the year for budding quality F_1 's on Perennial type 'Borker' and about 70% success was obtained.

PUNJAB

1. Scheme for improvement of cotton in South Eastern districts of Punjab:—This scheme which is an off-shoot of the Punjab Botanical Scheme was started at Hansi in March, 1945.

The original object of the scheme was to breed improved strains of *desi* and American cotton for Haryana tract, viz., (Hissar, Rohtak, Karnal and Gurgaon districts). Since partition, the emphasis was laid on the breeding of early maturing strains of Punjab American cotton which could be successfully grown under the peculiar agro-climatic conditions of the tract. This object was subsequently achieved to a large measure with the evolution of strains 216F and H.14 and hence the present objective is to evolve strains with longer and finer staple than strains 216F and H.14 i.e. with staple above 1". A secondary object of the scheme is the breeding of high yielding strains of *desi* cotton capable of spinning 15-20 counts.

During the year under report, all the strains tested in large scale trials recorded fibre length above 1 inch combined with higher ginning percentage

than the standard type 216F. In over-all performance, strains, 85F and A. C. 88 appeared to be the most promising, besides being earlier than others.

In the Preliminary Strains Trial, one strain, viz., A. C. 100 gave yield equal to 216F and H.14, while all the other strains proved superior to the control in respect of fibre-length and ginning percentage. Results obtained from Progeny Row Trials where a large number of re-selections from existing strains and hybrid derivatives were tested, indicated that a good number of them excelled strain H.14 in halo-length and ginning percentage combined with a fairly high level of yield.

Reselection with a view to isolating jassid-resistant type from the promising strain AC-53 has yielded four promising progenies which are proposed to be further tested in the coming season.

The work done under *desi* cottons indicated the superiority of the new hybrid strain D.C. 98 over M.60-A2 in lint length, ginning percentage and other technological characters but as it fell short in yield, further reselection is being done to improve this quality.

Of the other *desi* varieties tried during the year, strain D. C. 109 was found to be outstandingly superior to M.60-A2 in respect of yield, ginning percentage and fibre length. The strain recorded a yield of 1616 lbs. of *kapas* per acre against 1461 lbs. of M.60-A2 and possessed a spinning capacity of 23's H.S.C. compared to 6's of M.60-A2. Steps are under way to test this high yielding and high spinning strain extensively in the districts.

2. Scheme for breeding extra long staple cotton in Punjab.—The work of the scheme commenced at Abohar in April, 1948, with the object of breeding American varieties of cotton with a staple length of 1" and above, suitable for cultivation in the Punjab. As this object was realised in the evolution of strain LL.29 possessing a mean fibre length of 1.02", the object was modified to the evolution of strains with mean fibre length of 1½" and above.

The results of 17 successful trials conducted during the year on the cultivators' fields in Ferozepore district with the strains LL.43, LL.53 and LL.54 indicated, for the second year in succession, the superiority of the strain LL.54 in yield over the standard, strain 320F. It recorded, on an average, 27 lbs. of seed cotton more per acre over strain 320F. It is proposed to continue trials with these strains for one more year to collect more data on yield levels and to conduct mill tests.

Of the twenty long-linted strains tested in the Main Strains Trial, one strain, viz., LL.75 out-yielded the control 320F by a significant

margin of 247 lbs. of *kapas* per acre. All the strains were found to be superior to 320F in fibre length and fineness as also in ginning percentage. In maturity, 18 strains were found to be as early as or even earlier than 320F.

All the six long-linted strains tested in the Preliminary Strains Trial were found to possess fibre length over 1" compared to 0.86" of 320F. In yield and resistance to jassids, however, all the strains were found to be inferior to the control.

3. Scheme for breeding American cotton suitable for introduction in Central and Sub-montane districts of Punjab.— This scheme was put into operation at Jullundur in October, 1948, with the object of evolving American types of cotton capable of replacing the short staple *desi* variety at present grown in the sub-montane tract of East Punjab. As this object has been achieved by the evolution of a strain 320F, further work is directed towards the breeding of superior strains combining high yielding capacity, early maturity and adaptability of 320F with a staple over an inch, ginning over 35% and greater resistance to jassids than 320F.

The seasonal conditions during the year, particularly in the later stages, were unfavourable which, coupled with the heavy infestation of jassids, resulted in sub-normal yields and deterioration of the quality.

During the year under report, seventeen strains were tested, in the Main Trial, of which strain J.34 gave the highest yield in one set, thus registering its superiority over 320F for the fourth year in succession. In the second set, the performance of strain J.41 was found to be better than others in respect of yield, ginning percentage and mean fibre length.

Of the 27 bulked strains tested in the Preliminary Strains Trial, the promising strain J.34 excelled 320F in yield, while as many as 26 types were found superior to 320F in fibre length. A study of material in the Progeny Row Trials indicated that it would be possible to synthesise a strain possessing higher ginning percentage and halo length with good yield compared to strain 320F.

4. Scheme for cotton manurial trials in Punjab.— This scheme was put into operation on the 1st April, 1952, with the object of obtaining information on the exact manurial requirements of American cotton in relation to other controlling factors, e.g., sowing date, spacing and rotations, in different ecological regions of the cotton growing tracts of the Punjab.

During the year under report, eight sets of multi-factor experiments were conducted at all the three centres of trial. Response to nitrogen was

found to be much at Hansi while at Abohar and Jullundur it was comparatively less. The optimum doses calculated for the year 1956-57 were 100 lbs. at Hansi, 53 lbs. at Abohar and 36 lbs. at Jullundur.

The residual effect of ammonium sulphate applied to cotton crop was evident on the succeeding wheat crop and the effect was found to be at a higher level at Jullundur than at Hansi, thereby confirming the results of previous year. As regards the effect of sowings and spacings, the results obtained during the year confirmed the previous year's results, that early sowings and closer spacings were conducive to high yields. The optimum sowing time for American cotton was the month of April to 1st week of May at Hansi and Jullundur while at Abohar the month of May seemed to be beneficial. Similarly, 2' x 1' spacing gave the best results at Jullundur while at Abohar and Hansi 2' x 1' and 2' x 1½' were found to be at a par with each other. Application of nitrogenous fertilisers, in two doses i.e., half at thinning and half at flowering proved to be the best treatment in most cases. As regards the effect of rotational crops, cotton after leguminous crops was found to give higher yields than after wheat.

5. Scheme for the study of Agronomy of American cotton in Punjab. This scheme was put into operation on the 5th February, 1952, with the object of testing different American cotton varieties and also carrying out experiments on irrigation, with different dates of sowing and doses of manures.

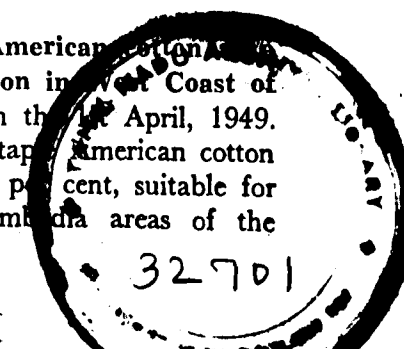
Trials undertaken during the year at Faridkot and Rauni farms indicated that in yield and resistance to jassids, the new strain 320F/35 proved to be superior to the existing strains 216F and H14.

As regards sowing and spacing experiments, the results obtained during the year confirmed the results of the previous years, that sowings done early in April with a spacing of 2½' x 1½' resulted in maximum yields. An increase in dosage of nitrogen caused a corresponding increase in yield, but this year the response was not significant due to the attack of jassids, pink boll-worm etc. Intercropping with *moth*, though caused reduction in yield of cotton, was found to be profitable on the whole.

MADRAS

1. Scheme for improvement of long staple American cotton in winter crop in Central districts and Sea-Island cotton in West Coast of Madras State.— This scheme was put into operation on the 1st April, 1949. The object of part 1 of the scheme is to evolve long staple American cotton possessing staple not less than 1-1/16" and ginning 38 per cent, suitable for cultivation in the early and late planted winter Cambodia areas of the Central districts.

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During the year under report, the new strain 9030 G. recorded, on an average, an extra yield of 224 lbs. of *kapas* or 79 lbs. of lint per acre more than control MCU 1 in trials conducted in Coimbatore and in Salem districts. In ginning percentage, it excelled MCU 1 by 1%. It was definitely finer and was adjudged to spin 40's as against 33's for MCU 1 and was estimated to yield a net gain of Rs. 40—119 per acre depending upon the yield level realised.

Arrangements are under way for further trials and multiplication of this promising strain.

The work on Sea-Island cotton on the West Coast of Madras since 1955 was directed towards achieving the modified objective of the scheme, viz., to select a higher yielding and better ginning type than Montserrat possessing optimum lint quality equivalent to Egyptian standards for ready use by the Indian mills.

From trials conducted during the year, "Andrews" appeared to be best in adaptability, vigour and productivity. It possessed a fibre length of 1.30" and was capable of spinning over 60's and its lint was valued at Rs. 2,700/- per candy.

In the experiment to ascertain the most suitable variety the optimum spacing and the best manurial schedule, there were indications that "Andrews" was the most adaptable type and that a manurial schedule comprising a basal and top dressing with 60 lb. N was necessary and that a spacing of $2\frac{1}{2}' \times 1'$ was the optimum.

As a result of reorganisation of States with effect from 1-11-'56, this work has been transferred to Kerala and Mysore States. The results obtained so far have been encouraging in that it has led to the initiation of an All India Scheme for the development of 'Andrews' variety in Kerala, Mysore and Assam States.

2. Scheme for production of long staple cotton in Madras State. This scheme started in November, 1946. The objects of the scheme are (a) the isolation of Upland strains longer than 1-1/16" staple and capable of maturing in 5½ months and (b) the evolution of *barbadense* varieties equivalent to the average Egyptian standards suitable for cultivation in the coastal belts of South Arcot districts.

In trials conducted during the year, four strains viz., L0315, L0509, L0299 and L0313 gave a bale and a quarter lint per acre. In ginning percentage strains L0509, L0299 and L0313 excelled the control MCU-2 by 2 to 4

percent. All these three selections which are the derivatives of MCU 2 x Kampala crosses possess mean fibre length superior to the control and they have the same fineness and strength. In spinning performance strains L0315 and L0313 were found suitable for 54's and 52's H.S.C. as against 43's of MCU-2. In addition, three selections in advanced trials viz., 0484, 0603 C and 3-6 were also found to be promising in yield and quality of lint.

3. Scheme for breeding unirrigated Cambodia cotton in Madras State.— This scheme started in September, 1950. The original object of the scheme was to evolve a hardy and productive type of Cambodia with a staple exceeding 15/16", capable of spinning 40's warp counts and suitable for cultivation as an unirrigated crop in the Central and Southern districts of the Madras State.

The new promising strain 9030-8-5 evolved under this scheme and tested on the cultivators' holdings for the second season in succession, was found to be on par with M.C.U. 1 in yield of *kapas*. This strain possessed higher ginning percentage and better fibre properties than M.C.U. 1. From the results of the mill test conducted on lint samples of this strain for the first time, it was observed that it had shown less loss percentage and slightly better lea test value than strain M.C.U. 1 for nominal 40's. The Mill valued this strain at Rs. 1,150/- per candy of 784 lbs. lint against Rs. 1,070/- for M.C.U. 1.

Promising results were also obtained in the Main Strains Trial where all the nine strains under study recorded lint yields higher than the objective of the Scheme (i.e. 130 lbs. per acre), ranging from 205 to 296 lbs. per acre. Six of these, viz., PK.924, 9030-G, 9030-D, PK.599, PK.863 and PK.860 recorded superior fibre properties and yielded stronger yarns than the control M.C.U. 1 for nominal 40's in micro-spinning tests. Among these, strain 9030-8-5 recorded the highest ginning percentage of 38 and gave a lint yield of 248 lbs. per acre.

Besides the above, a large number of cultures were under study in the earlier stages of breeding and promising material has been isolated.

4. Scheme for improvement of Tinnevely and Karunganni cottons in Madras State:— This scheme was started in 1949. The object of the scheme is to evolve a cosmopolitan strain of *arboreum* cotton suitable for cultivation in the Central and Southern districts of Madras State, with a staple length exceeding 15/16", possessing a ginning percentage of 34 or more, spinning capacity of 40's standard counts and yielding on an average about 150 lbs. lint per acre. The possibility of evolving Karunganni strain with a fibre

length of 1-1/32" and over and capable of spinning 40's H.S.C. is also to be investigated.

Trials conducted on the cultivators' holdings during the year, once again confirmed the superiority of the new strain 6186-9 over the existing strains K2 and K5. As compared to an yield of 263 lbs. of *kapas* recorded by the controls, strain 6186-9 gave an yield of 292 lbs. or 11% more per acre over the existing strains. Another strain, *viz.*, 8005-A recorded 10% increase in yield over the controls. Other promising material possessing superior fibre properties and better ginning percentage than the most promising strain, 6186-9 obtained in the scheme included five strains, *viz.*, 9581, 6383-I-A, 7152-E, 9430-B and 7405-C which recorded mean fibre lengths of 1-01" and 1-02" as against 1" recorded by strain 6186-9. Material indicating promise of fulfilling the redefined objectives of the scheme has also been isolated in the lower stages of breeding.

5. **Scheme for the evolution of an early variety of cotton suitable for cultivation as an off-seasonal crop in the rice fallows.**—This scheme was approved by the Committee in August, 1953, and commenced functioning from 1st April, 1954. The object of the scheme is the evolution of a short duration variety of American cotton suitable for cultivation as an off-seasonal crop in the rice fallows of Madras State.

The Punjab-American strain 216F continued to be the most suitable variety for cultivation in the rice fallows, recording the maximum yield of a bale of lint per acre in trials conducted during the year. The other two Punjab-American types, *viz.*, H.14 and P23F were notable for high bundle strength and ginning outturn, respectively. Among the new strains tested during the year, a few Punjab varieties, *viz.*, M41, LL53 and LL54 and some of the American types, *viz.*, DPL 14, DPL 15, and Coker were observed to be early and promising. The two long linted Punjab strains, *viz.*, LL53 and LL54 were also relatively more tolerant to jassids.

Agronomic trials conducted during the year indicated that a spacing of 1½' between rows with 2 plants per hole gave higher yields than the present practice of 2' spacing with one plant per hole. Among the manurial treatments tested, top-dressing with ammonium sulphate in the quantity of 451 lbs. nitrogen per acre was found to fetch the maximum yield.

ANDHRA

1. **Scheme for improvement of White Northern cotton in Andhra State.**—This scheme was started in 1949. The object of the scheme is to evolve a white linted *arboreum* type suitable to the Northern tract, possessing a longer staple, higher ginning percentage of over 30 with higher productivity

and capable of spinning upto 40's highest standard counts with fineness and strength equal to N.14.

During the year under report, three advanced cultures, *viz.*, 5975, 5001 and 122 were tried against the control N.14 on the cultivators' holdings in Northern tract. Although the culture 5975, gave numerically higher yield than N.14, the yield performance of all the cultures was below average and the differences between strains were statistically not significant. All the eleven promising strains tested against the control, N.14, in Strains Trial were found to be superior to N.14 in ginning percentage, but none of them registered any improvement in respect of yield. One culture, *viz.*, 516B alone proved to be superior to N.14 in lint length. However, more promising material was noticed to be available in the Preliminary Strains Trial where four families, *viz.*, 355-E-6-B, 516-B-4, 707-A and 907 recorded better values compared to N.14 in all the three economic attributes, *viz.*, yield, halo length and ginning outturn. Further, in the Progeny Row Tests, a good number of progenies had been observed to record numerically higher yields than strain N.14 combined with halo length and ginning outturn either equal to or better than N.14.

2. **Scheme for breeding Cambodia cotton at Nandyal in Andhra State.**—This scheme was started in 1945. This in fact forms a part of the original scheme for breeding Cambodia cotton at Siruguppa, the objects of which are to breed a long staple high yielding American type to be grown as a *rabi* crop under irrigation and American cotton suitable to be grown as a *rainfed* crop in dry area of Rayalaseema. While the work relating to the former aspect is being done at Siruguppa (Mysore State), that concerning the latter is located at Siruguppa, Hagari (Mysore State) and Nandyal (Andhra State).

During the season under review, the promising selection 327, was tested against Laxmi, M.A.2 and local cotton on the cultivators' holdings in the districts of Cuddapah, Kurnool and Anantapur. In five out of eight centres where the trials were successfully laid out, it recorded higher yields of seed cotton than Laxmi. In the Main Strains Trial, the yield differences between the strains tried were found to be insignificant and none of the strains recorded any improvement over the control in respect of other characters also. Material in the other breeding stages required further purification and selection.

3. **Scheme for evolution of white linted cotton for Coconada tract in Andhra State.**—This scheme was started in 1955. The object of the scheme is to evolve an early maturing medium stapled, high yielding white linted variety of cotton with a ginning outturn of 35% suitable for growing as a mixed crop with Sajja (*Bajra*), Korra (*Setaria italica*) groundnut or

chillies in the early season and as a pure crop in the late season for covering the entire area of Cocanadas tract including the "Chinnapathi" cotton tract of the Vishakhapatnam district and for replacing the Red Northern grown in the Kurnool district.

The prevalence of heavy rains in the months of October and November caused shedding of flowers in medium and long duration types in the July sown crop resulting in low yields. The early duration types however, withstood the heavy rainfall and gave normal yields. The August sown crop suffered from severe mildew attack in December and January resulting in defoliation and shedding of floral form. The harvests were consequently delayed but the yields were better than the July sown crop. The September sown crop was normal.

None of the nine varieties, viz., 197-3, Pratap, H.420, B.5, M.5.A., K.19, K.21, K.22 and K.32 tested in the Bulk Yield Trials in July, August and September sowings was uniformly good in all the three sowings. The lint outturn of most of the types was, however, better than both Chinnapathi and Cocanadas 2. In halo length also all the types were either equal to or better than Cocanadas 2 and Chinnapathi. A total of 97 medium stapled white linted types comprising of 53 Asiatic and 44 American cottons, obtained from Hyderabad, Rajasthan, Nagpur, Madhya Pradesh and Madras were studied in observation rows. It was found that while many of the *desi* cottons out-yielded both Cocanadas 2 and Anakapalli white in July sowings, in the August and September sowings none of them reached the yield level of Cocanadas 2. The yield of American cottons was generally poor in all the sowings though a few types in July and August sowings yielded on a par with Cocanadas 2. All the six types obtained from Adoni were found to be of medium duration. The yield performance of these varieties indicated that no variety was uniformly suited to all the three sowings. From the point of halo length, all the types were either equal to or better than Cocanadas 2. A similar performance was recorded by the seven promising selections obtained from Nandyal.

In the "Chinnapathi" improvement work, it was found, from the trials conducted during the season, that varieties Pratap, 197-3, H.420 and M.5.A. appeared to be promising from the point of adaptability and productivity. In the district trials conducted with the first two strains in the "Chinnapathi" tract, both the strains, recorded significantly better yield than Chinnapathi local.

RAJASTHAN

1. Scheme for improvement of cotton in Mewar. — This scheme commenced working on the 16th June, 1948, with the object of evolving a

strain of American cotton (*G. hirsutum*) superior to C. Indore-1 for growing under irrigated conditions and finding out an indigenous improved variety superior to local *desi* cotton for *barani* tract of Mewar.

The season under review started favourably, but receipt of continuous rains towards the end caused some shedding of flowers, buds and bolls depressing both the yield and quality of cotton. There was also incidence of jassid and pink bollworm, mostly in American cottons.

During the year, three American cotton strains viz., M. 48-4, M. 50-542 and M. 52-953 recorded significantly better yield than the control C. Indore-1 in the trials conducted at the Bhat Farm. From the past performance it would appear that the strain M. 48-4 is promising when compared to the existing strain C. Indore-1. In varietal trials conducted with nine promising American strains isolated in the scheme, using C. Indore-1 as control, four strains viz., M. 48-4, M. 52-953, M. 50-707 and M. 51-902 were found to possess a better combination of economic characters than the control though their yield level was on a par with the control.

In another trial conducted with four long linted strains from the Punjab, viz., LL. 43, LL.45, LL.53 and LL.54 against C. Indore-1, it was found that though all the strains were inferior to the control in yield, they were significantly superior to the control in ginning outturn, halo length and earliness.

All the strains tested in the Preliminary Strain Trials were found to be significantly better than C. Indore-1 in halo length though equal to it in yield. Hybrids obtained from Surat were found to be unsuitable to the tract owing to their late habit.

No work could be carried out on *desi* cotton during the year owing to receipt of heavy and continuous rains during the beginning of sowing season.

2. Scheme for improvement of cotton in Kotah-Bundi area in Rajasthan.— This scheme commenced working on the 15th June 1956 with the object of (a) breeding improved American varieties of cotton suitable for cultivation in Kotah/Bundi irrigated area and (b) studying the conditions for their successful growth.

The season under review was, on the whole unfavourable due to occurrence of incessant rainfall during July and August which caused delayed maturity besides shedding of flowers and bolls. Both the irrigated and unirrigated cottons were consequently poor.

From the results of a Varietal Trial conducted with four American cotton varieties viz., M.48-4, M.48-46, M.49-398 and M.49-435 with C. Indore-1 as control, it was found that the two strains viz., M.48-4 and M.49-435 recorded significantly better yields than the control. The differences between the four strains and the control in ginning outturn and halo length were not significant. Results of spinning test on these strains are awaited.

MADHYA PRADESH

1. Institute of Plant Industry, Indore. — This Institute which was established in 1924, is engaged in plant breeding work in respect of cotton and its rotational crops in Madhya Pradesh. In addition to evolving improved strains of the different crops, fundamental research work on the genetics of cotton is also in progress here.

Rainfall during the season under report, though deficit in total, was well distributed and the growth of crops was satisfactory.

Results of Varietal Trials conducted towards the evolution of a *desi* cotton strain for Malwa better than Bhoj in yield by 10%, spinning 24's and ginning 32% or over, showed that none of the new Malvi strains, 17 and 20, or the outstation strains of Maljari (Khargone), 197-3 (Khandesh) and G. 16-5 (Ujjain), exhibited significant differences in yield, though Maljari gave numerically the highest yield of 595 lbs. against 472 of the control. In ginning percentage, M. 17 and 20 were significantly lower than Bhoj, while in fibre length M. 17 was exactly equal to 197-3 and M.20 slightly higher than it. Therefore, no new variety, has yet been found possessing all the desired characters.

Trials towards the evolution of American cotton suitable for growing in the *adhan* lands of Malwa, indicated that the newer strains viz. 7, 8 and 9, derived from the cross, MU 8A x CO3, were significantly inferior in yield to the controls, Indore 2 and A. 51-9 from Khargone, though in lint length they were equal to the controls. In ginning percentage strain Ind. 8 was found to be significantly superior to Ind.2. It would therefore, appear that the Indore strains required further improvement in respect of productivity.

The Varietal Trial with material from interspecific crosses involving *thurberi* and *tomentosum* showed that though the promising strains yielded 10-18% higher than the control, Ind. 2, the differences were not significant. In lint length and ginning percentage, the new strains kept up their significant superiority over Ind. 2, and particularly, two strains registered a fibre length of over 1 inch. These strains, therefore, continue to hold promise of improvement over Ind. 2.

From entomological investigations, it was found that dusting of the crop with a mixture of DDT & BHC 5% each at 7 lbs. to 10 lbs. per acre, was effective against jassids. Two treatments with this mixture at 3 and 4 weeks' interval kept the pest under control. The cost per acre for each dusting was about Rs. 5/- to 6/-. In another trial, the three insecticides, DDT-BHC mixture, Endrin and Dieldrin were found to be effective against leaf rollers and semi-loopers. Out of the three Endrin (2.25% of 19.5 emulsion) was found to be the best. Significant increases in clean locks and yield were found to result from these treatments. In the case of *desi* cotton however, no good response to the treatments was obtained.

2. Scheme for improvement of Nimar cotton (Khargone). — This scheme was started in June, 1948. Its object is to evolve, (i) a strain of *desi* cotton that combines the yielding capacity of Maljari (D.48-154) with the ginning percentage of 197-3 (Virnar); and (ii) a strain of American cotton suitable for cultivation in the Nimar tract of Madhya Pradesh, superior to Buri 107 in yield, staple length and ginning percentage.

In the work towards the improvement of *desi* cottons, the available results from the District Varietal Trials conducted with the improved variety Maljari against 197-3 (Virnar) as control indicated that strain Maljari gave an average increased yield of 160 lbs. of *kapas* per acre over Virnar. In cash returns it was equivalent to Rs. 66/- more per acre over 197-3.

In the Strains Trial laid out with 22 promising selections, against Maljari and Virnar as controls, three strains viz., MJ-1 MJ-4 and K.55-565 were found to give significantly better yield than the controls. The strain K.55-565 also recorded significantly better ginning outturn than the better of the two controls in this character, viz., 197-3 and possessed the same halo length as the better control Maljari. Ten strains from this lot are proposed to be advanced to Varietal Trial during the next season.

As regards the work towards the improvement of American cottons, in the District Varietal Trials conducted with the two improved American varieties A.51-9 and A.51-10 with Buri 0394 as control, it was found that both the varieties out-yielded the control numerically but not significantly. Both the varieties, however, recorded significantly better ginning outturn than the control. It is proposed to study the performance of strain A.51-9 in the tract by trials on the cultivators' fields. Of the 6 strains tested in the Varietal Trials only 2 strains, viz., A. 51-9 and A. 51-10, were found to be promising in yield. Strain A.51-9 also recorded significantly better ginning percentage. This strain is proposed to be multiplied on account of its superiority over Buri 0394.

Apart from the above trials, 22 strains were tested against A.51-9 and B. 0394 as controls in two sets of strains tests. The results indicated that three strains viz., M.48-16, A.55-198 and 202 were promising in respect of yield. A few strains had also been found to record significantly better halo length and ginning outturn than Buri 0394.

3. Long Staple American cotton breeding scheme, Badnawar.—This scheme was sanctioned by the Committee at its meeting in July, 1952, and put into operation on the 9th December, 1954. The object of the scheme is to evolve a long staple American cotton possessing a mean fibre length of 1" and over capable of spinning 40's H.S.C. and above.

In the district trials conducted during the season on the cultivators' fields, all the four C.T.I. types tested viz., 1-4, 1-6, 4-19 and 4-21 proved to be better than the control, Indore-2, in yield, staple length and ginning outturn, C.T.I. 4-21 recording the highest staple length. It is proposed to repeat the trials on a larger scale with type C.T.I. 4-21.

In a Varietal Trial conducted with 13 types, derived from interspecific crosses, involving *arboreum* and *hirsutum* parents besides the wild types *thurberi* and *tomentosum*, it was found that the effect of the season on the types was very pronounced with the result that their performance during the year was not consistent with that of the previous year. Unlike the last season, many of the C.T.I. types recorded yields only equal to the control, Indore-2, while two of them were even significantly poorer compared to the control. In ginning percentage, however, all the interspecific hybrids except two were significantly superior to Indore-2 by 1.4 to 7.0%, the promising type C.T.I.-4 again being the highest as last year. On an average, there was a reduction of 2.1% in ginning percentage during the year compared to the last season. In fibre length, three *tomentosum* derivatives viz., C.T.I.—1-6, 4-2 and 4-25 recorded a staple of 1" and over which was the target set for the scheme.

The results of strain tests indicated that the C. T. I. types were more promising than all the *hirsutum* types and, it is therefore, proposed to concentrate breeding work on these types than on the pure *hirsutums*.

Promising material has been isolated in the other Preliminary Tests conducted with *hirsutum-barbadense* back-crosses, *thurberi* hybrid selections and American Asiatic cultivated selections.

In the work on breeding for jassid resistance, further reselections had been effected in the *thurberi* hybrids.

4. Scheme for surveying cotton areas in Malwa.—This scheme was sanctioned by the Committee at its meeting held in February, 1954, and put into operation on the 19th December, 1956. The object of the scheme is to select single plants from the cultivators' fields and bulk samples of seed cotton from ginneries from all over the Malwa region and to test them with a view to isolating a strain of *desi* cotton for Malwa better than Bhoj or Jarila in yield by 10%, spinning 24's and ginning 35% and over.

As the scheme commenced quite late in the season by which date cotton pickings were almost over in Malwa region, there was very limited scope for similar plant selections from the cultivators' fields. However, 27 single plants were selected from 7 villages in two tehsils of Indore district and 3 plants from Ratlam proper. Laboratory studies on these 30 plants revealed that 5 of them combined halo length of 23 mm. or above and a ginning percentage of 35 or over. These five plants together with another 5 plants which are high ginners (40% or over) and 2 plants having a halo length of 23 mm. or over, have been selected for further trials in the next season.

Besides the cultivators' fields, survey operations were extended to village cotton markets and cotton ginneries and in all 580 *kapas* samples were collected. Halo length measurements of these samples indicated that the cottons of the districts surveyed viz., Indore, Ujjain, Ratlam and Dewas had halo length ranging from 20 to 25 mm. and ginning percentage from 33 to 41. A total of 147 samples with a combination of halo length of 23 mm. or above and ginning outturn of 35% or over have been retained for further studies. Besides these, 44 samples have been selected for high ginning (40% or over) and 66 samples for good halo length (23 mm. or over).

A total of 142 bulk samples of cotton seed were also collected from the heaps of different ginneries. The samples mostly contained a mixture of all the types of cotton grown in this plateau. These were sorted out primarily into *desi* and American and further among the species depending upon the seed fuzz, seed size etc. All these seed samples are proposed to be sown for further selection.

The survey conducted during the year covered an area of nearly 8,222 square miles in 4 districts out of the 12 districts of Malwa region.

UTTAR PRADESH

1. Scheme for improvement of cotton in Western and Central districts of Uttar Pradesh.—This scheme was put into operation in April, 1951. The object of the scheme is to evolve by acclimatisation, hybridisation

and selection, superior long stapled cottons of *desi* and American varieties suitable for cultivation in Western and Central Uttar Pradesh. With regard to *desi* cottons, the target is a strain superior to 35/1 while in the American cottons the object is to isolate a strain superior to 216F.

In the work towards the improvement of *desi* cottons, out of the several strains of hybrid origin in advanced generations tested in the Main Strains Trial, strain 35/4 x Parbhani G.703 was found to record numerically higher yield than the control, 35/1. In spinning capacity, however, it recorded the same value of 12's H.S.C. as 35/1. Another strain, *viz.*, 51/50 registered a spinning capacity of 19's H.S.C. but in respect of yield, it was significantly poorer than the control. In another set of trials conducted with strains derived from crosses involving types like Jarila, Bani and Gaorani as parents, four strains, *viz.*, 35/1 x Jarila, Bani x C.520, C.520 x G.125 x C.520, C.520 x GLB-5 x C.520 recorded the same yield level as 35/1 but possessed superior quality. Strain Bani x C.520 was found to be better in yarn strength than the standard control, *viz.*, 35/1.

As for American cottons, the Punjab American cotton strain 216F was recommended for general cultivation in the districts of Bulandshahr, Aligarh, Mathura, Agra and Etah. In the district trials conducted with the three strains 216F, H.14 and M4 on the cultivators' fields in the main cotton growing districts of the region, strain 216F and H.14 recorded the same level of yields at Aligarh and Mathura, while no significant differences in yield were noticed between the three strains at Bulandshahr and Etah. The results obtained from the tests conducted on Government farms at Aligarh, Etah, Bulandshahr, Raya and Kalyanpur with strains 216F, H.14, LL.29 and M4 during the year indicated that strains H.14 and 216F were on a par in yield. In another trial conducted with seven extra-State types using 216F as control, none was found to give better yield than 216F.

In the time of sowing trial, the April sown crop was found to give significantly higher yield than the May sown crop both at Bulandshahr and Raya, besides recording superior ginning outturn.

2. Scheme for improvement of cotton in Rohilkhand Tarai area in Uttar Pradesh—This scheme was started in April, 1951. The objects of the scheme are (i) to evolve *desi* varieties suitable for growing under *barani* conditions in the sub-montane districts of Uttar Pradesh and (ii) to evolve hardy American types which can be grown under irrigation in restricted localities as a rotation crop with sugarcane.

The seasonal conditions during the year were unfavourable owing to heavy precipitation during the months of July and August and again at the

picking period in October accompanied by stormy weather which caused heavy shedding of flower buds and mature bolls. The quality of lint was also spoiled and the viability of the seeds impaired as the *kapas* on plants got soaked in water.

The experimental work under the scheme was carried out at Meerut, Naina and Hampur (Nainital). The study of the hybrid material in advanced stages of purification revealed that the strains derived from 35/4 x Parb. G.703 and C.520 x C.402 were numerically superior in respect of yield to the control 35/1, at Nagina and Meerut respectively. At the other two farms, namely, Muzaffarnagar and Kiserwa, where similar experiments were conducted, 35/1 out-yielded the others. The above two strains were found to be promising in respect of spinning value also having been adjudged suitable for spinning 21's and 20's against 16's of the control. It was further noted that derivatives from crosses involving 197-3 proved to be superior in yield and quality to the standard strain 35/1.

The results of the exploratory trial with early and late maturing American types conducted at Hampur indicated that varieties like L.S.S., C/Am-4 and 320F were suitable for cultivation in the *tarai* areas. Demonstration experiments were also conducted on the cultivators' fields in the districts of Muzaffarnagar, Meerut, Saharanpur and Moradabad. Strain 35/1 out-yielded the local mixture in all the four districts.

ASSAM

Scheme for improvement of Hill cotton in Assam.—This scheme was approved by the Committee at its meeting held in January, 1944, and put into operation in February 1947. The object of the scheme is to evolve high yielding strains of coarse short staple cotton with high ginning percentage and to explore the possibilities of increasing the yield per unit area by adopting such cultural practices, suitable to the conditions prevailing in the hilly regions of Assam.

The seasonal conditions during the year were not quite favourable due to the receipt of heavy rains at the time of germination and picking which caused considerable damage to the crop.

In the varietal trials conducted with six promising strains, *viz.*, MKR 168-1-49, D.46-2-1, G.135-49, CH.109, G.84-1 and G.27-51, against the local bulk as control the yield differences were found to be insignificant. However, strain D.46-2-1 recorded the highest ginning outturn of 47.5% compared to 45.7% of the local bulk.

In the combined spacing and seed rate trials, no significant difference in yield was observed either due to the three spacings of 9", 12" and 15" both ways or the three seed-rates of one seed, two seeds, and three seeds per hole. In mixed cropping trials, mixtures of cotton with groundnut and sunnhemp, gave same levels of yield. Cotton when sown alone produced higher yields, as expected. The economics of the pure and mixed crop, however, remained to be worked out.

ORISSA

Scheme for research on cotton in Orissa.—This scheme was approved by the Committee at its meeting held in March, 1952 and put into operation on the 20th September, 1954. Subsequently, the Committee at its meeting held in September, 1956, approved of a new scheme for research on cotton with revised objectives and the original scheme was replaced by this scheme from the 1st April, 1957.

"The object of this new scheme, the venue of which is the main station (Chakuli), is to develop strains of American cotton with a mean fibre length of 1" and capable of spinning 40's H.S.C."

"The object of the work at the sub-station (Arkabahali) is to develop strains with 13/16" staple and a ginning outturn of 33%."

Trials conducted during the *Rabi* season (1955-56) indicated that the variety Laxmi recorded the highest yield followed by M.C.U. 1 and Karunganni 2. In the varietal trials conducted during the *Khari* season of 1956-57 the variety M.C.U. 1 gave the highest yield followed by Buri 0394 and L.S.S. in the irrigated series while varieties P216F, Buri 0394 and Laxmi proved to be the best suited to unirrigated conditions.

ALL-INDIA

Scheme for the development and improvement of Sea-Island cotton in different States of India—This scheme was approved by the Committee at its meeting held in March 1957 and put into operation on 1st April, 1957. The objects of the scheme are as follows:—

(1) To cultivate the promising Sea-Island variety "Andrews" in the three States of Kerala, Mysore and Assam, over a total area of 3 lakh acres, to produce about 2.25 lakh bales of cotton and thereby reduce the import of long staple cotton of 1.3/16" and above by that quantity.

(2) To survey areas suitable for cultivation of Sea-Island cotton in the three States.

(3) To improve the fibre strength and ginning percentage of "Andrews" by selection and make the cotton more remunerative and suitable for spinning 80's counts. This work is being done at Pattambi.

(4) To conduct agronomic research to improve the yield and quality of "Andrews" in all the three States.

(5) To arrange for ginning and marketing the produce in all the three States.

As will be seen from the objectives enunciated above, this scheme envisages the production of cotton of extra long staple category of 1.3/16" and represents the first attempt made towards the production of extra long staple cotton on a commercial scale in the country itself. The work undertaken during the year mainly consisted of raising primary centres for the production of pure seeds for distribution during the next year. A total area of about 135 acres of "Andrews" cotton were raised under primary centres, in the States of Kerala, Mysore and Assam and it is expected that the seeds produced in this area would be sufficient to raise about 5000 acres under this cotton during the coming year.

CHAPTER IV

EXTENSION WORK IN THE STATES

It is admitted that while research forms the foundation for progress in agriculture, the seed constitutes the most important means of conveying the results of research to the cultivators. The need for putting the results of research across to the farmers has been emphasised from time to time by several experts both in the country and abroad. The Committee realising that the success of work would depend upon the availability of the pure seed of improved varieties evolved by the cotton breeders, formulated a policy of financing schemes intended for multiplication and distribution of seed of improved varieties of cotton in the different cotton growing tracts, after being thoroughly tested and declared superior to the existing types. In fact, the work concerning the evolution of improved cotton strains and seed multiplication and distribution of the approved varieties has gone on hand in hand, since 1929. It is this policy of the Committee that has brought about the change in the quality of the Indian cotton. This work has been greatly intensified in recent years. The total expenditure incurred by the Committee so far on such schemes amounted to rupees 38.35 lakhs. The present annual expenditure on this account is of the order of rupees 4.63 lakhs.

During the period under review, there were 23 seed distribution and extension schemes in operation in the various cotton growing States. Out of the total area of 118,39,288 acres proposed to be covered ultimately by improved varieties of cotton in different cotton tracts, an area of 73,73,938 acres has been covered during the year 1956-57 i.e. 62.3% of the cotton area has been covered with improved varieties of cotton and 37.7% of area still remains to be covered. The additional income to the growers of improved varieties of cotton during 1956-57 is estimated at Rs. 18.5 crores. A brief report on the working of these schemes is given below:—

BOMBAY

(i) Scheme for multiplication and distribution of Pratap cotton seed in Saurashtra:—This scheme was sanctioned by the Committee in March, 1952, and it came into operation on the 1st April, 1953. The object of the scheme is to replace the Mathio variety entirely by Pratap cotton over an area of 2,00,000 acres by the end of 1960-61 in Saurashtra region.

The summary of the progress made under this scheme is given below:—

Year	Quantity of seed distributed (B. Mds.)		Estimate of area covered (acres)			Estimated additional income	
	Deptl.	Non-Deptl.	Deptl.	Non-Deptl.	Total	Per acre Rs.	Total Rs.
1953-54	2½	690	21.0	4,140	4,161	9.00	37,449.00
1954-55	24	1,250	231.0	7,500	7,731	9.00	69,579.00
1955-56	753¼	1,800	3,000.0	5,000	8,000	5.00	40,000.00
1956-57	500	2,810	12,911.0	2,000	14,911	7.50	104,832.50

The produce of the cultivators was pooled through the system of authorised licencees of the Department, who performed all the subsequent operations like ginning, pressing, stocking of seed and final distribution of seed to cultivators for seed purposes under the close supervision of the Departmental staff.

During the year under review 1965 certified bales of Pratap Cotton were marketed.

Prices of certified Pratap Cotton (*kapas*) were about Rs. 2.50 per B. Md. more, over local Mathio *kapas* on an average.

The cotton acreage in the tract (districtwise) in 1956-57 is given below:—

Sr. No.	District	Improved Pratap strain (acres)	Local Mathio (acres)	Total (acres)	Area proposed to be ultimately covered by the improved strain Pratap (acres)
1.	Madhya Saurashtra	—	20,000	20,000	20,000
2.	Gohilwad	15,000	147,202	162,202	162,202
3.	Sorath	—	55,000	55,000	55,000
4.	Zalawad	—	10,000	10,000	10,000
5.	Halar	—	—	—	—
	Total	15,000	232,202	247,202	247,202

(ii) Scheme for multiplication and distribution of Kalyan cotton seed in Saurashtra Region:—This scheme was sanctioned by the Committee in July, 1954, to operate with effect from the 1st April, 1954.

The object of the scheme is to cover the entire area of 9 lakh acres in Wagad tract of Saurashtra by Kalyan cotton by the end of the Second Five Year Plan (1960-61) period.

The summary of progress made under the scheme, since its inception, is given below:—

Year	Quantity of seed distributed under the scheme (B. Mds.)		Estimate of area covered (acres)			Estimated additional income Rs.	
	Deptl.	Non-Deptl.	Deptl.	Non-Deptl.	Total	Per acre	Total
1954-55	3,500	3,000	35,000	31,500	66,500	15	997,500
1955-56	8,212	5,000	55,000	35,000	90,000	10/8	915,000
1956-57	17,036	6,000	97,471	23,000	120,000 (approx.)	10/3	1,260,000

The produce of the cultivators was sold through the system of authorised licencees of the department, who performed all the subsequent operations like shelling of *Kalas* till final distribution of seed to cultivators under supervision of departmental staff.

The total quantity of improved cotton marketed in full pressed bales of lint during the season was as follows:—

(1) Certified bales	12,000
(2) Uncertified bales	12,000
Total	24,000

During the season the price of certified *Kalas* of Kalyan cotton was about Rs. 3/- more per B.Md., over that of local Wagad cotton.

The cotton acreage in the tract during 1956-57 was as shown below:—

Sr. No.	District	Improved Kalyan's rain (acres)	Local Wagad (acres)	Total (acres)
1.	Madhya Saurashtra	3,000	146,337	149,337
2.	Gohilwad	471	—	471
3.	Sorath	13,000	108,245	121,245
4.	Zalawad	104,000	470,035	574,035
5.	Halar	—	48,590	48,590
	Total	120,471	773,207	893,678

(iii) Scheme for multiplication and distribution of superior long staple cottons in Saurashtra Region. — This scheme was sanctioned by the Committee in February, 1956, and came into operation on the 1st August, 1956.

The object of the scheme is to cover an area of about 1,02,841 acres with the superior long staple (170-Co.2) Indo-American cotton in former Saurashtra with a view to producing superior cotton of about 50,000 bales.

The summary of progress made in the scheme, since its inception, is given below:—

Year	Quantity of seed distributed under the scheme (B. Mds.)		Estimate of area covered (acres)			Estimated additional income Rs.	
	Deptl.	Non-Deptl.	Deptl.	Non-Deptl.	Total	Per acre	Total
1956-57	9,127	1,500	49,120	10,000	59,120	65	3,842,800

The produce of the cultivators was sold through the system of authorised licencees of the department, who performed all the subsequent operations like ginning, pressing and final stocking and distribution of seeds to cultivators under the supervision of the departmental staff. A total quantity of 35,000 certified (labelled) bales of improved cotton was marketed in full during the year.

Price of *Deviraj Kapas* was on an average Rs. 8/- (eight) more per B. Md. over the *Deshi* improved variety like Kalyan cotton.

The cotton acreage under *Deviraj* in the tract (districtwise) during 1956-57 was as follows:—

Sr. No.	District	Area under improved variety (<i>Deviraj</i> cotton)
1.	Madhya Saurashtra	15,663
2.	Gohilwad	2,327
3.	Zalawad	15,965
4.	Sorath	23,755
5.	Halar	1,410
	Total	59,120

(iv) Scheme for multiplication and distribution of 197-3 cotton seed in Khandesh tract of Bombay State:—This scheme was sanctioned by the Committee in September, 1950, for a period of five years with the object

of replacing Jarila cotton by 197-3 (Virnar) in the Khandesh tract, over an area of 7.5 lakh acres. The work under this scheme commenced in March, 1951. The scheme was launched on a self-supporting basis from the 1st March 1954. The entire cost of the scheme during 1956-57 was borne by the cotton growers and the scheme continued during 1957-58 also on the same basis.

A summary of the progress made under the scheme since its inception is given below:—

Year	Quantity of seed distributed under Scheme (Mds.)	Estimate of area covered			Estimated additional income	
		Departmental seed (acres)	Non-Deptl. seed (acres)	Total (acres)	Per acre Rs.	Total Rs.
1951-52	11,371	52,214	—	52,214	84-7-3	4,578,141
1952-53	69,638	2,80,000	170,000	450,000	41-0-0	18,450,000
1953-54	78,200	368,051	311,149	679,200	50-0-0	33,960,000
1954-55	54,415	2,264,184	490,454	754,638	20-0-0	15,092,760
1955-56	59,484	295,733	661,260	956,993	20-0-0	19,139,860
1956-57	51,794	313,319	546,398	859,717	50-0-0	42,985,850

The Cotton Sale Societies and groups of cultivators pooled the produce most of which was sold after ginning in the form of loose lint or pressed bales. Majority of the growers sold the *kapas* in regulated markets wherever they existed. At other places *kapas* was purchased by merchants or their agents in the villages who sold it after ginning in the form of pressed bales. The estimated production of Virnar cotton of the Tract was to the tune of 2,32,700 bales out of which nearly 24,000 bales had been consumed by the local mills without full pressing. The certified Virnar fetched on an average Rs. 20/- more per bale than the uncertified Virnar.

The cotton acreage (districtwise) during 1956-57 season in the tract was as shown below:—

Name of the District	Improved strains		Local (Acres)	Total (Acres)
	(a) Virnar (Acres)	(b) Long staple cotton (170-Co2) (Acres)		
East Khandesh	592,275	1,800	—	5,94,075
West Khandesh (excluding Nawapur and Akkalkuwa)	230,209	1,791	—	2,32,000
Nasik	37,233	3,408	—	40,641
	8,59,717	6,999	—	8,66,716

(v) Scheme for multiplication and distribution of 2087 cotton seed in Surat tract of Bombay State.— This scheme was put into operation in August, 1953 with the object of covering an area of about five lakh acres with the seed of the new strain 2087 in the Surat cotton tract, south of the river Narmada including Nawapur and Akkalkuwa talukas of West Khandesh district of Bombay State. The scheme has been taken up on a progressive self-supporting basis with effect from the 1st March, 1954. During the year 1956-57, the entire expenditure on the scheme was borne by the cotton growers of the tract.

The summary of the progress made under the scheme since its inception is given below:—

Year	Quantity of seed distributed under Scheme (B. Mds.)	Estimated area covered in acres			Estimated additional income	
		Deptl.	Non-departmental	Total	Per acre Rs.	Total Rs.
1953-54	11,182	99,315	—	99,315	30	27,99,450
1954-55	56,991	1,08,603	2,64,910	3,73,513	25	9,337,825
1955-56	60,055	3,81,043	1,06,877	4,87,920	15	7,318,800
1956-57	1,079,57-20	6,88,820	—	6,88,820	15	10,332,300

The seed cotton from the controlled area (upto 3rd stage) was pooled and ginned stagewise at ginning factories under departmental supervision.

Out of 1,34,344 F.P. bales of 2087 cotton (392 lbs. each) agmarked during 1956-57 season, 1,25,000 bales had been sold at an average premium of Rs. 40/- per candy in case of Black lables (representing 97% and above purity) and Rs. 50/- in case of Red lables (representing 98% and above purity) over the local.

The cotton acreage (districtwise) during 1956-57 season in the Surat tract is shown below:—

District	Improved strain 2087 (Acres)	Natural spread (Acres)	Local (non descript)	Total (Acres)
Surat	4,04,385	615	...	4,05,000
Broach*	2,40,292	9,708	...	250,000
West-Khandesh†	44,143	857	...	45,000
	6,88,820	11,180	...	7,00,000

* Lying south of river Narmada.

† Nawapur and Akkalkuwa talukas.

(vi) **Scheme for multiplication and distribution of Vijay cotton seed in Middle Gujarat.**—This scheme commenced working in December, 1943 with the object of replacing local Broach and B.D.8 cottons by "Vijay" cotton in the Narmada-Mahi and the Mahi-Sabarmati zones of Middle Gujarat. The scheme has been taken up on a progressive self-supporting basis with effect from the 1st March, 1955.

The summary of the progress made under the scheme since its inception, is given below :—

Year	Quantity of seed distributed under the scheme (B. Mds.)	Estimate of area covered (acres)			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1943-44 ...	16,605	1,10,098	...	1,10,098	Almost the entire area has been covered by Vijay, hence no estimates regarding additional income per acre can be given.	
1944-45 ...	9,182	47,450	41,000	89,450		
1945-46 ...	8,902	55,227	64,700	1,19,927		
1946-47 ...	18,667	78,727	10,623	1,84,750		
1947-48 ...	12,604	75,565	1,35,035	2,10,600		
1948-49 ...	19,854	1,04,350	1,10,216	2,14,566		
1949-50 ...	13,766	1,10,128	2,54,117	3,64,245		
1950-51 ...	24,948	1,99,584	2,14,416	4,14,000		
1951-52 ...	31,410	2,51,280	2,31,373	4,82,653		
1952-53 ...	20,803	1,66,424	2,96,576	4,63,000		
1953-54 ...	33,047	3,30,470	1,38,718	4,69,188		
1954-55 ...	17,100	1,71,000	8,07,343	9,78,343		
1955-56 ...	31,255	3,12,550	5,48,822	8,61,372		
1956-57 ...	24,338	1,77,565	...	1,77,565		

Switching over from Vijay to Dig-Vijay.

1955-56 ...	5,263	52,630	...	52,630	Estimated Additional Income of Rs. 4,67,100 @ Rs. 8-14-0 per acre. Estimated Additional Income of Rs. 9,06,000 to growers of Reserved and General area of about 3,00,000 acres (wherein Agmarking and certification was carried out by the Department) @ Rs. 3.43 per acre.
1956-57 ...	78,541	7,84,470	...	7,84,470	

The marketing of cotton was done through the agencies of the Agricultural Produce Market Committees, the Cotton Sale Societies and Groups,

and the middlemen and brokers. There were 16 Agricultural Produce Market Committees, 42 Co-operative Cotton Sale Societies and 25 Co-operative Cotton Sale Groups, working in the Vijay cotton zone of Middle Gujarat.

Out of the estimated production of about 3 to 3.25 lakh bales of cotton during 1956-57 in the tract, the number of Agmark and certified bales of Vijay and Dig-Vijay cotton were as shown below:—

Variety	Agmarked bales	Certified bales
Vijay	2,200	...
Dig Vijay	85,000	20,000

On account of unfavourable seasonal conditions the cotton production in Middle Gujarat was less by about 47% as compared to that of the previous year.

The cultivators obtained a premium varying from Rs. 8/- to Rs. 12/- per Bhar (12 B. mds. = 960 Lbs.) of certified Dig-Vijay cotton from the traders. The Agmark F.P. bales of Dig-Vijay fetched a premium of Rs. 8/- to Rs. 14/- per candy.

The cotton acreage (districtwise) in the tract during 1956-57 was as shown below:—

Sr. No.	District	Improved strains (Vijay, Dig-Vijay & Indo-American types) Acres	Other varieties Acres	Total Acres
1.	Broach (Part)	2,10,000	...	2,10,000
2.	Baroda	5,52,763	...	5,52,763
3.	Kaira	1,06,036	6,000	1,12,036
4.	Panchmahals	80,041	...	80,041
5.	Sabarkantha	1,94,274	...	1,94,274
6.	Ahmedabad (Part)	14,000	...	14,000
		11,60,114	6,000	11,66,114

(vii) **Scheme for multiplication and distribution of Kalyan cotton seed in Wagad tract of Bombay State:**—These schemes for multiplication and distribution of Kalyan (K.72-2) cotton in Ahmedabad district for five years and Mehsana district for three years and eight months were sanctioned by the

Committee in February, 1947, and March, 1948, respectively. During the year 1951-52, these were amalgamated into one scheme, which had for its object the multiplication and distribution of pure seed of Kalyan cotton in the Wagad tract of Ahmedabad and Mehsana districts of North Gujarat. The scheme is being operated on a self-supporting basis with effect from the 1st April, 1954.

The Summary of the progress made under the scheme since its inception, is given below.

Year	Quantity of seed distributed under the Scheme B. Mds.	Estimate of area covered (Acres)			Estimated additional income	
		Departmental seed	Non-departmental seed (natural)	Total	Per acre Rs.	Total Rs.
1947-48	452	1,914	...	1,914	8-12-0	16,747/-
1948-49	4,169	12,083	...	12,083	8-13-0	1,08,481/-
1949-50	9,441	35,400	...	35,400	13-0-0	4,60,200/-
1950-51	25,445	84,945	15,000 approx.	99,945 approx.	19-4-0	19,23,941/-
1951-52	73,003	2,30,935	50,000 approx.	2,80,935 approx.	15-0-0	42,14,025/-
1952-53	51,389	2,70,664	45,000 approx.	3,15,664 approx.	25-0-0	78,91,600/-
1953-54	1,07,245	85,275 Reserved Area	3,55,400 General Area approx.	4,40,675 approx.	24-0-0	1,05,76,200/-
1954-55	23,832 Reserved Area	1,19,900 Reserved Area	5,30,100 General Area approx.	6,50,000 approx.	15-0-0	99,10,770/-
1955-56	27,990 Reserved Area	1,25,998 Reserved Area	4,24,002 General Area approx.	5,50,000 approx.	14-0-0	78,37,770/-
1956-57	29,006 Reserved Area	1,14,895 Reserved Area	4,10,105 General Area approx.	5,25,000 approx.	17-8-0	92,97,500/-

The produce of the Reserved Area of 1,14,895 acres, which had been organised round about major ginning centres of the tract, was pooled and processed till final production of seed and Agmark certified bales through the system of authorised licencees under the close supervision of the departmental staff. The authorised licencees were also assisted in the marketing of their agmarked bales of Kalyan cotton, which were purchased by the textile mills.

During the 1956-57 cotton season, about 22,000 agmarked bales of Kalyan cotton were produced from the Reserved Area out of the total esti-

mated production of about 1,70,000 bales of Kalyan cotton in North Gujarat.

The Agmarked bales of Kalyan cotton from the Reserved Area fetched a premium of Rs. 10/- per Candy of lint over those of the General Area.

The cotton acreage in the tract during 1956-57, was as shown below:—

Sr. No.	District	Improved Strain of Kalyan Cotton Acres (Approx.)	Local		Total (Acres) approx
			Vijay Cotton (Acres) (approx)	Mathio Cotton (Acres) (approx)	
1.	Ahmedabad	3,33,000	15,000	30,000	3,78,000
2.	Mehsana	1,92,000	...	...	1,92,000
North-Gujarat:-		5,25,000	15,000	30,000	5,70,000

(viii) Scheme for distribution and marketing of H.420 in Bombay State:—This scheme was sanctioned by the Committee in October, 1949, and came into operation in September 1951. The object of the scheme is to produce pure seed and multiply it by stages for distribution to cultivators, so that H.420 cotton grown in Vidarbha in general would be of a high standard of purity.

The Summary of the progress made under the scheme since its inception, is as follows.

S. No.	Year	Quantity of Cotton Seed distributed in Mds.	Estimate of area in acres			Estimated additional income per acre Rs.	Total Rs.
			Departmental	Natural	Total		
1.	1951-52	77,838	4,11,197	1,37,369	5,48,566	10-0-0	54,85,660
2.	1952-53	85,883	4,48,141	5,18,411	9,66,552	15-6-0	148,50,737
3.	1953-54	83,430	4,30,000	6,00,000	10,30,000	5-8-0	56,65,000
4.	1954-55	84,708	4,74,632	7,29,368	21,04,000	7-6-0	77,29,000
5.	1955-56	66,340	3,74,833	3,53,228	7,28,061	3-12-0	24,91,691
6.	1956-57	54,038	3,08,676	2,80,487	5,89,163	8-4-0	41,85,283

Cotton Pool work was managed by the Vidarbha Marketing Society with the help of the local agricultural associations. During the year only fifteen centres could pool the cotton. In all 1240 *khandies* of H.420 from rogued area equivalent to about 826 bales were pooled at the above centres, in the districts of Amravati, Akola, Yeotmal, Nagpur and Wardha under auction and premium sale system.

Comparative prices obtained by improved and local varieties, were as shown below:—

District	Average price per Kh. of <i>kapas</i>		Premium obtained over local Rs.
	H-420 Rs.	Local Rs.	
Amravati	277	281	4
Akola	271	263	8
Yeotmal	266	260	6
Total	271	268	3

Cotton acreage (districtwise) during 1956-57 is shown below:—

District	Area in acres under H-420	Area in acres under other varieties including local		Total
		American	<i>Deshi</i>	
Amravati	1,29,073	2,49,949	4,14,054	7,93,076
Akola	1,54,879	8,901	5,12,157	6,75,937
Yeotmal	1,65,634	1,51,469	3,41,467	6,61,570
Nimar	57,721	...	...	57,721
Total	5,07,307	4,10,319	12,70,678	21,88,304
Nagpur	8,851	14,887	1,74,922	1,98,660
Wardha	35,519	8,499	3,26,323	3,70,341

(ix) Scheme for distribution and marketing of Buri 0394 cotton in Vidarbha:—This scheme was sanctioned by the Committee in September, 1950. The object of the scheme is to cover an area of 2,19,000 acres with Buri 0394 cotton in Vidarbha tract, and was put into operation on the 1st April, 1953.

The Summary of the progress made under the scheme, is as follows:—

Year	Quantity of seed distributed in B. Mds.	Estimated area covered in acres			Estimated additional income	
		Deptl.	Natural	Total	Per acre Rs.	Total Rs.
1953-54	18,266	1,10,000	50,000	1,60,000	41-0-0	65,60,000
1954-55	18,411	1,26,000	65,000	1,91,000	16-12-6	32,05,209
1955-56	14,662	1,06,940	85,030	1,91,970	19-4-6	37,01,421
1956-57	27,528	1,70,868	78,307	2,49,175	15-15-0	39,71,226

The cotton pool work had been entrusted to the Vidarbha Marketing Society and its sub-agents. Pooling of Buri 0394 cotton was conducted at 15 centres under auction and premium sale system.

1375 Khandies of *kapas* from rogued area, equivalent to 916 bales, were marketed through cotton pool centres during the year.

Comparative prices obtained by the improved and local varieties of cotton during the season are shown below:—

District	Average price per khandi of <i>kapas</i>		Premium obtained over local in Rs.
	Buri 0394 Rs.	Local Rs.	
Amravati	305	281	24
Nagpur	292	287	5
Yeotmal	288	260	28
Total	295	276	19

The total cotton acreage (districtwise) in the tract in 1956-57, is given below:—

District	Area in acres under Buri 0394	Area under other American varieties (Acres)	Total (Acres)	Area under other varieties (Acres)	Total (Acres)
Amravati	1,38,346	1,11,603	2,49,949	5,43,127	7,93,076
Akola	5,459	3,442	8,901	6,67,036	6,75,937
Yeotmal	64,873	86,596	1,51,469	5,10,101	6,61,570
Nimar	24,610	—	...	...	24,610
Nagpur	7,388	7,499	14,887	1,83,773	1,98,660
Wardha	8,499	—	8,499	3,61,842	3,70,341
Total	2,49,175	2,09,140	4,33,705	22,90,489	27,24,194

(x) Scheme for seed distribution and marketing of improved variety of cotton No. 91 in Nagpur-Wardha tract:—This scheme was sanctioned by the Committee in February, 1954, with the object of producing pure seed of the improved variety No. 91 and multiplying it by stages for distribution to cultivators in compact blocks to cover an area of about 53,300 acres in the Nagpur and Wardha districts of Madhya Pradesh. The scheme was put into operation on the 19th February, 1955.

The stagewise area covered by No. 91 cotton during 1956-57 is shown below :—

S. No.	Particulars	Area covered in acres (Stages)				Total
		III	IV	V	VI	
1.	Target for the year	300	3,000	22,000	28,000	53,300
2.	Actual position	548	80	160	1,500	2,288
3.	Actual position in previous year 1955-56.	530	740	—	10	1,280

Due to limited supply of seed, the targets for acreage under stages IV, V and VI could not be fulfilled.

Facilities for pooling areas of the variety were offered at all the pooling centres in Nagpur and Wardha districts. *Kapas* of the variety was pooled only at 3 centres—i.e. Nagpur, Katol and Arvi to the extent of 45 *khandies* equivalent to 30 bales. The pooling was conducted in coordination with the Vidarbha Marketing Society and its sub-agents.

The cotton acreage in the tract (districtwise) in 1956-57 is shown below:—

Name of District	Area in acres under No. 91	Area in acres under other varieties	Total acres
Nagpur	1,968	1,96,692	1,98,660
Wardha	320	3,70,021	3,70,341
Total	2,288	5,66,713	5,69,001

The total estimated income to the growers of No. 91 cotton in 1956-57 was of the order of Rs. 47,047/-.

(xi) Scheme for seed distribution and marketing of M. 5A (Malini) cotton in Chikhli taluka of Buldana district :—This scheme was sanctioned by the Committee in February, 1954. The object of the scheme was to multiply and distribute pure seed of M.5A (Malini) cotton to cover an area of 1,19,938 acres in the Chikhli taluka of Buldana district. The scheme was put into operation on the 8th March, 1955 and terminated on the 7th March, 1956.

(xii) Scheme for multiplication and distribution of Gaorani 12 cotton seed in Bombay State :—This scheme was started on the 11th October, 1950, with a view to arranging for the production and distribution of pure pedigree seed of Gaorani 12 in the south and western portions of Gaorani protected areas, and also to organise the marketing of its produce.

A summary of the progress made under the scheme since 1951-52 is given below:—

Year	Quantity of seed distributed under the scheme in maunds	Variety	Estimated area covered in acres			Estimated additional income in O. S. Rs. upto 1952-53 and I. G. Rs. from 1953-54		Remarks
			Departmental seed	Non-Dept. Seed i.e. Natural spread	Total	Per acre	Total	
1951-52	10,961	G. 12. R.A. G. 12. G.A.	15,307 40,693		15,307 40,693	31- 5-10 24-13-10	4,80,097-10-10 10,11,814- 7-10	
1952-53	47,063	G. 12. R.A. G. 12. G.A.	57,000 1,30,000		57,000 1,30,000	20-13- 4 16-10- 8	11,87,500- 0- 0 21,66,666-10- 8	
1953-54	48,400	G. 12. R.A. G. 12. G.A.	39,500 2,17,428	... 43,072	39,500 2,60,500	13-11- 0 10- 7- 9	5,40,658- 0- 0 27,31,179-11- 0	
1954-55	20,867	G. 12. R.A. G. 12. G.A.	14,858 1,28,374	... 94,875	14,858 2,24,249	10- 3- 0 7-12- 3	1,51,365-14- 0 17,41,432-14- 9	
	333	Gao. 6	1,000	...	...	...	...	
1955-56	14,161	G. 12. R.A. G. 12. G.A.	11,252 64,348	... 2,03,434	11,252 2,67,782	1- 1- 3 ...	12,131- 1- 0 ...	
	161	Gao. 6	900	3,487	4,367	—	...	
	9	1422	59	...	59	14/8/-	Rs. 855- 8- 0	
1956-57	3,091	G. 12. R.A. G. 12. G.A.	6,253 10,227	... 1,73,756	6,253 1,83,983	2-10- 0 ...	16,414- 2- 0 ...	
	28	1422 R.A. 1422 G.A.	129 21		129 21	248-2- 0 ...	31,884- 1- 0 ...	
	3	Co. 4-B.40 & 170-Co. 2	32	125	157	...	...	
	120	Gao. 6	640	...	640	...	...	

G. 6. seed was distributed in Narayankhed Taluka of former Bidar Dist, so ~~as~~ under non Dept. seed is not available. The said Taluka is in Andhra Pradesh now.

NOTE :— Acreage from 1956-57 is given for only Osmanabad District including merged Talukas of Bidar District and for Mominabad Taluka of Bhir District. Due to trifurcation of Hyderabad State, Scheme's jurisdiction is only Osmanabad District and Mominabad Taluka of Bhir District from November, 1956.

The Cotton Marketing was supervised by the Departmental Staff at Latur, Udgir and Parli Markets. Special steps were taken to avoid admixture of other varieties by strict supervision and rigid control by issuing certificates and passes etc.,

The total quantity of improved cotton marketed in full pressed bales of lint is shown below:—

District	Market	Quantity of improved cotton marketed in Mds.			Bales pressed			Remarks
		G. 12. R. A.	G. 12. G. A. & Natural spread	1422	G. 12. R. A.	G. 12. G. A. & Natural spread	1422	
Osmanabad	Latur	934	93,695	210	61	5,981	15	
"	Udgir	3,960	1,04,228	32	290	6,453	2	
Bhir	Parli	41	...	...	...	...	...	
Total		4,935	1,97,923	242	351	12,434	17	

The cotton acreage in the tract (district-wise) during 1956-57 was as shown below:—

District	Estimated area under improved cotton						170. Co. 2 Natural spread	Total area under improved cotton	Local varieties (Jarilla, American & Warangal, etc.)	Total cotton area
	Depil. Seed	Non-Dept. Seed	1422 Dept. Seed	Co. 4-B. 40 Dept. Seed	Natural spread	Acres				
Osmanabad including merged Taluka of Bidar Dist.	14,880	1,53,488	149	10	12	113	1,68,652	5,700		1,74,352
Mominabad Taluka	1,600	20,288	1	...	...	22	21,891	13		21,049

The total estimated additional income to the growers of Gaorani 12 cotton in the Reserved area in 1956-57 was of the order of Rs. 16,414 against Rs. 12,131 in 1955-56.

(xiii) Scheme for establishment of Gaorani 6 cotton seed multiplication farms at Bhainsa and Nanded in Bombay State:—This scheme was sanctioned by the Committee in February, 1955, for a period of five years and was put into operation on the 22nd March, 1956.

The original object of the scheme was to establish two seed farms with a total area of 200 acres—100 acres each at Nanded and Mudhol or

Bhainsa—with the object of covering the Gaorani 6 cotton area of about 1.5 lakhs of acres with the 5th generation seed in five years.

As a result of the re-organisation of the States, the Bhainsa centre had been transferred to the Andhra Pradesh and the present review deals with the establishment of the seed multiplication Farm at Nanded only which has for its object the production of sufficient quantity of earlier generation seed of Gaorani 6.

The following was the cropping scheme for the year 1956-57 at the Seed Multiplication Farm, Nanded:—

Cotton Variety	Area sown Acres-Guntas
Gaorani 6	20—30
1494	19—10
1946	3—0
1422	2—0
1585 and other varieties	1—20
Total area under cotton	46—20

The following table gives the quantity of pure seed of earlier generations produced during the season 1956-57 for distribution during 1957-58:—

Variety	Selfed	Quantity of seed produced (lbs.)				Total
		1st gen.	2nd gen.	3rd gen.	4th gen.	
Gaorani 6	33	134	2,109	—	—	2,276
1494	36	808	934	—	—	1,778
1946	46	85	174	26	565	896
1422	—	—	307	92	192	591
1585	4	—	—	102	—	106
Total	119	1,027	3,524	220	757	5,647

(xiv) Scheme for multiplication and distribution of 2204 (Daulat) cotton seed in Parbhani district of Bombay State:—This scheme was sanctioned by the Committee in February, 1954, with the object of covering an area of five lakh acres with the improved cotton variety 2204 (Daulat) in Parbhani district of Hyderabad State. The scheme was put into operation on the 14th July, 1955.

The summary of the progress under the scheme since its inception is given below:—

Year	Qty. of seed distributed under the scheme Mds.	Estimate of area covered (acres)			Estimated additional income		Remarks
		Deptl. Seed	Non-Deptl. Seed	Total	Per acre Rs.	Total Rs.	
1955-56	981-24	3,800	...	3,800	10/-	38,000/-	
1956-57	1138-00	5,700	...	5,700	15/-	85,500/-	

Daulat cotton was offered Rs. 20/- as premium on and above the daily prevailing market rate of local variety in Parbhani market.

The total cotton acreage in the tract during 1956-57 was as shown below:—

District	Improved strains		Local	Total
	G. 6	Daulat		
Parbhani	23,019	5,700	5,21,280	5,50,000
Total	23,019	5,700	5,21,280	5,50,000

MADHYA PRADESH

Scheme for multiplication and distribution of D.48-154 (Maljari) seed in Nimar tract of Madhya Pradesh:—This scheme was sanctioned by the Committee in July, 1954 and came into operation on the 16th April, 1956.

The object of the scheme is to cover the entire *Desi* cotton tract, comprising an area of 2 lakh acres in Nimar zone of Madhya Pradesh with the strain D.48-154 within a period of three years.

The summary of progress made under the scheme during the first year of its working is given below:—

Year	Quantity of seed distributed under the scheme Mds. srs.	Estimate of area covered (acres)			Estimated additional income		Remarks
		Departmental seed	Non-departmental seed	Total	Per acre Rs.	Total Rs.	
1956-57	1647-34	7,128	2,000	9,128	40/-	3,65,120	

The variety D.48-154 (Maljari) gave an acre yield of 725 lbs. during the season as against 565 lbs. of 197-3.

The first and second stage seed was purchased by the Department while the seeds from other stages were sold by auction under Departmental supervision. The ginning of the produce was also done under Departmental supervision. There were no co-operative marketing societies but efforts were made to establish these societies at least at three centres, viz., Khargone, Burwah and Khetia, which were important multiplication centres.

89 bales (392 lbs. each) of lint obtained from the cotton purchased by the Department were sold in the market. Besides, 1,540 bales were also offered for sale in the market.

The total cotton acreage in the tract during 1956-57 is shown below:—

District (Centre)	Improved strains	Local strains	Total
Nimar	7,128 acres	3,47,872 acres	3,55,000 acres

MADRAS

(i) Combined scheme for multiplication and distribution of K.2 and Co. 4/B.40 cotton seeds in Madras State:—This scheme was sanctioned by the Committee in February, 1952, with the object of covering an area of 4½ to 5 lakhs of acres with the seed of K.2 cotton strain in the rainfed areas of Tirunelveli, Ramanathapuram and Madurai. The scheme also aimed at covering about 0.5 lakh acres with the seed of Co.4/B.40 (Madras Uganda) strain. This has since been replaced by the new strain Madras Cambodia Uganda-2 from the 1955-56 season.

The scheme was put into operation on the 7th September, 1950.

A summary of the progress made under this scheme since 1948-49 is given below:—

K. 2 (Karunganni 2)

Year	Quantity of seed distributed under the scheme (Maunds)	Estimate of area covered in acres			Estimated additional income	
		Departmental spread	Non-Departmental spread	Total	Per-acre Rs.-np.	Total Rs.
1948-49	178	1,200	—	1,200	16-06	19,275-00
1949-50	980	3,000	7,000	10,000	32-75	3,93,000-00
1950-51	4,894	30,000	87,000	1,17,000	21-56	25,22,812-50
1951-52	5,021	50,700	99,500	1,50,200	13-62	20,46,475-00
1952-53	9,928	60,000	2,00,000	2,60,000	13-12	34,12,500-00
1953-54	7,273	50,000	2,00,000	2,50,000	6-25	15,62,500-00
1954-55	13,962	57,000	2,00,000	2,57,000	7-25	18,63,250-00
1955-56	13,142	65,170	1,97,190	2,62,900	7-87	20,70,337-00
1956-57	13,554	77,000	2,83,160	3,60,160	14-08	50,17,053-00

MADRAS CAMBODIA UGANDA 1

(Since replaced by M. C. U. 2 from 1955-56)

Year	Quantity of seed distributed under the scheme (Maunds)	Estimate of area covered acres			Estimated additional income	
		Departmental spread	Non-Departmental spread	Total	Per acre Rs. np.	Total Rs.
1948	304	1,300	31,700	33,000	00 95	31,35,000
1949	3,166	13,000	26,000	39,000	115-00	44,85,000
1950	8,738	31,500	21,200	52,700	11 000	57,97,000
1951	11,320	31,500	35,300	66,800	100 00	66,80,000
1952	14,133	59,300	5,700	65,000	90-00	58,50,000
1953	9,783	41,100	22,254	63,354	108-00	68,42,232
1954	6,110	25,100	38,300	63,400	116-00	73,54,400
1955	11,063	36,000	23,300	59,300 (1)	55-81 *	27,54,850
				(2)	32-00 +	
1956	7,102	29,950	30,300	60,250 (1)	55-81 *	26,41,184
				(2)	32-00 +	
1957	10,636	22,400	48,660	71,060 (1)	51-30 *	26,10,720
				(2)	32-00 +	

* Represent the estimated additional income per acre for the MCU 2 certified crop.
+ Represent the estimated additional income per acre for the MCU 2 uncertified crop.

The Madras Cambodia Uganda-2 seed farm is being run by the Sriviliputtur Co-operative Marketing Society with the financial help given by the Government and under departmental supervision at every stage of work. It is also proposed to transfer the Karunganni-2 cotton seed farm work to certain Co-operative Societies in Sattur and Koilpatti.

(ii) Scheme for multiplication and distribution of M.U. 1 cotton seed in winter cropped area of Madras State:—This scheme was sanctioned by the Committee in February, 1953, for a period of five years with the object of covering, within five years, the entire winter cropped area comprising two lakh acres (of which 1,34,000 acres are irrigated and 66,000 acres are rainfed) in the districts of Madurai, Tiruchirapalli, Coimbatore and Salem of Madras State with Madras Uganda-1, thus converting the entire production of 1,17,900 bales of Cambodia cotton from 7/8" to 15/16" to full one inch staple. The scheme was put into operation on the 1st July, 1953.

A summary of progress made under this scheme since its inception is given below:—

Year	Quantity of seeds distributed under the scheme in maunds	Estimate of area covered in acres			Estimated additional income in Rs.	
		Departmental	Non-departmental	Total	Per acre	Total
1953-54	12,068	39,300	60,019	99,319	90	Rs. 89,38,710/-
1954-55	7,768	39,562	64,100	1,03,672	33	Rs. 34,21,176/-
1955-56	8,592	49,238	55,662	1,04,900	40	Rs. 41,96,000/-
1956-57	16,382-1	98,706	10,075	1,08,781	51	Rs. 66,35,641/-

The area under this variety is expected to increase appreciably as new lands are brought under cotton with the development and expansion of irrigation facilities in the Ayacut area of the Lower Bhavani Project in Coimbatore district and with the introduction and enforcement of the Cotton Control Act, 1952, notifying protected areas for cultivation of standard varieties of cotton prescribed for each tract.

The District Market Committees and their branches functioning in the different cotton centres in the tract continued to provide necessary facilities to the growers for marketing their improved produce and obtaining reasonable prices.

(iii) Scheme for multiplication and distribution of K.5 cotton seed in Madras State:— This scheme was started from 1-7-1955. The object of the scheme is to cover an area of about 1,42,000 acres in the Central Districts comprising Coimbatore, Salem and Trichy and part of Madurai with Karunganni 5 strain.

A summary of the progress made under this scheme since its inception is given below:-

Year	Quantity of seeds distributed under the scheme in maunds	Estimate of area covered (acres)			Estimated additional income (Rs.)		Remarks
		Departmental seed	Non-departmental seed	Total	Per acre	Total	
1955-56	5,227	26,281	90,156	1,16,437	11.25	13,09,916	
1956-57	8,740	40,954	81,304	1,22,258	11.36	13,88,850.88	

NOTE: Average price of Karunganni 5 *Kapas* per pothi of 280 lb. Rs. 128/-
do ordinary Karunganni *Kapas* do Rs. 119/-
Difference in price. Rs. 9/-
Average yield of Karunganni 5 *Kapas* per acre 200 lb.
Extra income Rs. 11-36 ap.

Necessary facilities to the growers for marketing their produce at reasonable prices were provided in the tract by the District Market Committee and their branch organisations already established in important cotton centres.

PUNJAB

(i) Scheme for multiplication and distribution of 320F American cotton in Ferozepur, Ludhiana, Jullundur and Amritsar districts of Punjab State:—This scheme was sanctioned by the Committee in February, 1953. The object of the scheme is to distribute seed of the new variety 320F for cultivation over 600,000 acres in Central and Submontane districts of Punjab State. The scheme was put into operation on the 1st September, 1953. The summary of the progress made under the scheme since its inception is given below:—

Year	Quantity of seed distributed under the scheme (mds.)	Estimated area covered (acres)			Estimated additional income to growers		Total (Lakhs of rupees)
		Departmental seed	Other seed	Total	Per acre (Rs.)		
1953-54	22,567	1,48,942	15,944	1,64,886	43.50		63.3
1954-55	34,121	2,25,198	89,256	3,14,454	21.81* 78.25**		168.4
1955-56	40,205	2,65,353	83,302	3,48,655	37.37* 135.87**		267.8
1956-57	43,036	2,84,038	1,79,507	4,63,545	25.19* 224.00**		487.2

*Over L. S. S. in Ferozepur district.

**Over *Desi* cotton in other districts.

The cotton acreage (districtwise) in the tract during 1956-57 is shown below:—

District	Area in acres			Total
	<i>Desi</i>	320F	L. S. S.	
1. Ferozepur	48,178	2,27,369	46,228	3,72,675
2. Amritsar	17,718	78,084	...	95,802
3. Ludhiana	12,800	64,600	..	77,400
4. Jullundur	9,069	43,492	...	52,561
Total area (1956-57)	87,765	4,63,545	46,228	5,97,538
Total area (1955-56)	95,082	3,48,655	94,304	5,38,041
Increase (+) or decrease (-) over the last year	-7,317	+ 1,14,890	-48,076	+ 59,497

There were well-organised markets in all the four districts, where *kapas* was auctioned daily in the presence of an official of the Market Committee. In addition to the auctions conducted by the officers of the Agriculture Department for the sale of *kapas* from the rogued area and of such good lots whose seed was purchased by the department for general distribution, cotton developmental and co-operative societies were also functioning. The total quantity of *kapas* sold through auctions and the premium obtained on account of guaranteed purity of the produce is given below:—

Total quantity	Average market price per maund of <i>kapas</i>	Average rate per maund of auctioned <i>kapas</i>	Premium per maund
37,660 mds.	Rs. 34.31	Rs. 35.56	Rs. 1.25

The owners of the auctioned lots obtained an additional income of Rs. 47,000/-

The quantity of 320F cotton marketed in full pressed bales (392 lbs. each), district-wise, as reported by Messrs. Volkart Brothers was as follows:—

District	Bales (392 lbs.)
Ferozepur	2,18,842
Amritsar	35,459
Ludhiana	59,810
Jullundur	17,711
Total	3,31,822

(ii) Scheme for multiplication and distribution of pure seed of H.14 American cotton in South Eastern districts of Punjab State:— This scheme was sanctioned by the Committee in February, 1955, and was put into operation on the 16th August, 1956. The object of the scheme is to multiply and distribute pure seed of H. 14 cotton to cover an area of 1,27,000 acres in the South Eastern districts of Punjab State.

The summary of the progress made under the scheme during the first year of its working is given below :—

Year	Quantity of seed distributed during the Year	Estimated area covered (acres)			Estimated additional income to the growers over 216F	
		Deptl. seed	Non-Deptl. seed	Total	Per acre (Rs.)	Total (Rs.)
1956-57	9,032	40,000	—	40,000	63.4	25,36,000

The regulated markets existed in the chief cotton growing centres of the tract, under whose aegis the growers marketed their produce. Their complaints, were redressed by the market committees.

A total quantity of about 19,000 bales of H-14 cotton (according to trade estimates) was marketed in different cotton markets located in the tract during the year under review. The *Kapas* and lint of H-14 fetched, on an average, a premium of Rs. 0.72 and Rs. 5.60 per maund, respectively, over the previous improved variety Punjab American 216F, but on the basis of lint price, the premium for the *kapas* of H-14 would be of the order of Rs. 1.90 per maund instead of Rs. 0.72, actually realised.

The total estimated additional income, to the growers of H-14 cotton in 1956-57 was of the order of Rs. 2,536,000 at Rs. 63.4 per acre.

The cotton acreage (district-wise) during 1956-57 season in the tract was as shown below :—

District	Area in acres			
	216F	H-14	Desl	Total
1. Hissar	84,645	19,000	35,394	1,39,039
2. Rohtak	28,897	9,000	7,981	45,878
3. Karnal	57,536	12,000	11,506	81,042
4. Gurgaon	956	—	1,039	1,995
Total	1,72,034	40,000	55,920	2,67,954

(iii) Scheme for multiplication and distribution of American cotton seed in Punjab (erstwhile Pepsu):—The scheme was sanctioned by the Committee in October, 1949, and came into operation on the 2nd September, 1952.

The object of the scheme is to increase the area under long and medium staple cottons in erstwhile Pepsu by replacing the short staple cottons by the improved American strains.

The summary of the progress made under the scheme since its inception is given below :—

Year	Quantity of seed distributed under the Scheme ('000 mds.)	Estimate of area covered ('000 acres)			Estimated additional income	
		Deptl. seed	Non-Deptl. seed	Total	Per acre Rs.	Total Rs. (lakhs)
1952-53	4	32	48	80	30/-	24
1953-54	12	96	64	160	35/-	56
1954-55	13	144	72	216	40/-	86
1955-56	16	123	122	250	42/-	105
1956-57	21	168	112	280	40/-	112

In the major cotton growing tracts well-organised markets were established and the sales were effected under the supervision of market committees. At some places, cooperative marketing unions were also functioning.

Total produce marketed (in full pressed bales) in the tract during 1956-57 was 2.7 lakh bales.

Comparative prices obtained by the improved and local varieties during the season under review in the tract were as follows :—

Month	Market price of cotton per md. (Rs.)	
	Desl	American
October	32/-	36/-
November	30/-	33/8/-
December	28/12/-	33/4/-
January	33/-	33/2/-
February	30/-	34/-
March	29/4/-	29/5/-
Season's average	30/-	34/-

The cotton acreage in the tract during 1956-57 was as follows :—

	Improved strains '000 acres	Desi strains '000 acres	Total '000 acres
Patiala	21	45	66
Bhatinda	66	153	219
Kapurthala	3	7	10
Sangrur	50	55	105
Mohindergarh	—	—	—
	140	260	400
Departmental Estimate	280	180	460

RAJASTHAN

Scheme for multiplication and distribution of Indore-1 cotton seed in Rajasthan :—This scheme was sanctioned by the Committee in September, 1948, and was put into operation in May, 1951. The object of the scheme is to produce pure C. Indore-1 seed sufficient for the whole cotton growing area in Mewar and to distribute it among cotton growers to enable them to produce pure crop of C. Indore-1 cotton which is greatly in demand.

The summary of progress made under the scheme since its inception is given below :—

Year	Quantity of seed distributed under the scheme Mds.	Estimate of area covered Acres			Estimated additional Income per Acre Rs.	Total Rs.
		Departmental	Non-Departmental	Total		
1951-52	642	2,568	...	2,568	—	
1952-53	771	3,084	...	3,084	—	
1953-54	1,294	5,176	...	5,176	20/- to 40/-	
1954-55	3,327	13,368	36,632	50,000	18/- to 36/-	
1955-56	3,252	13,008	46,992	60,000	15/- to 30/-	9,00,00
1956-57	4,737	23,685	Approximately 75,000 Acres	Approx 1 Lakh Acres	25/- to 30/-	25,00,00

In Mewar Tract, the Ginning and Pressing Factories virtually formed major cotton markets, the smaller ones and more numerous being the village *mandies*. Three parties operated in the markets: (i) Primary producer who brought the cotton to the market and sold it through the broker, (ii) Village merchant who purchased cotton from the cultivators from village to village, and (iii) Cotton dealers who purchased cotton from the first two agencies, got it ginned for exporting the lint.

The means of communication and transport were still undeveloped and in many places, there were not even cart tracks. This situation encouraged the sale of cotton in small lots to the village merchants with the result that the cultivator became the loser as he lost the benefit of competitive bidding. This also created problems for the collection of the produce for the seed procurement work. The ill effects of the existing system are proposed to be remedied after the enactment of the Agricultural Produce Markets Act; which is under the active consideration of the Government.

UTTAR PRADESH

Scheme for seed distribution and extension of improved cotton 35/1 in Uttar Pradesh :—This scheme was sanctioned by the Committee in September, 1950, and came into operation on the 1st February, 1952. The object of the scheme is to cover an area of about 1.5 lakh acres with the improved cotton variety 35/1 in the districts of Meerut, Muzaffarnagar, Bijnor, Saharanpur and Moradabad in Uttar Pradesh.

The summary of the progress made under the scheme since its inception is given below :—

Year	Quantity of seed distributed under the scheme in Mds.			Estimate of area covered in acres			Estimated additional income	
	Departmental	Non-Departmental	Total	Departmental	Non-Departmental	Total	Per acre Rs.	Total Rs.
1950-51	60	—	60	309	—	309	20/-	6,180/-
1951-52	284	50	334	2,458	400	2,858	20/-	57,160/-
1952-53	540	400	940	3,126	4,400	5,526	20/-	1,10,520/-
1953-54	464	2,500	2,964	2,824	14,794	17,618	20/-	3,52,360/-
1954-55	1,046	2,080	3,126	5,327	12,521	17,848	14/8	2,58,795/-
1955-56	885	6,000	6,885	4,786	40,559	45,345	17/12	8,04,873/-
1956-57	1,467	8,000	9,467	10,536	53,061	63,597	16/8	10,49,350/-

The total cotton area in the state (district-wise) during 1956-57 is given below :—

District	Improved strains area in acres		Local <i>Desi</i> area in acres	Total area in acres
	35/1	Americans		
1. Saharanpur	13,340	1,018	13,792	14,810
2. Muzaffarnagar	15,450	2,512	8,392	10,904
3. Meerut	14,626	8,741	11,717	20,458
4. Bijnor	8,200	129	12,050	12,179
5. Moradabad	6,981	307	4,916	5,223
6. Bulandshahr	1,918	6,971	20,500	27,471
7. Aligarh	1,225	3,864	12,653	16,517
8. Mathura	8	12,422	8,729	21,151
9. Agra	45	1,312	2,125	3,437
10. Etah	135	988	2,880	3,868
11. Mainpuri	160	315	265	580
12. Etawah	410	812	283	1,095
13. Farrukhabad	204	82	715	797
14. Kanpur	315	522	1,695	2,217
15. Rampur	72	94	1,306	1,400
16. Nainital	...	98	1,002	1,100
17. Badaun	700	703	1,350	2,053
18. Bareilly	78	90	429	519
Total	63,597	40,980	1,04,799	1,45,779
Rest of U. P.		257	755	1,012
Total U. P.	63,597	41,237	1,05,554	1,46,791

There were no Government or Co-operative marketing organisations in the tract and most of the cultivators generally grew small areas under cotton and the produce was ginned either by hand gins or in the ginneries nearby. The lint was utilised for domestic consumption by the growers themselves. The growers who had comparatively large areas, sold their produce to the department at a premium of 12½% over the prevailing market rates.

MYSORE

Scheme for multiplication and distribution of Jayadhar and Laxmi cottons in Karnatak.—This scheme was put into operation in March, 1950. The object of the scheme was to cover the stipulated area of 12,00,000 acres under the improved strains Jayadhar and Laxmi cottons in the Karnatak tract. This scheme was put on a self-supporting basis with effect from the 1st March, 1954. The scheme terminated on the 28th February, 1957.

The summary of the progress made under the scheme since its inception indicating the area under both Jayadhar and Laxmi cottons is given below:—

Year	Quantity of seed distributed under the scheme B. Mds.	Estimate of area covered (acres)			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1950-51						
Jayadhar ...	25,749	1,97,811	42,389	2,40,200	15	36,03,000
Laxmi ...	12,267	98,034	2,000	1,00,034	20	20,00,680
Total ...	38,016	2,95,845	44,389	3,40,234	...	56,03,680
1951-52						
Jayadhar ...	83,258	6,00,114	62,010	6,62,124	15	99,31,860
Laxmi ...	43,189	3,47,530	33,487	3,81,017	20	76,20,340
Total ...	1,26,447	9,47,644	95,497	10,43,141	...	1,75,52,200
1952-53						
Jayadhar ...	68,612	3,96,004	44,125	4,40,129	15	66,01,935
Laxmi ...	45,850	3,39,100	92,519	4,31,619	20	86,32,380
Total ...	1,14,462	7,35,104	1,36,644	8,71,748	...	1,52,34,315
1953-54						
Jayadhar ...	54,786	3,79,475	1,25,321	5,04,796	15	75,71,940
Laxmi ...	50,635	3,88,409	1,29,861	5,18,270	20	1,03,65,400
Total ...	1,05,421	7,67,884	2,55,182	10,23,066	...	1,79,37,340
1954-55						
Jayadhar ...	29,981	2,52,762	1,98,977	4,51,739	15	67,76,085
Laxmi ...	39,742	3,64,446	2,69,965	6,34,411	20	1,26,88,220
Total ...	69,723	6,17,208	4,68,942	10,86,150	...	1,94,64,305
1955-56						
Jayadhar ...	54,533	3,76,057	2,31,251	6,07,308	15	91,09,620
Laxmi ...	60,421	3,84,460	1,53,973	5,38,433	20	1,07,68,660
Total ...	1,14,954	7,60,517	3,85,224	11,45,741	...	1,98,78,280
1956-57						
Jayadhar ...	44,182	3,29,507	4,19,971	7,49,478	15	1,12,42,170
Laxmi ...	60,890	4,60,144	2,79,622	7,39,766	20	1,47,95,320
Total ...	1,05,072	7,89,651	6,99,593	14,89,244	...	2,60,37,490

The acreage under Jayadhar and Laxmi cottons (districtwise), during the year 1956-57, was as shown below :—

JAYADHAR

District	Estimated area covered in acres				Total	Natural spread	Grand Total
	III	IV	V	VI			
Dharwar	620	5,773	29,716	90,115	1,26,224	1,05,454	2,31,678
Belgaum	500	5,373	19,236	99,700	1,24,809	17,991	1,42,800
Bijapur	431	3,015	7,580	67,448	78,474	2,96,526	3,75,000
Total	1,551	14,161	56,532	2,57,263	8,29,507	4,19,971	7,49,478

LAXMI

District	Estimated area covered in acres				Total	Natural Spread	Grand Total
	III	IV	V	VI			
Dharwar	641	7,571	1,93,865	1,84,887	3,86,964	1,02,802	4,89,766
Belgaum	30	—	5,360	14,780	20,170	4,830	25,000
Bijapur	—	50	19,090	33,870	53,010	1,71,990	2,25,000
Total	671	7,621	2,18,315	2,33,537	4,60,144	2,79,622	7,39,766
Grand Total	2,222	21,782	2,74,847	4,90,800	7,89,651	6,99,593	14,89,244

The total quantity of improved cotton lint marketed in full pressed bales of lint of 392 lbs. during 1956-57 is shown below :—

Variety	Reserved area	General area	Total
Jayadhar	12,212	4,052	16,264
Laxmi	33,411	2,585	35,996
Total	45,623	6,637	52,260

CHAPTER V**PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON**

Realising the need for making available the results of cotton breeding experiments to the cotton growers in the different tracts of each State, the Indian Central Cotton Committee, as has already been referred to in the previous pages, instituted a system of multiplying the seed of the improved varieties adjudged suitable for growing in a particular locality and distributing it in stages for extending the area under these varieties with the ultimate object of covering the entire tract with their seed. In view of the fact that this work is a slow process, it is usual to report the record of progress in the introduction of improved varieties of cotton in the different localities every year in this report. This serves as an index for gauging the progress achieved under the seed multiplication and distribution schemes as also for assessing the benefits accrued to the cotton cultivators. Progress in the introduction of the various improved varieties of cotton is directly reflected in the gradual changes taking place in the quality of the Indian cotton.

During the year under report, of the total area of 1,98,43,000 acres under cotton in India, the area covered by improved varieties was 1,08,74,000 acres constituting 55% of the total area. The details of the spread of the various types in the different tracts Statewise are given below :—

1. ANDHRA PRADESH

As a result of the reorganisation of the States, the Andhra Pradesh at present has 7 cotton growing areas covering a total acreage of 10.05 lakh acres. The original cotton tracts before reorganisation were:

- (i) Cocanadas; and
- (ii) Chinnapathi, in the coastal districts,
- (iii) the White and Red Northerns in Kurnool district,
- (iv) the Westerns; and districts. To these are added a part of the
- (v) Mungari area in Bellary, Cuddapah, Kurnool and Anantapur
- (vi) Gaorani cotton growing tract and a greater part of
- (vii) Adilabad tract growing Parbhani American cotton.

The strain C2 in the Cocanadas tract, the strain N.14 and Laxmi in the Northern tracts, Anakapalli white and H.14 in the Chinnapathi area, H.420 and R-1 in the Mungari area, Westerns-1 and Laxmi in the Westerns area, Gaorani-6 in the Gaorani area and Parbhani American-1 in the Adilabad area are cultivated in place of the original unimproved bulk crops.

Though the season 1956-57 commenced favourably with the receipt of timely rains for sowing, it is reported that the heavy rains received after the sowing of the cotton crop adversely affected the growth of the crop and consequently the yields were reported to be sub-normal. The total area covered by the various improved varieties was of the order of 8,11,456 acres; the area covered by the departmental seed being 2,25,794 acres and that by natural spread 5,85,662 acres. Thus, the area covered by the improved strains constituted 81% of the total area under cotton in the States.

The premia realised by N.14 over local White Northern in the pre-price control years, of Gaorani-6 and Parbhani American over Jarila, are said to be Rs. 100, 40 and 70, respectively. The gross extra income earned by the cotton growers was estimated at about 1.2 crores of rupees.

2. BOMBAY

With the reorganisation of the States, the new Bombay State has 17 cotton growing tracts covering a total area of 1.08 crores of acres. Prior to reorganisation, the State of Bombay had five tracts, viz., (1) North Gujarat, (2) Middle Gujarat, (3) Surti tract, (4) Khandesh tract and (5) Bombay-Karnatak. While Bombay-Karnatak region has been added to the State of Mysore, Mathio cotton tract, Indo-American tract, Saurashtra and Kutch region, Marathawada region and Vidarbha region have merged with Bombay to form the present Bombay State. The names of the tracts in the present Bombay State together with the improved varieties being distributed in each tract are given below:—

<i>Name of the tract</i>	<i>Name of improved varieties</i>
A. Old Bombay State	
(i) North Gujarat Cotton Tract	Kalyan
(ii) Middle Gujarat Cotton Tract	Vijaya, Digvijay
(iii) South Gujarat Cotton Tract	Vijalpa (2087)
(iv) Khandesh Cotton Tract	Virnar
(v) Mathio Cotton Tract (Amreli District)	Pratap

<i>Name of the tract</i>	<i>Name of improved varieties</i>
(vi) Deccan Canal Area and Surat, Broach and Baroda District	170-Co2 (Devi Raj)
(vii) Kaira, Ahmedabad and Sabarkanth District	134-Co2M (Devi Tej)
B. Saurashtra and Kutch Region	
(i) Wagad tract of Saurashtra	Kalyan
(ii) Mathio tract of Saurashtra	Pratap
(iii) Scattered all over the region under irrigation	Devi Raj (170-Co2)
C. Marathawada Region	
(i) Hyderabad American (Kinwat Taluka of Nanded District)	Prabhani American
(ii) Hyderabad Gaorani	
(a) Nanded District excluding part of Kinwat & Rajura Talukas, Basmath, Hingoli, Valamnuri & Gangakhed Talukas of Parbhani District	Gaorani 6
(b) Parbhani and Jintur Talukas of Parbhani District, Mominabad Taluka of Bhir District and whole of Osmanabad District	Gaorani 12
(c) Parbhani Taluka of Parbhani District	Daulat (2204)
(d) Aurangabad District	Virnar (197-3)
D. Vidarbha Region	
(i) Amravati, Akola, Yeotmal Districts	H.420 (<i>desi</i>) and Buri 0394 (American)
(ii) Nagpur Wardha Tract	No. 91

The seasonal conditions, on the whole, were mostly favourable for the cotton crop in all the tracts except in North Gujarat, Middle Gujarat, South Gujarat and Marathawada. Erratic rainfall adversely affected the crop in these tracts and the yields obtained were sub-normal. Severe frost and intense cold wave in the month of February also caused damage to the crop in North, Middle and South Gujarat.

The total area covered by the improved varieties during the year is estimated at 56,00,507 acres constituting about 52% of the total area of about 1.08 crores of acres under cotton.

It is reported that there was a fall in the area covered by the improved varieties Vijay and Digvijay during the year under report due to the change-over from Vijay to Digvijay. The demand for Digvijay seeds was heavy but it could not be fully met since the strain was only in the second year of its multiplication. The demand for Vijay cotton seed was on the decline due to the popularity of Digvijay. Consequently, the total uptake of certified seeds of these cottons was less as compared to that of the year 1955-56. The variety H.420 also received a setback in Akola and Amravati districts in Vidarbha region due to the good premium obtained by the Khandesh variety—Virnar.

The premium obtained for the improved varieties as compared with trade varieties was as under:—

Tract	Variety	Premium obtained over trade variety 1956-57	Remarks
(A) Old Bombay State.			
North Gujarat	Kalyan	Rs. 10	Produce of Reserved area fetched a premium of Rs. 10/- over produce of general area since all the area in the tract is under Kalyan.
Middle Gujarat	Digvijay	8 to 12	Average premium per Bhar (12 B. Mds.) of certified Digvijay seed cotton.
		10 to 23	Average premium per candy (784 lbs.) of Agmark bales of Digvijay cotton.
South Gujarat	Vijalpa	40	Premium obtained on Agmark bales over trade variety per candy.
Mathio tract of Amreli District	Pratap	0 8 0 to 0 10 0	Premium on local Mathio per B. Md. of seed cotton.
Khandesh Cotton Tract	Virnar	20	Premium fetched by certified Virnar over non-certified Virnar.
Scattered area all over old Bombay State	Devi Raj, Devi Tej, Co 4-B-40 Hybrid.	—	There is no trade variety for these cottons in the State. The prices for these strains vary from Rs. 800 to Rs. 1200 per candy.

Tract	Variety	Premium obtained over trade variety 1956-57	Remarks
(B) Saurashtra & Kutch Region.			
Wagad Tract of Saurashtra	Kalyan	Rs. 3	Premium per B. Md. of <i>kapas</i> .
Mathio Tract of Saurashtra	Pratap	25	Premium per B. Md. of <i>kapas</i> .
Scattered area under Indo-American strains.	Devi Raj (170-Co 2)	8	Premium per B. Md. over Deshi improved variety like Kalyan.
(C) Merathawada Region.			
Hyderabad	Gaorani-6	Rs. 2.5 to 5	} As per meeting of cotton trade held at Nanded on 24th November 1956, under the Presidentship of the Director of Agriculture.
	Gaorani-12	Rs. 3.5 to 4.5	
	Daulat (2204)	Rs. 20	
(D) Vidarbha Region.			
Amravati, Akola, Yeotmal Districts	H. 420	3	Premium per Khandi
Amravati, Akola, Yeotmal, Nagpur, Wardha Districts.	Buri 0394	19	-do-
Nagpur-Wardha Tract.	No. 91	71	-do-

The gross extra income earned by the cotton growers of the tracts by cultivating the improved strains, during the year under report is estimated at Rs. 8.57 crores.

3. MADHYA PRADESH

The present Madhya Pradesh has three cotton growing areas, viz., (1) West Nimar (2) East Nimar and (3) Malwa tract, covering a total area of about 21.85 lakh acres. The improved varieties distributed in these tracts are Maljari, Virnar, Buri 0394 and A51-9 in the West Nimar tract, H.420 and Buri 0394 in the East Nimar tract and Bhoj, Malvi-9 and Indore-2 in the Malwa tract.

The season under report was favourable in the early stages but the prevalence of droughty conditions in the later stages caused heavy shedding of buds and bolls. The incidence of jassids, boll-worms and blackarm resulted in the lowering of the average yields.

The total area covered by the improved strains in the State, during the year under report, was 7.11 lakh acres, constituting about 32% of the total cotton area.

The extra income obtained by the cotton growers by cultivating the improved strains was, on an average, about Rs. 10/- per acre. The total gross extra income thus earned by the cotton growers was estimated to be about Rs. 71.1 lakhs.

4. MADRAS

The present Madras State has three distinct cotton growing tracts viz. (1) Winter Cambodia Zone comprising the districts of Coimbatore, Salem, North Arcot, Tiruchirapalli and part of Madurai. (2) Irrigated Summer Cambodia tract covering districts of Madurai, Ramanathapuram, Tirunelveli and South Arcot and (3) Tinnies and Karunganni tract comprising Tirunelveli, Ramanathapuram, Coimbatore and Madurai districts. Besides, the cultivation of American cotton in the rice fallows during summer is also practised in the districts of Tanjore, South Arcot, North Arcot and Coimbatore. The improved varieties recommended for cultivation are M.C.U.-1 for the winter Cambodia Zone, M.C.U.-2 for the summer Cambodia tract and K.2 and K.5 for the Tinnies and Karunganni tract. Strain P.216F is recommended for cultivation in the rice fallows.

The season 1956-57 proved to be unfavourable for cotton throughout the State due to the uneven distribution of rainfall. Consequently, the yields were sub-normal. The total area under cotton in the State during 1956-57 was 12.04 lakh acres out of which 5.46 lakh acres were covered by the improved strains constituting about 45% of the total.

The premium obtained by the various improved varieties as compared with the trade varieties were as follows :—

M. C. U. 1	Rs. 55/- per acre
M. C. U. 2	Rs. 65/- " "
K. 2	Rs. 30/- " "
K. 5	Rs. 40/- " "

The estimated gross extra income earned by the cotton growers by cultivating the improved varieties was of the order of about 2.59 crores of rupees.

5. MYSORE

The present Mysore State can be broadly classified into three cotton growing areas, viz., (i) Dharwar Division, (ii) Raichur Division and (iii) Rest of Mysore, having a total area of about 24.03 lakh acres under cotton representing about 10% of the total cultivated area in the State.

The improved strains grown in the Dharwar Division are Laxmi, M. C. U. 1, 170-Co.2, Jayadhar and Virnar; Laxmi and Jayadhar in the Raichur Division and M.A.V., Laxmi, M.C.U.1, Sel.69, Jayadhar, Westerns-1 and H.420 in the rest of the Mysore State.

The season, on the whole, was unfavourable for cotton throughout the State due to uneven distribution of rainfall. It is reported that the rains received during the second and first fortnight of March and April, 1957, in some parts of the State, damaged the cotton crop, while continuous droughty conditions during May, June and later in October in some other parts resulted in heavy shedding of flowers and bolls in the early and late sown crop depressing the yields.

The total area covered by improved strains during 1956-57 was about 18,76,228 acres (9,12,791 acres under developmental seed and 9,63,437 acres under natural spread) constituting about 78% of the total area under cotton.

The premia realised by the various improved varieties are given below :—

Dharwar Division.

Jayadhar	— Rs. 20 to 30 per Nag of 1344 lbs. of <i>gabs</i>
Laxmi	— Rs. 50 to 70 per Nag of 1344 lbs. of <i>gabs</i>

Rest of Mysore excluding Raichur Division.

M.A.V.	Rs. 50 per bale of 392 <i>gabs</i> lint
Laxmi	Rs. 30 -do- -do-
Sel. 69	Rs. 15 -do- -do- -do-
Jayadhar	Rs. 15 -do- -do- -do-
Westerns-1	Rs. 30 -do- -do- -do-

The estimated gross extra income earned by the cotton growers by cultivating the improved varieties was estimated to be 89.43 lakhs of rupees.

6. PUNJAB

The State of Punjab has 2 cotton tracts comprising the Central and Sub-montane districts of Ferozepore, Jullundur, Ludhiana, Amritsar, Kapurthala, Bhatinda and part of Sangrur and Patiala districts growing 320F cotton and the Southern districts of Hissar, Rohtak, Gurgaon and Karnal, growing the strains 216F, H. 14 and 320. F. Besides, *desi* cottons are also grown in small pockets of the State.

The season remained quite favourable during sowing and the early stages of the cotton crop during the year under report but proved to be slightly adverse during the later stage.

The total area covered by the various improved strains was 10.07 lakhs of acres or 71% of the total cotton area of 14.15 lakh acres in the State.

A premium of Rs. 1.25 per maund of *kapas* was obtained for the improved variety, 320.F, as compared with the trade variety during the year. The gross extra income earned by the cotton growers by growing improved varieties during the year 1956-57 was estimated to be about 7.8 crores of rupees.

7. RAJASTHAN

Rajasthan at present has 5 cotton growing tracts: viz., Ganganagar tract growing 320.F and Ganganagar-1; Jaipur-Tonk tract growing C.520 and Ganganagar-1; Mewar tract growing C-Indore-1, Jhalawar tract growing Virnar and Banswara-Dungarpur tract growing 134-Co. 2-M and C. Indore-1 cottons.

The season, on the whole, was reported to be not quite favourable during the year with the prevalence of dry conditions during the early stages and heavy and untimely rains during the later stages.

Out of the total area of about 5,42,292 acres under cotton during the year, the improved varieties covered an area of about 2,29,280 acres, constituting about 42% of the total.

The premium obtained by the improved variety over the trade variety during the year was about Rs. 4/- per maund of *kapas* in the case of American cottons and Re. 1/- to Rs. 5/- in the case of strain Ganganagar-1,

The gross extra income earned during the year by the cotton growers from cultivating the improved strains was estimated at about 49.81 lakhs of rupees against 25.51 lakhs in the previous year.

8. UTTAR PRADESH

The cotton growing area of the State is divided into four cotton growing tracts, viz., (1) Tarai and Sub-montane tract, (2) Western tract, (3) Central tract and (4) Bundelkhand tract and other eastern districts covering a total area of about 1,46,791 acres. The improved varieties distributed in these tracts are the improved *desi* strain 35/1 and the Punjab American strains 216 F, 320.F and H. 14.

The season was altogether unfavourable to cotton, mainly due to receipt of heavy rains accompanied by winds, particularly at harvest time. At sowing time, in the months of April, May and June, however, there was inadequacy of canal water supply due to which there was a marked decline in the area in the Tarai and sub-montaneous tract. On the whole, the damage caused to the crop is reported to be about 75% in the case of 35/1 and 40% in the case of 216.F cottons.

The total area covered by the improved strains during the year was estimated to be 92,741 acres or 63% of the total cotton area. The strain 35/1 fetched a premium of about Re. 1/- to Rs. 2/- per maund of *kapas* over local *desi*. The premium fetched by 216 F cotton was about Rs. 2/- to Rs. 3/- per maund of *kapas* on an average.

The gross extra income earned by the cotton growers during the year under report was estimated at Rs. 7.25 lakhs against Rs. 4.32 lakhs in the previous year.

**CONSOLIDATED STATEMENT SHOWING THE PROGRESS
MADE IN THE INTRODUCTION OF IMPROVED
VARIETIES OF COTTON IN THE INDIAN
UNION DURING 1956-57**

Sr. No.	State	Names of improved varieties of cotton	Total cotton area in the State	Total area covered by improved varieties	Percentage of Col. 5 over Col. 4	Gross extra income earned by the growers (In lakh of Rs.)	Re-mark
1	2	3	4	5	6	7	8
1.	Andhra Pradesh	C.2, N. 14, Laxmi, H.14, H. 420, R-1, Westerns-1, Gaorani 6, Parbhani American 1 and Anakapalli white.	1,005	811	81%	120.00	
2.	Bombay	Kalyan, Vijay, Digvijay, Vijalpa Virnar, Pratap, 134-Co. 2-M, Devi Raj (170-Co. 2), Prabhani American, Gaorani 6, Gaorani 12, Daulat, H. 420, Buri 0394 and No. 91.	10,833	5,601	52%	857.00	
3.	Madhya Pradesh	Maljari, Virnar, Buri 0394, A 51-9, H. 420, Bhoj, Malvi and Indore-2.	2,185	711	32%	71.10	
4.	Madras	MCU-1, MCU-2, K. 2, K. 5 and P. 216F.	1,204	546	45%	259.00	
5.	Mysore	Laxmi, MCU-1, 170-Co. 2, Jayadhar, Virnar, M. A. V., Sel. 69, Westerns-1 and H. 420.	2,403	1,876	78%	89.43	
6.	Punjab	320F, 216F, H. 14 and Desi cottons in small pockets.	1,415	1,007	71%	780.00	
7.	Rajasthan	320F, Ganganagar-1, C. 520, C. Indore-1, Virnar and 134-Co. 2-M	542	229	42%	25.51	
8.	Uttar Pradesh	35/1, 216F, 320F and H. 14.	147	93	63%	7.25	
9.	Rest of Indian Union		109	Negligible			
Total ...			19,843	10,874	55%	2,209.29	

CHAPTER VI

**COTTON MARKETING, LEGISLATION AND OTHER
PROTECTIVE MEASURES**

(i) Cotton Import Policy

Imports of foreign cotton into India, during the year 1956-57 continued to be restricted to cotton of staple length 1-1/16" and above, as India had achieved self-sufficiency in its requirements of cotton upto that staple length. During the year, the world supply position of cotton was easy and India could import its requirements as and when necessary. Imports of cotton of staple length 1-1/16" and above were permitted from U.S.A. under Public Laws 480 and 665 and those from sterling areas were restricted to 1-3/16" and above. Under the U. S. Aid Agreement, India is to get 500,000 bales of 500 lbs. each of U.S.A. cotton spread over a period of three years under PL 480 and another one lakh bales under PL 665. Of the cottons from sterling area, imports of certain fixed quantities of East African, Egyptian and Sudanese cottons were permitted. Under a special payment procedure imports of Egyptian cotton were also allowed during the year. The total quantity imported during the year was 617,000 bales, of which over 50% were from the U.S.A.

(ii) Cotton Export Policy

As in the past, short staple cotton, after meeting the needs of the Indian Textile Industry in respect of such cotton, was allowed for exports. The total quantity so allowed was 4 lakh bales in the year, comprising 100,000 bales of Bengal Deshi and 300,000 bales of other cotton stapling $\frac{3}{4}$ " and below. Half the quota was announced in December 1956 and the other half in February, 1957. The export licences were originally valid upto 30th June, 1957, but in view of the apprehended scarcity of cotton and rise in prices of cotton, exports were banned with effect from the 30th March, 1957. Assam/Comilla, Zoda, Yellow pickings, sweepings, etc. were freely allowed for export throughout the season. The total exports thus amounted to 301,000 bales. The export duty on Bengal Deshi was raised from Rs. 50/- to Rs. 100/- per bale with effect from the 1st December, 1956. Duty on the other exportable varieties remained unchanged during the year.

(iii) Control on Prices, Trade and Distribution

Control over cotton was continued during the 1956-57 season and the floor and ceiling prices fixed under the Cotton Control Order were the same as those in the previous season. There was no control on the movement and distribution of Indian cotton in view of the easy supply position, till the 30th March, 1957. On that day, the Government of India authorised the Textile Commissioner, Bombay, to requisition cotton by directing the holders of stocks to make sales of cotton as specified by him. This step was taken to enable mills to obtain cotton at reasonable prices, as there had been a tendency for the prices of Indian cotton to rise and in some cases even touch the ceilings.

As an incentive to grow more cotton and to enable the grower to derive the benefit resulting therefrom, the Government of India, on the recommendation of the Committee have decided that with effect from the 1958-59 season, the floor and ceiling prices of Indian cotton would be announced in April every year *i.e.* well in advance of the sowing time.

(iv) Revision of Hedge Contract

The Indian Cotton Contract was revised in June 1957, in the light of the working of the hedge contract during the 1956-57 season. In place of two contracts with Fine Jarila 25/32" and Fine Vijay 27/32" in 1956-57, a single new contract *viz.*, Indian Cotton Contract with Moglai Jarila 25/32" as basis was established. The months of delivery are March, May and August. Practically all varieties except short staple cotton (Oomras, Bengals, Mungari, Mathio and Assam/Comilla) are tenderable. Tendering differences are to be fixed on the basis of spot rates, with powers to make adjustments at the description of the Special Committee. A super appeal committee has also been established to consider appeals against such fixation. Invoicing back of rejected cotton would be at spot rates. The deposit system has been made more stringent and would come into operation when futures prices rise above Rs. 750/-. No trading would be permitted when prices are above Rs. 790/-. Trading in the new contract was permitted as from the 23rd June, 1957.

(v) Regulated Cotton Markets

Legislation for the establishment of regulated markets for cotton (and other crops where necessary) has been enacted in the former States of Bombay, Madras, Madhya Pradesh, Punjab, Andhra, Hyderabad, Madhya Bharat, Pepsu and Mysore. The number of regulated markets for cotton which functioned satisfactorily during 1956-57 in these States is given below:—

<i>Name of State</i>	<i>No. of regulated markets for cotton</i>
Bombay	100
Punjab	81
Madras	4
M. P.	42
Mysore	28
Raj sthan	7
Andhra Pradesh	6

The question of enacting similar legislation is still under the consideration of the Governments of Rajasthan and Uttar Pradesh.

(vi) Legislation to maintain purity of cotton and other protective measures

It is a recognised fact that the purity and quality are the two prime factors which determine the performance of cotton in the mill, but owing to several reasons these are not maintained under Indian conditions upto the desired level. Though efforts are made to improve the quality of cotton and to supply pure seed of the improved varieties to the cultivator, it appears that these two factors do not receive adequate attention at the Ginning Factory. Since early days the deterioration in the quality of the crop, apart from the effect of seasonal and other conditions, has been attributed to the intervening stage between the parting of the produce by the grower and its purchase by the manufacturing industry. The Indian Central Cotton Committee has devoted a great deal of attention to the need for exercising strict control over the ginning and pressing operations to ensure the maintenance of the purity and the quality of cotton and as a result of its recommendations several improvements have been effected in the marketing of the produce and suitable legislative Acts enacted by the State Government providing stringent measures against the malpractices adopted in the processing of ginning and pressing. While the marketing has been systematised by the establishment of regulated markets, the purity and quality were sought to be maintained by preventing the inferior cotton entering the areas growing superior cotton or by prescribing definite varieties for cultivation in particular tracts or by controlling the ginning and pressing factories. The three main Acts adopted are the Cotton Transport Act, the Cotton Control Act and the Cotton Ginning & Pressing Factories Act. The progress under these various items is enumerated below :—

(a) **Cotton Transport Act** :—This Act was in force in the following reorganised States, with the areas notified as protected against each:—

<i>States</i>	<i>Protected Areas</i>
Bombay State	— Areas comprising North Gujarat, Narbada-Sabarmati, Surat, Khandesh, Kumpta Dharwar (North Satara, South Satara, Kolhapur Ratnagiri districts and Mangalveda taluk, of Sholapur district), Hyderabad Gaoran and Vidarbha region.
Madras	— Cambodia & Tirunelvely areas.
Andhra Pradesh	— Northern and Westerns & Hyderabad Gaorana Protected areas.
Mysore	— Kumpta Dharwar (Dharwar, Belgaum & Kanara districts), Bijapur, Bagalkot and Raichur Protected areas.
Madhya Pradesh	— Nimar, Hoshangabad, Betul, Chhindwara districts of Maha Koshal region.

The question of enforcing the Act in the Punjab is under the consideration of the State Government.

The Cotton Transport Act is applicable to Part A and C States and Part B States are free to enact similar legislations. After reorganisation, the only Part B State is Jammu and Kashmir and it will now be necessary for the Government of A States, to enforce the Act in the other areas of the States.

(b) **Cotton Control Act** :—This is a State legislation and supplementary to the Cotton Transport Act. The position in respect of this Act in the various States is given below:—

1. **Bombay Cotton Control Act, 1912** is in operation in North Gujarat, Khandesh, Narbada-Sabarmati zone of the Bombay State and Bombay-Karnatak (Kumpta-Dharwar, Bijapur and Bagalkot areas) tracts of Mysore State. The varieties specified for exclusive cultivation in these areas are Kalyan in North Gujarat, Virnar in Khandesh, Vijay in Narbada-Sabarmati area, Jayadhar and Laxmi in Bombay-Karnatak and Jarila and Virnar in Indi, Sindgi and Bijapur talukas of Bijapur district of Mysore State.

The question of specifying the variety 134-Co.2-M for cultivation in North Gujarat area and 134-Co.2-M and 170-Co.2 in Narbada-Sabarmati

zone and the application of the Act to Surat area is under the consideration of the Government of Bombay.

2. **Madras Cotton Control Act, 1952.** The Government of Madras have repealed this Act in view of the Essential Commodities Act, 1955. As however, that Act does not contain provisions similar to those in the Cotton Control Act, the question of issuing, under the Essential Commodities Act, a Cotton Control Order on the lines of the Control Act is under the consideration of the State Government.

3. **Madhya Pradesh Cotton Control Act, 1954,** was made applicable to two Revenue Inspectors' circles in Morsi tehsil of Amraoti district, and four Revenue Inspectors' circles in Wani tehsil of Yeotmal district of Vidarbha Division of Bombay State for growing H. 420 and Buri 0394. The question of extending the Act to other areas would be taken up when adequate pure seed is available.

4. **Saurashtra Cotton Control Act** was enacted in 1955, but the rules were not framed and this State has merged in Bombay State.

5. **Bhopal State Cotton Control Act, 1936** continued to be in operation during 1956-57 in the Bhopal region of M.P.

The question of enacting similar legislation is under the consideration of the Government of Mysore. The Uttar Pradesh Government would take up this legislation when adequate quantity of pure seed becomes available. The Punjab Government do not intend to enact this legislation in view of the East Punjab Improved Seeds and Seedlings Act, the Punjab Cotton Seed Control Order in operation in the State and the proposed enforcement of the Cotton Transport Act.

6. **East Punjab Improved Seeds and Seedlings Act,** which provides for compulsory sowing in specified areas, of seed of certain varieties of cotton as approved by the Department of Agriculture was in force in the following areas of the State during 1956-57.

<i>Variety of cotton</i>	<i>Districts</i>
320 F	Districts of Amritsar, Jullundur, Ludhiana, Ferozepore (except Eastern Canal Zone), Batala tehsil of Gurdaspur district and Dabwali sub-tehsil of Hissar district.
216 F	Districts of Hissar (except Dabwali sub-tehsil), Rohtak and Karnal.
1. S. S.	Fazilka and Muktsar tehsils of Ferozepore district.

7. Pepsu Improved Seeds and Seedlings Act was in operation in the following tehsils of Bhatinda district.

Variety of cotton	Tehsils
320 F	Faridkot
216 F	Mansa and all villages of Police Station Maur of tehsil Bhatinda.

3. The following areas were specified under the Hyderabad Cotton Cultivation and Transport Act for growing Gaorani 6 and Gaorani 12 cottons.—

Districts	Talukas
Gaorani 6 :—	
Bombay State	
Nanded	All talukas
Parbhani	(1) Basmath (2) Kalamnuri (3) Gangakhed (4) Hingoli
Andhra Pradesh	
Adilabad	Nirmal taluka
Gaorani 12 :—	
Bombay State	
Parbhani	Parbhani district, excluding Pathri and Partur and the four talukas included under Gaorani 6
Osmanabad	All talukas
Bhir	Mominabad taluka

(c) Cotton Ginning and Pressing Factories Act: (i) During the year under report, the question of including provision regarding licensing of gins and presses is under consideration of the Government of Punjab.

(1) The Uttar Pradesh Act, 1949, is similar to the Punjab Act and the rules under it are being finalised.

(2) The question of amending the Cotton Ginning and Pressing Factories Act, 1925, with a view to providing *inter alia* for licensing of gins and presses and for the prevention of watering, mixing and other malpractices is under consideration of the Government of Mysore.

(3) *Establishment of co-operative cotton gins and presses.*—The Rural Credit Survey Report of the Reserve Bank of India, laid considerable emphasis on marketing and processing of agricultural commodities on co-operative basis. The Government of India in the Ministry of Food & Agriculture (Department of Agriculture) had under examination the question of establishing cotton gins and presses with special reference to the Second Five Year Plan. During 1956-57, the first year of the Second Plan period, it has been reported that 17 co-operative cotton ginning and pressing societies had been set up i.e. 12 in the Bombay State, 3 in Punjab and 2 in Assam. In this connection, the National Co-operative Development and Warehousing Board sanctioned loans of Rs. 2.16 lakhs to three such societies in the Bombay State and Rs. 75,000 for one society in Assam. Besides, the Assam Government have given assistance to two cotton ginning societies to the extent of Rs. 1.5 lakhs. In Madras, the State Government provided assistance to the extent of Rs. 93,000 to 4 co-operative marketing societies for installation of cotton gins.

(4) *Economic and technical survey of cotton gins.*—As decided by the Committee at its meeting held in February, 1954, the Director, Technological Laboratory, conducted a survey of the cotton gins in India. Out of about 2,500 cotton ginning factories, some 540 factories had responded. It would appear a large number of factories have closed down permanently or were not working for some time. The survey covered equipment and its working, handling of *kapas*, ginning and pressing charges, etc. The results of the survey were interesting and a technological leaflet has been issued for general information. Recommendations have been made for the provision of storage sheds, installation of pre-cleaning machinery where necessary, scrapping of old and obsolete gins, proper distribution of gins to avoid unhealthy competition, installation of saw gins in large areas growing American varieties, appointment of trained technical personnel, conversion of bush bearings to ball bearings to save power, prevention of mixing of different varieties, provision of credit facilities, provision of adequate premium to encourage marketing of clean cotton, provision of transport and warehousing facilities, amendment of factory laws which were too stringent for seasonal factories. The matter is under consideration of the various State Governments.

(5) At its meeting in September, 1956, the Committee appointed a Special Sub-Committee to examine the working of the various cotton Acts and to suggest ways and means for the stricter implementation of these measures in the States, with a view to eliminating the prevalent malpractices in cotton ginning and trade. This Sub-Committee met in February, 1957 and after reviewing the existing legislation on cotton in force in the country, recommended several amendments to the various Acts.

The recommendations were endorsed by the Committee at its meeting in March, 1957, and it was suggested that for the proper collection of statistics, a penal clause *viz.*, withdrawal of licences should be enforced. The matter is now under the consideration of the Government of India and the State Governments.

(vii) Agmarking

(6) During the year under review, the agmarking of cotton bales was continued in Khandesh, Surat, Middle and North Gujarat tracts of Bombay State. Purity standard for issuing Agmark labels and departmental certificates for certified produce was as under: —

Labels	Purity percentage
Agmark certified pedigree (Red labels)	Upto 98
Agmark certified (Black labels)	Upto 97
Departmental certificates	95 to 97

The certified produce was pooled in approved gins, ginned, pressed, agmarked and certified under close supervision of the departmental staff.

(viii) Cotton Baling Hoops

(7) The arrangements for the distribution of cotton baling hoops were continued on the same lines as in the past. During the year under report, 3400 tons of controlled indigenous hoops were actually released to pressing factories in the country by the Committee's office working in conjunction with Iron & Steel Controller, Calcutta.

(ix) Other requirements of Cotton Ginning and Pressing Factories

During the year under report, recommendations for the supply of coal to cotton ginning and pressing factories were sent direct to the Deputy Coal Controller (Distribution), Calcutta, as in the previous year and about 1,94,216 tons of coal were recommended for supply. With a view to minimising as far as possible, the difficulties experienced by factories in getting supplies of coal in time, recommendations for supply of coal for the 1956-57 season were made well in advance of the commencement of the season with the concurrence of the Deputy Coal Controller to ensure timely despatch of coal.

In addition, assistance was given to the factories for obtaining cement, iron and steel materials required for maintenance and repairs to the existing factories and for new construction.

CHAPTER VII

'GROW MORE COTTON' CAMPAIGN

The cotton extension schemes for increasing the production of cotton in the country, sponsored by the Government of India and put into operation in 1950-51, were continued in the various States for the Seventh Year in 1956-57. In 1951-52, these schemes were merged with the cotton plan under the First Five Year Plan. The target of production of cotton fixed under the First Plan was 42.27 lakh bales, against the production of 29.71 lakh bales in 1950-51, the base year of the Plan. Although, this target was achieved in 1954-55, a year ahead of schedule, the production during that year being 42.29 lakh bales, the production was only 40.01 lakh bales in 1955-56, the last year of the Plan. This figure was short of the target by 2.26 lakh bales mainly due to unfavourable weather conditions during the later period of crop growth. The target fixed for cotton under the Second Five Year Plan is 65.00 lakh bales for achievement by 1960-61. The target for 1956-57, was 45.46 lakh bales.

Detailed plans for achieving the targets fixed for the various States in 1956-57, were approved by the Government of India and out-right grants to the extent of Rs. 11.75 lakhs for staff and other expenditure and loans to the extent of Rs. 22.5 lakhs for the purchase of improved seed were sanctioned to the State Governments. The following measures were adopted as in the past, under the cotton extension schemes:—

- (i) Expansion of cotton area by (a) reclamation of waste and fallow lands, (b) replacement of food and other crops by cotton, and (c) growing cotton as a second crop,
- (ii) Intensive cultivation by (a) provision of extra-irrigational facilities, (b) inter-cropping of cotton with other crops, (c) use of improved seed, (d) application of manures and fertilisers, (e) adoption of plant protection measures, and (f) adoption of improved cultural practices,
- (iii) Organising cotton crop competitions, and
- (iv) Propaganda and technical advice to cotton growers.

The season had a good start and *khariif* sowings were generally completed in time. The germination was, on the whole, satisfactory except in parts of Rajasthan, where dry winds damaged the young seedlings and in the Gujarat Zone of Bombay State, where heavy rains in July and August affected the germination adversely. Continuous heavy rains experienced in

many parts of the country hampered intercultural operations but subsequent clear weather proved beneficial. Heavy rains in parts of Andhra Pradesh resulted in poor germination of the late sown crop. The weather was, however, favourable to the crop in Punjab till the end of August. Wide spread rains received in September and October were, in general, favourable for the *rabi* sowings. Excessive rains hampered the sowings of Laxmi cotton in some parts of Mysore State. The humid conditions which prevailed in September and October damaged the crop in the sub-montane districts of the Punjab and also caused attack by jassids and leaf-roller. Heavy rains during this period resulted in shedding of buds and flowers in Rajasthan and the Vidarbha region of Bombay State. The rains also influenced the attack of insect pests in many parts of the country, affecting the quality of crop, which was, however, better compared to that in the previous season. Severe frost during February was reported to have affected the crop in Gujarat to a considerable extent. Thus the expectations of a comparatively bumper crop at the earlier stages of the crop growth did not materialise.

The work done under each of the important measures adopted under the schemes is described below :—

(i) Expansion of area

The targets of additional production of cotton fixed under this measure and their achievements in the various States were as under :—

States.	Additional area (Acres)		Additional Production (Bales)	
	Target	Achievement	Target	Achievement
Punjab-Punjab Division	100,000	103,000	57,000	*
Pepsu ..	20,000	28,000	20,000	*
Rajasthan	*	52,546	21,667	23,907
Uttar Pradesh	20,000	20,000	5,000	2,750
Madhya Pradesh	†	†	†	†
Bombay Saurashtra & Kutch Region	40,000	100,000	8,000	20,090
Vidarbha ..	42,000	58,000	8,400	8,400
Marathwada ..	16,000	16,000	2,666	2,666
Bombay ..	50,000	†	11,000	†
Andhra Pradesh	31,183	31,956	4,499	4,011
Mysore	24,000	71,700	7,500	5,000
Madras	42,000	30,505	20,000	14,080

* Not furnished

† It is felt that area under cotton has reached saturation point.

No targets of additional area have been fixed under the Second Plan but the figures of area given above are as reported by the various States. The targets of additional production could not be achieved in Uttar Pradesh, Madras and Mysore owing to adverse seasonal conditions.

(ii) Provision of extra irrigational facilities

The targets fixed and the achievements reported under this measure in the various States are as under :—

States	Total area (acres)		Additional Production (bales)	
	Target	Achievement	Target	Achievement
Rajasthan	4,000†	2,528†	800	1,756
Uttar Pradesh	*	110,941	22,180	12,200
Bombay Saurashtra & Kutch Region	3,000	3,500	375	440
Vidarbha ..	4,500	4,500	2,250	2,250
Marathwada ..	600	881	300	440
Bombay ..	116,000	100,000	26,000	50,00
Mysore	50,000	31,109	23,700	8,99

* Not fixed

† Represents additional area.

From the above, it will be seen that the targets have been more or less achieved in all the States except Mysore. It is reported that the target could not be achieved in that State as water was not made available during the season for cotton under major irrigation projects, as programmed. The total area under irrigated cotton in the country during 1956-57 season is estimated at 20.7 lakh acres against 18.1 lakh acres in the last season.

The Indian Central Cotton Committee, at its meeting held in July, 1957 while reviewing the progress made under these schemes noted that at present the cultivators in the project areas were not fully utilising the water available for irrigation purposes and recommended that steps be taken by way of propaganda and necessary training in the utilisation of water in order to increase the area under cotton in the various irrigation projects.

(iii) Use of improved seed

The use of seed of improved varieties of cotton is one of the potential measures being adopted at present in the country for increasing yield per

acre. An increase of about 10% in yield is expected under this measure. The quantities of improved seeds distributed by the various State Departments of Agriculture under the scheme and the area covered by improved varieties during 1956-57 as compared with those for 1955-56 are shown in the table below :—

State.	1956-57			1955-56		
	Quantity of seeds distributed. (Mds.)	Area covered by improved varieties. † (acres)	Percentage to total area.	Quantity of seeds distributed (Mds.)	Area covered by improved varieties. † (acres)	Percentage to total area.
Punjab (Former State)	67,000	640,000	69	64,052	755,000	91
Punjab-Pepsu Division	21,000	252,000	52	16,000	250,000	55
Rajasthan.	12,582	236,789	43	9,938	167,400	30
Uttar Pradesh	9,975	104,834	70	5,779	99,000	73
Madhya Pradesh	28,981	*	*	46,310	*	*
Bombay-Saurashtra & Kutch Region	29,212	194,583	16	12,288	109,000	8
- Vidarbha ..	95,348	2,252,400	64	103,412	1,964,000	50
- Marathwada ..	53,113	1,179,306	61	106,928	1,700,000	50
- Bombay ..	335,540	4,485,000	95	323,116	5,118,000	95
Andhra Pradesh	5,101	*	*	2,230	404,421	57
Mysore	118,398	1,876,269	67	5,745	308,000	75
Madras	28,808	*	*	22,749	581,000	59
Orissa	260	1,400	6	123	976	4
Other States.	—	12,000	—	—	12,000	—
Total	805,924	—	—	718,670	—	—

* Not available.

† Includes natural spread.

N. B. :—The information for 1955-56 given above are for the States as they existed before re-organisation.

The targets fixed under this measure have been achieved practically in all the States. However, the procurement of improved seed was handicapped owing to its non-availability in requisite quantities or lack of transport facilities in the States of Rajasthan and Marathwada region of Bombay State. The low distribution of Gaorani 6 and 12 seeds was stated to be due to the cultivators not being in favour of growing these varieties in some areas.

It will be seen from the table above that the total quantity of improved seeds distributed by the various State Departments of Agriculture was 805,924 maunds against 718,670 maunds in 1955-56. The total area covered by improved varieties during 1956-57 may be estimated at some 14.3 million acres against 13.6 million acres in 1955-56.

The Indian Central Cotton Committee, at its meeting held in July, 1957, while considering the progress made under the schemes expressed the opinion that the cotton extension work should be speeded up and efforts made to cover at least 90% of the area under cotton in the different tracts by improved varieties during the next three years.

(iv) Application of manures and fertilisers

Manuring of cotton crop is another important measure for increasing yields. It is estimated that the average increase in yield is of the order of one bale for every ton of fertiliser applied. One ton of fertiliser is estimated to cover an area of 15 to 20 acres. The quantities of fertilisers distributed in the various States during the 1956-57 and 1955-56 seasons were as under :—

State	Quantity distributed (tons)	
	1956-57	1955-56
Punjab - Former State	6,500	5,000
- Pepsu Division	1,600	1,500
Rajasthan	1,841	344
Uttar Pradesh	1,817	854
Madhya Pradesh	86	173
Bombay-Saurashtra & Kutch Region	500	430
Vidarbha Region	5,887	5,237
Marathwada ..	320	433
Bombay ..	5,000 *	5,000 †
Mysore	260	39
Madras	+	+
	23,811	19,010

* Estimated

+ Not available

It will be seen that about 24,000 tons of manures have been applied to the crop during the season, against 19,000 tons in 1955-56. The targets fixed under this item were not achieved in Madhya Pradesh and Marathwada region of Bombay State. The unfavourable weather during the season and the cultivators not being manure-minded resulted in the low distribution of the fertilisers.

In this connection, the Indian Central Cotton Committee had suggested earlier that State Governments should take steps for the issue of fertilisers as *taccavi* loans in kind, a practice which was being followed by some States, such as Punjab, Madhya Pradesh and Andhra Pradesh. The Orissa Government is formulating a scheme for distributing fertilisers on credit to the cultivators through Gram Panchayats and Co-operative Societies. In the Madras State, a detailed scheme is being formulated, for consideration by the State Government. The Uttar Pradesh Government has decided to issue fertilisers on *taccavi* and cash on a 50:50 basis.

(v) Adoption of improved cultural practices

Targets have been fixed under the measure in the States of Rajasthan and Madras and were achieved in both the States.

On an enquiry made of the State Governments, it is understood that line sowing of cotton is being adopted practically in all the States, and predominantly in the Southern States. This practice is now on the increase in the Northern States as well, and almost the entire area under American cotton in Punjab and Uttar Pradesh is sown in lines. But in the case of *desi* varieties of cotton in Uttar Pradesh, the seed is generally sown broadcast as the season for sowing is short and germination is affected due to excessive moisture owing to depressions formed in fields by the plough in the case of line sowing during rainy weather.

Other measures adopted under the schemes for increasing the production of cotton were (i) inter-cropping of cotton with other crops, (ii) provision of plant protection measures (iii) propaganda and publicity, and (iv) holding of cotton crop competitions.

The production of cotton in the country during 1956-57 was officially estimated at 47.23 lakh bales showing an increase of 7.22 lakh bales or 18% compared to that in the previous season. The trade estimate of the crop for the season was around 50.80 lakh bales. The statement below gives the area and production of cotton in the various States in 1956-57, as compared to those in 1950-51, the basic year and 1955-56, the final year of the First Five Year Plan :—

(Based on Official Estimates)

States	Area ('000 acres)			Production ('000 bales)		
	1950-51	1955-56	1956-57	1950-51	1955-56	1956-57
Andhra Pradesh	1,413	1,031	1,005	171	131	135
Assam	30	38	35	12	9	9
Bihar	15	11	7	3	2	1
Bombay	6,879	10,858	10,833	1,439	1,921	2,176
Kerala	18	22	22	6	10	10
Madhya Pradesh	1,925	2,425	2,185	268	403	653
Madras	710	1,160	1,204	214	335	358
Mysore	2,321	2,388	2,403	305	363	358
Orissa	24	24	23	2	2	2
Punjab	693	1,253	1,415	310	605	800
Rajasthan	378	604	542	125	184	167
Uttar Pradesh	106	141	147	45	29	46
Tripura	23	21	20	9	7	8
Other States.	1	2	2	1	—	—
Total	14,536	19,978	19,843	2,910	4,001	4,723

While reviewing the progress made under the cotton extension schemes in 1957-58, at the meeting of the Committee held in July, 1957, the question was raised as to whether the target of 65.00 lakh bales fixed for 1960-61 could not be achieved earlier, particularly in view of the rapid increase in the production and consumption of cloth. As cotton played an important role in this connection, the Committee suggested that the State Governments might be addressed to take effective steps in this direction.

B. L. SETHI,

Secretary,

Bombay, March 1958

Indian Central Cotton Committee.

APPENDIX I

MEMBERS OF THE INDIAN CENTRAL COTTON COMMITTEE

- (i) President, Dr. M. S. Randhawa, I.C.S., Vice-President, Indian Council of Agricultural Research, (*ex-officio*)
- (ia) The Agricultural Commissioner with the Government of India, (*ex-officio*)
- (ii) Representatives of Agricultural Departments :—
- | | | |
|----------------|----|--------------------|
| Madras | .. | Shri A. Venkatesan |
| Bombay | .. | Shri S. P. Mohite |
| Uttar Pradesh | .. | Dr. S. B. Singh |
| Madhya Pradesh | .. | Dr. R. S. Bhatt |
| Punjab | .. | Dr. Arjan Singh |
- (iii) The Director-General of Commercial Intelligence and Statistics, (*ex-officio*)
- (iv) Representatives of Chambers of Commerce and Associations :—
- | | | |
|--|----|-----------------------------|
| The East India Cotton Association | .. | Shri Madanmohan R. Ruia |
| The Bombay Millowners' Association | .. | Shri Vithal N. Chandavarkar |
| The Bombay Chamber of Commerce | .. | Mr. C. S. Barrett |
| The Indian Merchants' Chamber | .. | Shri Chimanlal B. Parikh |
| The Ahmedabad Mill-owners' Association | .. | Shri Surottam P. Huthcesing |
| The Tuticorin Chamber of Commerce | .. | Mr. A. Mueller |
| The Upper India Chamber of Commerce | .. | Shri J. K. Srivastava |
| The Empire Cotton Growing Corporation | .. | Mr. T. H. Parrett |

(v) Representatives of the Cotton Manufacturing or Cotton Ginning Industry :—

- | | | |
|----------------|----|---|
| Madhya Pradesh | .. | { Shri R. V. Deshmukh
Vacant <i>vice</i> Shri P. H. Bhutta |
| ✓ Madras | .. | Shri D. C. Kothari |
| ✓ Punjab | .. | Shri Kundan Lal Ahuja |

(vi) West Bengal Representative Shri T. P. Chakraborty

(vii) Co-operative Banking Representative Shri R. G. Saraiya

(viii) Representatives of Cotton Growing Industry :—

- | | | |
|------------------|----|--|
| Madras | .. | { Shri A. K. D. Balarama Raja
Vacant <i>vice</i> Shri N. Maribasavana
Gowd |
| Bombay | .. | { Shri J. R. Deshmukh
Shri N. S. Patil |
| Uttar Pradesh | .. | { Kunwar Kushal Singh
Shri Digambar Singh |
| ✓ Madhya Pradesh | .. | { Vacant <i>vice</i> Shri S. K. Wankhede
Vacant <i>vice</i> Shri P. S. Patil |
| Punjab | .. | Shri Surja Ram |

(ix) Representatives of other States :—

- | | | |
|-----------|----|----------------------|
| Mysore | .. | Shri M. Mallaraj Urs |
| Rajasthan | .. | Shri Samrath Raj |
| Kerala | .. | Shri P. D. Nair |

(x) Additional Members nominated by the Central Government under the Section 4 (x) of the Indian Cotton Cess Act :—

- Shri Chunilal B. Mehta
Mr. D. N. Mahta
Shri R. J. Patil

Dr. M. D. Patel
 Shri Bharat Ram
 Shri V. Nanjappa
 Dr. V. K. R. V. Rao
 Mr. Neville Wadia
 Pandit Thakur Dass Bhargava
 Sardar Satwant Singh
 Shri C. Jagannatha Rao
 Shri Kalidas Sawhney

Economic and Statistical Advisor to the Government of India
 and
 Joint Secretary to the Government of India, Ministry of Finance
 (Food & Agricultural Division), New Delhi.

APPENDIX II

SUB-COMMITTEES

STANDING FINANCE SUB-COMMITTEE

Shri Madanmohan R. Ruia (Vice-President), *Chairman*,
 Dr. M. S. Randhawa (President), (*ex-officio*),
 Shri Chimanlal B. Parikh,
 Shri R. G. Saraiya,
 Shri Chunilal B. Mehta,
 Mr. D. N. Mahta,
 Shri Vithal N. Chandavarkar,
 Mr. C. S. Barrett,
 Vacant *vice* Shri P. S. Patil.

LOCAL SUB-COMMITTEE

Dr. M. S. Randhawa, (President),
 Shri Madanmohan R. Ruia, (Vice-President),
 Shri Chimanlal B. Parikh,
 Shri R. G. Saraiya,
 Shri Chunilal B. Mehta,
 Mr. D. N. Mahta,
 Shri Vithal N. Chandavarkar,
 Mr. Neville Wadia,
 Mr. C. S. Barrett,
 Shri S. P. Mohite,
 Mr. A. Mueller,
 Shri J. R. Deshmukh.

AGRICULTURAL RESEARCH SUB-COMMITTEE

- i. The President—Dr. M. S. Randhawa, (*ex-officio*),
- ii. The Vice-President—Shri Madanmohan R. Ruia, (*ex-officio*),
- iii. Co-operative Banking Representative—Shri R. G. Saraiya,
- iv. Cotton Growers' Representatives :—

Vacant <i>vice</i> Shri S. K. Wankhede
Vacant <i>vice</i> Shri P. S. Patil
Shri N. S. Patil

v. Cotton Trade
Representatives :—

{ Shri Samrath Raj
Shri Chunilal B. Mehta
Mr. C. S. Barrett
Mr. A. Mueller
Vacant *vice* Shri P. H. Bhutta
Shri D. C. Kothari

vi. Agricultural
Officers :—

{ The Agricultural Commissioner with
the Government of India,
(*ex-officio*)
Shri A. Venkatesan
Mr. D. N. Mahta
{ Dr. S. B. Singh
Shri S. P. Mohite
Dr. Arjan Singh
Shri Samrath Raj
Shri M. Mallaraj Urs
{ Dr. R. S. Bhatt

vii. Additional
Members :—

{ Pandit Thakur Dass Bhargava
Shri K. Sawhney
Shri J. L. Merh
Dr. V. G. Panse
Dr. B. P. Pal
Dr. R. S. Vasudeva
Dr. E. S. Narayanan
Dr. S. M. Sikka
{ Prof. R. H. Dastur
Dr. R. L. N. Iyengar
Shri G. B. Patel
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Dr. K. V. Giri
Dr. B. L. Gupta
Dr. R. D. Asana
Dr. Gursham Singh
Shri L. Neelkantan
{ The Cotton Botanist, Bombay State
Shri V. K. Bederker
The Economic Botanist Institute of
Plant Industry, Indore
The Economic Botanist, Assam
The Economic Botanist, Bihar
The Cotton Development Officer,
{ Orissa

viii. The Secretary, Indian Central Cotton Committee, (*ex-officio*)

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The Vice-President, (Shri Madanmohan R. Ruia),
The Agricultural Commissioner with the Government
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} (*ex-officio*),
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Shri Chimanlal B. Parikh,
Shri R. G. Saraiya,
Shri Chunilal B. Mehta,
Shri Vithal N. Chandavarkar,
Mr. Neville Wadia,
Shri Bharat Ram,
Mr. D. N. Mahta,
Mr. A. Mueller,
Shri J. K. Srivastava,
Vacant *vice* Shri P. H. Bhutta,
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Dr. R. S. Bhatt,
 Shri S. P. Mohite,
 Shri Kalidas Sawhney,
 Dr. Arjan Singh,
 Shri R. V. Deshmukh,
 The Director of Industries, Bombay,
 Shri J. L. Merh,
 Dr. R. L. N. Iyengar,
 Dr. V. G. Panse,
 Dr. S. M. Sikka,
 Dr. Gursham Singh,
 Shri L. Neelkantan,
 Shri C. Jagannatha Rao,
 The Economic Botanist, Institute of Plant Industry, Indore,
 Vacant *vice* Shri P. S. Patil,
 Shri V. K. Bederker,
 Shri P. S. Pandya,
 Shri P. S. Gupta,
 The Principal, Victoria Jubilee Technical Institute, Bombay,
 Dr. G. M. Nabar,
 Shri Babulal Bubna,
 Shri B. D. Kulkarni,
 Shri Madanmohan Ramanlal,
 Shri Madhusudan Chamanlal,
 Shri Manilal H. Patel,
 Shri Jamnadas Ramdas Dossa,
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The President, (Dr. M. S. Randhawa),	}	(ex-officio)
The Vice-President, (Shri Madanmohan R. Ruia),		
The Agricultural Commissioner with the Government of India, (Dr. B. N. Uppal),		
The Director General of Commercial Intelligence and Statistics, Dr. V. K. R. V. Rao,		

The Director of Agriculture, Bombay State,
 The Director of Agriculture, Madras State,
 The Director of Agriculture, Uttar Pradesh,
 The Director of Agriculture, Madhya Pradesh,
 The Director of Agriculture, Punjab,
 The Director of Land Records, Madhya Pradesh,
 The Director of Statistics, Madras,
 Shri Chimanlal B. Parikh,
 Shri R. G. Saraiya,
 Shri Chunilal B. Mehta,
 Mr. D. N. Mahta,
 Mr. A. Mueller,
 Shri D. C. Kothari,
 Shri K. Sawhney,
 The Director, Bureau of Economics and Statistics, Hyderabad-Deccan,
 The Economic and Statistical Advisor to the Government of India, Ministry of
 Food and Agriculture,
 Dr. V. G. Panse.

COTTON GINNING AND PRESSING FACTORIES SUB-COMMITTEE

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 The Vice-President (Shri Madanmohan R. Ruia), (*ex-officio*),
 Shri Chimanlal B. Parikh,
 Shri Vithal N. Chandavarkar,
 Shri Chunilal B. Mehta,
 Mr. A. Mueller,
 Mr. C. S. Barrett,
 Shri D. C. Kothari,
 Shri Kundan Lal Ahuja,
 Shri J. K. Srivastava,
 Shri R. V. Deshmukh,
 Shri R. G. Saraiya,
 Shri S. P. Mohite
 Dr. R. S. Bhatt,
 Dr. R. L. N. Iyengar,
 Shri K. Sawhney.

**The President, (Dr. M. S. Randhawa),
The Vice-President, (Shri Madanmohan R. Ruia),
Shri Chimanlal B. Parikh,
The Director of Agriculture, Bombay State,
The Secretary.**

RESEARCH STUDENTS SELECTION SUB-COMMITTEE

The President (Dr. M. S. Randhawa), (*ex-officio*),
The Vice-President, (Shri Madanmohan R. Ruia), (*ex-officio*).
The Agricultural Commissioner with the Government
of India (Dr. B. N. Uppal),
Shri Chimanlal B. Parikh,
Dr. R. L. N. Iyengar, Director, Technological Laboratory,
The Secretary, (*ex-officio*).

APPENDIX III

Statement of Receipts and Payments for the year ended 31st March, 1957.

[illegible]

* Due to the adjustment of Rs. 1,10,089-15-4 on account of transfer of miscellaneous receipts to the schemes financed from the Cotton Fund.
† Due to the adjustment of Rs. 5,32,116/- being interest on unpaid balances transferred to Cotton Fund account and non-receipt of interest on securities for want of exemption certificates from the Income-tax Officer.

$$x_8 (j781) \cdot 2 \text{ n57t}$$