Indian central cotton committee

1956 - August.

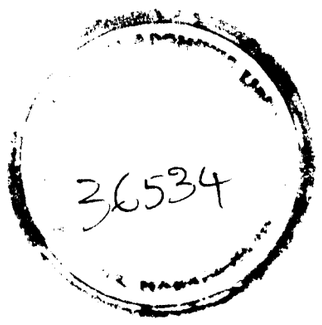
THIRTY-FIFTH
ANNUAL REPORT

of the

INDIAN CENTRAL COTTON COMMITTEE

for the year ended
31st August,
1956.

PRICE Rs. 3/-



74th MEETING OF
THE INDIAN CENTRAL COTTON COMMITTEE
(Held in September, 1956)

Facing the Camera *From left to right:—*

1st Row—Shri Madanmohan R. Ruia, Shri Vithal N. Chandavarkar, Shri Chunilal B. Mehta, Shri R. G. Saraiya, Shri Chimanlal B. Parikh (Vice-President), Dr. M. S. Randhawa, I.C.S., (President, I.C.C.C.), Dr. B. L. Sethi (Secretary), Dr. B. N. Uppal.

2nd Row—Shri T. P. Barat.

3rd Row—Shri R. M. Sundaram.

Back to Camera—

1st Row—Shri S. K. Wankhede, Shri P. N Suri.

2nd Row—Reporter.

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INDIAN CENTRAL COTTON COMMITTEE

ANNUAL REPORT

CHAPTER I

GENERAL

This is the thirty-fifth Annual Report, covering the period 1st September, 1955 to 31st August, 1956.

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, following 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

*One lakh = One hundred thousand.

raw cotton. In order to provide a more assured and adequate income to the Committee to carry out its work and policy effectively, two successive amendments of the Indian Cotton Cess Act, were carried out 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-five 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 growers' interest must be paramount in all matters considered by it.*

The first task of the Committee was to initiate a well-directed 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 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 they represented, as on the 31st August, 1956 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 each

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, the post of the Secretary of the Committee was held by Shri P. D. Nair upto the 2nd October, 1955 and by Dr. B. L. Sethi from the 3rd October, 1955 onwards. The post of Deputy Secretary was held by Dr. R. Sankaran upto the 6th February, 1956, by Shri M. S. Natesan thereafter upto the 29th February, 1956, and by Shri K. Dharmarajulu from the 24th August, 1956 onwards. The post of Assistant Secretary was held by Shri M. S. Natesan upto the 6th February, 1956, by Shri K. Dharmarajulu from the 7th February to the 23rd August, 1956 and by Shri T. T. Paulose from the 24th August, 1956 onwards.

The total receipts of the Committee since its inception in 1923, to the 31st March, 1956, amounted to Rs. 3,75,12,515-4-8 of which Rs. 2,95,40,759-13-5 represent collections from the Cotton Cess and miscellaneous receipts and the remainder, special grants from the Government of India from the Fund for the benefit of cotton growers. The receipts during the financial year 1955-56 amounted to Rs. 15,13,616-11-1, the total expenditure being Rs. 20,86,974-10-7. A statement of receipts and payments for the year ending 31st March, 1956, is given in Appendix III.

Shri 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, 1956. During the year under report, Shri Chimanlal B. Parikh represented the Committee on the Indian Council of Agricultural Research. In addition, Dr. B. L. Sethi also represented the Committee on the Indian Council of Agricultural Research and its Advisory Board with effect from 27th August, 1956. Shri Chunilal B. Mehta with Mr. A. P. Darlow as alternative member continued as the Committee's representative on the Administrative Council of the Empire Cotton Growing Corporation during the period under review. 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' repre-

sentatives, three persons, not having dealings in forward contracts, as Directors of the Association. Sarvashri S. K. Wankhede, S. T. More (upto 31st March, 1956) and A. S. Desai worked in this capacity during the cotton year 1955-56.

One meeting of the Committee was held during the year under report. This meeting was inaugurated by the Dr. Punjabrao Deshmukh, Union Minister for Agriculture, Ministry of Food & Agriculture, Government of India, New Delhi and was presided over by Shri M. S. Randhawa in his capacity as the Vice-President, Indian Council of Agricultural Research.

One of the important subjects considered by the Committee at this meeting was the organisation of cotton research on a regional basis, which arose as a sequel to the recommendations of Dr. S. C. Harland who examined on the spot and reviewed the work being carried out on cotton at the several Research Stations and submitted a report. The main functions of the Regional Research Stations are to deal with cotton problems of fundamental research as well as such applied research problems as are common to the areas in the various States, included in a particular region. Though this regionalisation of research would result in increased expenditure in some directions, economies would also be possible by preventing overlapping and duplication of work.

Another important decision related to the holding of the Conference on Cotton Growing Problems in India. This Conference which used to be held at Bombay every third year, is now proposed to be held annually in the first instance at different centres of cotton research and, after the establishment of Regional Research Stations, at those centres also by rotation. Accordingly, the Seventh Conference was proposed to be held at Chandigarh in the first week of November, 1956.

The Committee considered the following resolution moved by Shri S. T. More, a representative of the cotton growers:—

> "The Committee is of opinion that it is detrimental to the cotton growers to put restrictions in the prices of cotton especially at such a time that the grower has not sold all his cotton. The effect of this sort of policy of Government is that there is no hedging in cotton trade".

The representatives of the growers, trade, the mill-owners and the Government took part in the discussion at the meeting. During discussion, it was argued that there was justification for Government to take action, inasmuch as the prices in the forward market were completely unrelated to those in the spot market. It was also pointed out that if the prices had been allowed to rise unchecked, there was a great danger of the success of the Second Five Year Plan being jeopardised. As the matter was *sub judice* the resolution was not passed but, as decided a copy of the discussion was sent to the Government of India for their consideration. Later, the Bye-laws of the East India Cotton Association were amended with a view to making the hedge contract more realistic and futures trading was permitted from the 18th June, 1956, with two hedge contracts, *viz.*, Fine M.G. Jarila 25/32" and Fine M.G. Broach 27/32".

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 remodelling 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.

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PRODUCTION OF COTTON

(Thousand bales of 392 lbs. each)

Staple length groups	1950-51	%	1951-52	%	1952-53	%	1953-54	%	1954-55	%	1955-56	%
Long staple (7/8″ and above)	684	23	918	29	905	29	1,442	36	1,529	36	1,577	39
Medium staple (Below 7/8″ and above 11/16″)	1,448	49	1,223	39	1,395	44	1,651	42	1,908	45	1,781	44
Short staple (11/16″ and below)	839	28	992	32	831	27	872	22	790	19	662	17
Total ..	2,971	100	3,133	100	3,131	100	3,965	100	4,227	100	4,020	100

As compared to 1950-51, the total production of cotton has increased during the plan period by 35% and that of long and medium staple varieties by 131 and 23 per cent respectively. On the other hand, the production of short staple cotton decreased by 21%. Thus, the trend is for producing finer varieties of cotton, particularly long staple.

(ii) Report on staple length of Indian cotton crop

A report on the staple length of the Indian cotton crop, based on the final estimate of the cotton crop, issued by the Directorate of Economics and Statistics, New Delhi, and on the information obtained from the State Departments of Agriculture, is published by the Committee annually. The approximate distribution of the crop in 1955-56 into the five staple length groups with the corresponding figures for the previous five seasons is shown in the table on next page.

COTTON PRODUCTION

(Thousand bales of 392 lbs. each)

Staple length groups	1950-51	%	1951-52	%	1952-53	%	1953-54	%	1954-55	%	1955-56	%
Superior long staple (1″ and above)	47	2	55	2	66	2	103	3	117	3	305	8
Long staple (7/8″ to 31/32″)	637	21	863	27	839	27	1,339	33	1,412	33	1,272	31
Superior medium staple (13/16″ to 27/32″)	793	27	825	26	842	27	1,044	27	1,215	29	1,217	30
Medium staple (Below 13/16″ and above 11/16″)	655	22	398	13	553	17	607	15	693	16	564	14
Short staple (11/16″ and below)	839	28	992	32	831	27	872	22	790	19	662	17
Total ..	2,971	100	3,133	100	3,131	100	3,965	100	4,227	100	4,020	100

(iii) Improvement in yield per acre

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

(1) Distribution of seed of improved varieties

(2) Application of manure

(3) Extension of irrigation facilities

(4) Adoption of improved cultural practices, such as line sowing, proper spacing between lines and plants, inter-cropping, etc.

(5) Control of insect pests and diseases.

Vigorous propaganda for these measures is being 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 estimates of actual crop arrived at by the Committee during the six year period ending 1955-56:—

YIELD PER ACRE OF COTTON

Year (1st September to 31st August)	Area (Thousand acres)	Estimated production (Actual crop) (Thousand bales of 392 lbs. each)	Yield per acre (lbs.)
1950-51 ..	14,556	3,282	89
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 ..	20,230	4,600	90

It will be seen that there has been a steady improvement in the yield per acre, except in 1955-56 which was low due to unfavourable weather conditions that prevailed during the period of crop growth.

(iv) Statistics of cotton pressed

The State-wise figures of cotton pressed during the year under report with those for the five preceding seasons are given in the table on next page.

COTTON PRESSED

(Thousand bales of 392 lbs. each)

States	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
Bombay	724	750	845	1,322	1,795	1,362
Madras	206	207	198	90	135	157
Andhra	*	*	*	86	103	116
Madhya Pradesh	598	981	713	713	858	550
Punjab	153	229	249	349	437	423
Uttar Pradesh ..	—	1	3	4	9	4
West Bengal ..	8	8	9	11	25	16
Assam	5	3	5	7	22	5
Hyderabad ..	306	461	280	223	266	168
Pepsu	170	226	248	234	277	244
Madhya Bharat ..	60@	242	245	314	255	279
Saurashtra ..	202	88	160	246	378	262
Rajasthan ..	93	82	109	147	136	119
Mysore	21†	17†	9†	26	47	72
Ajmer	12	8	15	26	23	19
Bhopal	3	6	13	11	11	3
Kutch	4	1	7	12	28	16
Total ..	2,565	3,310	3,069	3,821	4,805	3,815

*Included under Madras. @Incomplete.
†Excluding Bellary district, figures for which are included under Madras.

(v) Imports

At present, imports are restricted to cotton stappling 1-1/16" and above. Cotton of staple 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 mainly from Egypt, Sudan, Peru and Aden. During the year under report, the imports aggregated to 6.10 lakh bales against 6.14 lakh bales in the previous year. The following statement shows the figures of imports of cotton from foreign countries during the last six seasons:—

IMPORTS OF COTTON

(Thousand bales of 392 lbs. each)

Countries	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
Egypt	253	147	255	263	143	214
Sudan	72	53	79	45	79	130
East Africa ..	217	135	228	183	287	234
U. S. A. ..	265	890	86	190	93	10
Peru	13	10	5	—	7	4
Others	11	5	24	10	5	18
Total ..	831	1,240	677	691	614	610

(vi) Mill consumption

The Committee publishes monthly, the figures of mill consumption of Indian and foreign cotton, for general information. These statistics are based on the returns furnished by mills under the Indian Cotton Cess Act, 1923. The mill consumption of Indian and foreign cotton in Part, A, B and C States during 1955-56 season, with those for the previous five seasons are shown below:—

MILL CONSUMPTION OF COTTON
(Thousand bales of 392 lbs. each)

States	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
			Indian Cotton			
Part A States ..	1,850	2,241	2,808	3,057	3,269	3,418
Part B States ..	509	547	600	618	656	689
Part C States ..	142	166	182	185	199	206
Total ..	2,501	2,954	3,590	3,860	4,124	4,313
			Foreign Cotton			
Part A States ..	1,083	1,071	850	719	622	597
Part B States ..	48	49	33	28	19	14
Part C States ..	17	14	6	6	5	4
Total ..	1,148	1,134	889	753	646	615

The mill consumption of cotton in India, during the year under report reached the all-time record of 4,928,000 bales, comprising 4,313,000 bales of Indian and 615,000 bales of foreign cotton. As compared with 1950-51 (base year), this shows an increase of 1,812,000 bales or 73% in the consumption of Indian cotton and a reduction of 533,000 bales or 46% in that of foreign cotton. Such increase in mill consumption was made possible by increase in the production of cotton during the First Five Year Plan.

The mills situated in the cotton growing areas generally consume large quantities of loose (ginned but unpressed) cotton. Consumption of such cotton during the 1955-56 season, as compared with the previous five seasons was as shown in the table on next page.

MILL CONSUMPTION OF LOOSE (UNPRESSED) COTTON
(Thousand bales of 392 lbs. each)

States	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
Part A States ..	174	184	188	225	282	290
Part B States ..	57	64	62	57	67	54
Part C States ..	12	12	11	9	10	5
Total ..	243	260	261	291	359	349

(vii) Demand for various types of cotton in India

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 1955-56 were 41.2 lakh bales and 6.4 lakh bales respectively against 44.4 lakh bales and 6.6 lakh bales in the previous season. The percentages of long, medium and short staple Indian cottons were 45, 50 and 5, respectively. The figures of receipts of foreign cotton in 1955-56 classified according to countries of origin, with the corresponding figures for the previous five seasons, are given below:—

RECEIPTS AT MILLS OF FOREIGN COTTON
(Thousand bales of 392 lbs. each)

Country of origin	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
Pakistan ..	36	10	15	23	4	—
Egypt	268	149	235	277	169	194
Sudan	77	55	82	52	78	142
East Africa ..	204	133	260	192	261	257
American (U.S.A., Peru etc.) ..	371	884	188	191	134	15
Others	—	4	3	7	11	31
Total ..	956	1,235	783	742	657	639

(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 up to and including 25/32" was allowed for export. The varieties which were exported during the year were Bengal *Deshi*, Oomras, Dholleras, Assam Comillas, Cocanadas, Kalyan, Jarila, Virnar, Vijay, etc. The statement on next page shows the figures of exports of Indian cotton to different countries. A separate

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Leaflet showing cotton exported during the year according to varieties is published by the Committee compiled from voluntary returns received from exporters.

QUANTITY EXPORTED

(Thousand bales of 392 lbs. each)

Countries	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
United Kingdom	28	10	18	18	46	65
U.S.A.	73	14	42	12	18	4
Europe	22	52	105	30	77	103
Japan	61	124	141	73	135	340
China (including Hongkong)			—	—	40	97
Others			3	1	3	3
Total	184	200	309	134	319	612

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

Statistics of stocks of cotton held by the mills at the end of each cotton season are collected on the voluntary basis and those held by the trade through the co-operation of State authorities and trade bodies. Such statistics in the States of Bombay, Madhya Pradesh, Uttar Pradesh, Punjab, Hyderabad and Saurashtra are collected on a statutory basis. The figures of stocks of Indian and foreign cotton held by the mills and trade on the 31st August, 1956, with those for the previous five years are shown in the statement below:—

STOCKS OF COTTON HELD BY MILLS AND THE TRADE ON 31ST AUGUST.

(Thousand bales of 392 lbs. each)

	1951	1952	1953	1954	1955	1956
			Mills			
Indian cotton	1,236	1,260	1,013	1,011	1,443	1,408
Foreign cotton	301	391	246	200	179	205
Total	1,537	1,651	1,259	1,211	1,622	1,613
			Trade			
Indian cotton	520	830	560	860	990	367
Foreign cotton	60	100	70	80	80	70
Total	580	930	630	940	1,070	437
Grand Total	2,117	2,581	1,889	2,151	2,692	2,050

(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

	Long staple	Medium staple	Short staple	Total
	(Lakh bales of 392 lbs. each)			
A. Supply				
1. Carryover on 31st August, 1955				
(a) *with mills*				
Indian cotton	5.1	8.5	0.8	14.4
Foreign cotton	1.8	–	–	1.8
(b) *with trade*				
Indian cotton	2.5	3.9	3.5	9.9
Foreign cotton	0.8	–	–	0.8
Total	10.2	12.4	4.3	26.9
2. Production	18.0	22.5	5.5	46.0
3. Imports	6.1	–	–	6.1
TOTAL SUPPLY	34.3	34.9	9.8	79.0
B. Distribution				
4. Mill consumption				
Indian cotton	18.2	22.9	2.6	43.7
Foreign cotton	6.0	–	–	6.0
5. Exports	–	3.1	3.0	6.1
6. Extra-factory consumption	–	0.4	2.3	2.7
TOTAL DISTRIBUTION	24.2	26.4	7.9	58.5
C. Carryover on 31st August, 1956				
(a) *with mills*				
Indian cotton	6.3	7.2	0.6	14.1
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	34.3	34.9	9.8	79.0

The position regarding supply and distribution of cotton during the six years ending 1955-56 is shown in the table below:—

Year ending 31st August	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
		(Lakh bales of 392 lbs. each)				
SUPPLY						
Opening stocks with mills ..	14.2	15.4	16.5	12.6	12.1	16.2
,, ,, ,, trade ..	6.7	5.8	9.3	6.3	9.4	10.7
Production (Actual crop) ..	32.8	37.6	36.7	45.8	52.9	46.0
Imports	8.3	12.4	6.8	6.9	6.1	6.1
Total Supply ..	62.0	71.2	69.3	71.6	80.5	79.0
DISTRIBUTION						
Mill consumption of Indian cotton	25.2	29.9	36.1	38.9	41.4	43.7
Mill consumption of Foreign cotton	11.0	10.8	8.5	7.2	6.3	6.0
Exports	1.9	2.0	3.1	1.3	3.2	6.1
Extra-factory consumption ..	2.7	2.7	2.7	2.7	2.7	2.7
Total Distribution ..	40.8	45.4	50.4	50.1	53.6	58.5
Carryover with mills	15.4	16.5	12.6	12.1	16.2	16.1
,, ,, ,, trade ..	5.8	9.3	6.3	9.4	10.7	4.4
Total ..	21.2	25.8	18.9	21.5	26.9	20.5

(xi) Cotton prices

Control on cotton prices was continued during 1955-56 and the minimum and maximum prices for the different varieties remained the same as for the previous season. Due to smaller crop and scarcity of quality cotton, the prices during the early part of the season ruled higher than those in the previous year.

During the year under report, futures trading in cotton was done in the Bombay cotton market under the Forward Contracts (Regulation) Act, 1952. The Indian Cotton Contract, February, 1956, delivery, opened at Rs. 630 on the 1st September, 1956. During the month, prospects of good crop in India and U.S.A., expectation of an announcement of export quota, announcement of export sales programme and slackness in spinners' demand, influenced the market and the price dropped to Rs. 610½ on the 28th September. Thereafter, unfavourable heavy rains, reported crop damage, possible scarcity of tenderable cotton, record sales of piecegoods and trade support pushed up prices from Rs. 626½ on the 3rd October, to

Rs. 688½ on the 30th November. During December, however, up-country arrivals, continued spinners' demand and short covering raised the price to Rs. 747 on 22nd December and sharply declined to Rs. 735 on the 23rd December, on heavy liquidation and profit taking. Trading in May Contract was permitted from 5th November and the price rose from Rs. 637 on that day to Rs. 705 on the 23rd December.

Trading in both Contracts was suspended by the Government of India from that day, following the rise in price by about Rs. 140 per candy during the previous 4 or 5 weeks due to heavy speculation and option dealings. In view of an emergency having thus arisen, the East Indian Cotton Association prohibited from the 7th January, 1956, trading in the hedge contracts above a maximum of Rs. 700 per candy fixed by the Government. From that date to 24th January, the February Contract remained glued to the maximum and the May Contract fluctuated between Rs. 682 to Rs. 698. Subsequently, the Government of India directed the East India Cotton Association to close the Contracts on the 25th January, 1956, at Rs. 700 and Rs. 686½ respectively. Since then, there was no forward trading in Bombay cotton market up to 18th June, 1956.

Trading was resumed with effect from the 18th June, 1956 and with two hedge contracts, one with Jarila 25/32″ Fine and the other with Vijay 27/32″ Fine, as basis. This change was expected to provide a better hedge and offer protection to a larger crop. The delivery months for Jarila Contract are March, May and July and those for Vijay Contract are April, June and August. By the shift in the month of delivery from February to March, it is expected that larger supplies of cotton would be available for tender. On the 18th June, trading started with Jarila, March 1957 delivery, at Rs. 681¼ and Vijay, April 1957 delivery, at Rs. 825¼. On reports of satisfactory rains in cotton growing tracts and discouraging offtake of cloth, the prices slumped to Rs. 642/- and Rs. 803/- on the 21st June. The announcement of Government's new textile policy of producing additional 1,700 million yards of cloth in the Second Five Year Plan period and news of no change in floor and ceiling prices for the 1956-57 season, raised the price of Jarila to Rs. 663 by the end of June 1956. During the same period, Vijay Contract moved upto Rs. 825 and closed steady at Rs. 816 on the 30th June. Thereafter the prices fluctuated on reports of favourable and un-

favourable weather conditions, U.S. aid agreement and revision of excise duty on cloth. Jarila Contract was quoted at Rs. 668½ on the 4th July and was pushed up to Rs. 671½ on the 31st July. After rising to the highest level of Rs. 705 on the 14th August, the Contract closed on the 31st August, at Rs. 682½. Vijay Contract rose to Rs. 822 on the 4th July and receded to Rs. 800½ on the 31st July. During August, the Contract which opened at Rs. 809½ rose to Rs. 837 on the 14th August and declined to Rs. 819 on the 31st August.

The graph on page 133 of the Report shows the progress of prices in the Bombay cotton market, both futures and spot.

(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 yarn and cloth exports of cotton piecegoods and Government policy affecting raw cotton and cotton manufacturers, as announced by Government from time to time.

(xiii) Improvement of cotton forecasts

The official forecasts of area and production of cotton in the country is an important factor in judging the prospects of the supply of cotton to meet possible demand. This knowledge is of importance to the trade and the grower alike. To the grower, it serves as a useful guide in forming an idea of the probable future value of his crop. Its usefulness depends mainly on the accuracy and reliability of the forecasts. For this purpose, the official forecasts are compared with the data of actual utilisation of the crop. This examination also serves to locate sources of error in the forecasts and to suggest remedial measures.

During the year under report, the all-India official estimates of cotton (both State-wise and variety-wise) for the 1953-54 season were compared with the estimates of the actual crop arrived at on the basis of figures of cotton consumed in mills, cotton pressed, exported, held in stock, etc. The actual crop has been estimated at 45.73 lakh bales, as against the final official estimates of 39.35 lakh bales (revised to 39.65 lakh bales). Thus, the official estimate was

an under estimate by 14.0% of the actual. The following table compares official estimates of the different major trade blocks and main varieties with the actual crop.

1953-54

Trade Blocks or Varieties	In bales of 392 lbs. each			Percentage deviation from actual crop	
	Actual crop	Official estimate			
		Final	Revised	Final	Revised
Trade Blocks					
Assam	11,000	19,000	19,000	+72.7	+72.7
Punjab, Pepsu, Delhi & Himachal Pradesh ..	6,74,000	5,46,000	5,54,000	−19.0	−17.8
Madhya Pradesh ..	7,32,000	6,47,000	6,78,000	−11.6	−7.4
Bombay, Saurashtra & Kutch	16,50,000	13,05,000	13,05,000	−20.9	−20.9
Madras, Andhra & Travancore-Cochin ..	4,18,000	3,65,000	3,69,000	−12.7	−11.7
Rajasthan & Ajmer ..	1,89,000	1,85,000	1,27,000	−2.1	−32.8
Madhya Bharat, Bhopal & Vindhya Pradesh	3,35,000	3,45,000	3,30,000	+3.0	−1.5
Hyderabad	4,04,000	3,81,000	4,04,000	−5.7	—
Mysore	1,02,000	75,000	1,24,000	−26.4	+21.6
Varieties					
Bengals	5,00,000	4,34,000	3,53,000	−13.2	−29.4
Americans	11,78,000	9,20,000	9,41,000	−21.1	−20.1
Oomras	13,04,000	13,32,000	10,32,000	+2.1	−20.8
Dholleras	4,09,000	3,04,000	3,04,000	−25.6	−25.6
Southerns	4,59,000	3,41,000	3,46,000	−25.7	−24.6

(xiv) Crop estimating surveys on cotton

With a view to have an objective assessment of the production of cotton, crop-estimating surveys on a random sampling method have been recommended for adoption. The technique employed under the survey is to determine the average yield of *kapas* per acre by actual pickings in a certain number of plots randomly selected for the purpose and calculating the yield per acre for the tract. The data thus collected for a number of years can be utilised for purposes of preparing the final official estimates of the crop and the periodical revision of district standard outturns. These surveys are at present in operation in the States of Madhya Pradesh and Bombay as an annual routine and in Rajasthan in the initial stages. The work done in these States during the year under report is indicated below:—

Madhya Pradesh.—The survey in Madhya Pradesh has been in operation for 13 years since 1943-44. During the 1955-56 season, the survey covered 99.4% of the total area under cotton in the State. Complete *Girdwari* of sample villages works out to 4,129,000 acres against the forecast estimate of 3,991,000 acres. On the basis of the survey, the average yield per acre of *kapas* in the State comes to 95.6 lbs., the average ginning percentage being 35.3. Thus, the total production of cotton lint in the State is estimated at 3,56,000 bales of 392 lbs. each, with a marginal error of 20,000 bales based on the *Girdwari* estimate of area, against 453,000 bales.

Bombay State.—The survey has been in operation in this State for ten years since 1946-47. In 1955-56, an area of 5,367,000 acres, comprising 99.8% of the total area under cotton in the State, was covered by the survey. The total production of cotton lint in the State during the season was estimated at 1,195,000 bales, with a standard error of 29,000 bales.

Rajasthan.—The survey is being conducted in the State since 1952-53. During 1955-56, the survey covered an area of 465,450 acres, or 85.4% of the total area under cotton in the State. The production of cotton lint in the State on the basis of the results of the survey was estimated at 148,807 bales.

The Indian Central Cotton Committee has been stressing time and again the importance of crop estimating surveys on cotton being conducted in all the cotton growing States, in order to arrive at an accurate estimate of the cotton crop. The Committee has accordingly offered to finance such schemes fully for a period of five years, subject to the States concerned giving an undertaking to the effect that the scheme would be continued at their own expense after the five year period. The Madras Government have agreed to conduct the surveys at their own cost. As regards other States, the proposals received in this connection from the States of Punjab, Hyderabad, Pepsu, Madhya Bharat, Rajasthan and Uttar Pradesh were approved by the Committee and the necessary sanction of the Government of India was applied for. The schemes were held up for some time pending a decision by the Government of India in regard to the demarcation of the functions of the various units of the Ministry of Food and Agriculture. Subsequently, as suggested by the Government of India, the schemes were forwarded for scrutiny to the Directorate of National Sample Survey under the Cabinet Secretariat.

The Directorate of National Sample Survey have now intimated that they have been authorised to take up the work of crop estimating surveys. Detailed proposals are awaited.

The persistant disparity between the official and trade estimates of production of cotton in the country was a matter for serious consideration by the Committee at its meeting held in September, 1956. 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 Sub-Committee to examine the various points thoroughly and to suggest ways and means of effecting improvements in the accuracy of all cotton statistics.

(xv) Cost of production surveys on cotton

A pilot scheme was conducted under the joint auspices of the Indian Central Cotton Committee, the Indian Council of Agricultural Research and the Indian Central Oilseeds Committee in the Akola district of Madhya Pradesh during 1952-53, for obtaining data on the human and bullock labour and materials required for the estimation of the cost of production of cotton and other rotation crops. The survey conducted under the scheme yielded useful results and it was considered very essential that such data should be collected for the important cotton growing tracts, for dealing with the questions relating to the economics of cultivation of cotton and other competing crops, fixation of prices for different varieties of cotton, relative price levels for cotton and cotton textiles, formulation of agricultural policy and other connected issues.

In this connection, the Committee considered and approved of a scheme for estimating the cost of production of cotton and its rotation crops in the major cotton growing tracts in India, at an estimated cost of Rs. 12 lakhs spread over a period of 3 years, to be shared equally by the Indian Central Cotton Committee, the Indian Council of Agricultural Research and the Indian Central Oilseeds Committee. The co-ordinated scheme was proposed to cover four regions, *viz.* (1) Punjab and Pepsu, (2) Gujerat and Saurashtra, (3) *Rabi* cottons tract of Karnatak and (4) Westerns tract.

(xvi) Extra-factory consumption of cotton

Cotton is utilised in loose condition for such domestic purposes as hand spinning, making of quilts, mattresses, wicks, etc. On the

basis of the survey conducted by the Committee in 1933-36, it was estimated that about 270,000 bales were utilised for the purpose. Due to changed circumstances, on account of World War II, prevailing high prices for cotton and the increased demand for cotton by the textile industry, it was considered that this figure may not reflect the correct position in regard to such consumption, at present. Accordingly, the Committee decided that fresh investigations should be undertaken to obtain more accurate estimates of extra-factory consumption of cotton in some States where such consumption was high. A model scheme drawn up for conducting these surveys in the States of Uttar Pradesh, Punjab, Pepsu, Hyderabad and Madras, was approved by the Committee. The scheme was put into operation in March, 1956, in the States of Hyderabad and Punjab and in July, 1956, in the Madras State. The field survey has been completed in all the three States and the final results are awaited. No such surveys were undertaken in the States of Pepsu and Uttar Pradesh during the year.

(xvii) Scheme for assessing the extent of accuracy and completeness of cotton ginning and pressing statistics

It has been observed that there was a wide disparity between the official and trade estimates, the latter based mainly on cotton pressed and market arrivals. As the statistics of cotton pressed are generally incomplete, a scheme for conducting a sample survey to assess the accuracy and completeness of the cotton ginning and pressing statistics in the Bombay State was approved by the Committee in July, 1954. The scheme is proposed to be put into operation during the 1956-57 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. From the data collected, consolidated weekly statements are prepared and issued to those interested. A quarterly summary of the prices and arrivals is 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 are published each 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 1955-56:—

Name of market	Name of variety	Total arrivals of *kapas* during the season (In candies of 784 lbs. each)	Price range of *kapas* during the season (In rupees per candy)
Bijapur	Jarila	8,162	218-15 to 263—9
Amravati	,,	13,087	230—0 to 290—0
Wardha	,,	19,054	231—1 to 304—8
Dhamangaon ..	,,	21,331	280—5 to 325—0
Dhulia	Virnar (197-3)	38,668	175—0 to 252—7
Shirpur	,,	25,441	203—0 to 294—0
Malkapur	,,	35,252	263—5 to 386—8
Amravati	H. 420	9,902	235—0 to 356—0
Akola	,,	13,496	250—0 to 310—0
Amravati	M. P. Cambodia	11,781	230—0 to 282—0
Amravati	Buri	14,230	250—0 to 311—0
Akola	Oomras	10,419	224—3 to 336—0
Nanded	Gaorani 6	19,382	252-12 to 288-12
Latur	Gaorani 12	10,822	233—6 to 295—4
Kapadvanj	Vijay	38,421	334-13 to 404—4
Bodeli	,,	47,804	327—8 to 397—4
Nargund	Jayadhar	8,403	218-12 to 309-12
Bijapur	,,	19,960	245—4 to 268—3
Gadag	Laxmi	36,218	180—4 to 391—7
Raichur	,,	12,454	200—1 to 369-12
Adoni	,,	20,680	198—6 to 387—4
Tirupur	Southern Cambodia	94,402	245—2 to 386—3
Virudhnagar ..	Karungani	19,178	169-11 to 318-13
Thasra	170-Co. 2	5,020	389—2 to 466—2
Dhansura	134-Co. 2-M	18,145	396—1 to 496—8
Abohar	Punjab *Desi*	10,916	214-11 to 310—5
Moga	,,	12,663	210—3 to 266—0
Barnala	,,	20,610	180—8 to 253—5
Sunam	,,	16,434	187-10 to 247—0
Abohar	320 F	96,350	225-10 to 351-11
Giddarbaha	,,	32,332	263-10 to 349—2
Kotkapura	,,	30,155	225-10 to 326—0
Nabha	216 F	15,738	288-12 to 321—0
Hansi	,,	35,927	219-11 to 334—8
Malout	L. S. S.	7,473	299-14 to 349—0
Adoni	Mungari	6,317	141—4 to 292—0
Bellary	,,	13,815	164—0 to 268—8

(xix) Publications

The following Statistical Publications were issued during the year:—

(i) Price Bulletin—A study of the prices and arrivals of *kapas* in the up-country markets during 1952-53 *(Second issue)*.

(ii) Bulletin on "Cotton Seed Prices in India" 1954-55 *(Second issue)*.

CHAPTER III

RESEARCH

It is axiomatic that there can be no progress in any crop improvement programme except through research. Research has, therefore, been the main plank for the improvement of the cotton crop under the aegis of the Indian Central Cotton Committee. In consonance with this principle which embraces one of the main objectives of the formation of the Committee under the Indian Cotton Cess Act, the Committee has been financing a very large number of research schemes for the evolution of improved cotton strains which combined not only the higher standards of quality than those previously cultivated, but also gave higher yields, resulting in greater monetary return to the cultivators. The results already achieved in the network of research schemes spread over the entire country have borne testimony to the soundness of the Committee's policy. In this programme for improvement of cotton, the Technological Laboratory, Matunga, has played a very important role. The Committee's funds were also provided for undertaking research on the physiology of the cotton plant and on the investigation of pests and diseases with a view to controlling the loss to the country by devising suitable remedial measures.

The majority of the research schemes were financed entirely by the Committee, the cost of the remaining few, however, was shared by the Committee and the State Governments concerned. During the past 12 years, the Government of India made large grants from the Cotton Fund to meet the expenditure on research and extension work.

TECHNOLOGICAL RESEARCH

The Committee's Technological Laboratory continued to render valuable service to the Cotton Breeders in their efforts to evolve new varieties of cotton by providing facilities for proper assessment of the spinning properties of such varieties. The Cotton Trade and Textile Industry also took full advantage of the facilities available at the Testing House of the Laboratory. The activities of the Laboratory recorded further progress during the year. The various features of interest are given below:—

(1) The total number of samples received for tests was 3,699 as against 2,683 in the previous year, recording an increase of 38 per cent. Most of these samples were tested and the results included in 79% reports as against 663 issued last year, registering an increase of 20 per cent. Mill and Laboratory tests were carried out on as many as 41 samples during this period.

(2) In order to provide the Breeders with technological data on their strains before the next sowing date, the spinning and testing sections worked double shifts since the 27th February, 1956, and it is noteworthy that the programme of work has been executed successfully.

(3) Tests on improved varieties from distributed seeds in various stages of multiplication for the past five seasons had indicated that there was no general decline in spinning quality as the stage advanced except in a few cases.

(4) Technological bulletins on trade varieties of Indian cottons and on standard Indian cottons grown in the experimental farm were published for general information. Technological circulars were also issued as soon as tests were completed on each trade variety. These publications proved useful to the cotton trade and the textile industry. The Testing House of the Laboratory received as many as 1,279 samples for various tests during the year as compared with 805 last year showing a record increase of 59 per cent.

(5) It is reported that, in response to the second attempt made in issuing a questionnaire, about 540 proformas were duly filled in and returned to the Laboratory. This was considered to be satisfactory and was treated as representing a cross section of the Cotton Ginning Industry in India. An analysis of the replies revealed that 75% of the roller-gins were single and 25% were double roller-gins confined mostly to the areas in Madras, Andhra, Karnatak and Hyderabad States. The output in 40% of the factories was less than 10 bales of lint per shift of 8 hours and in the remaining 60%, it was less than 20 bales of lint per shift. Only 5% had had a production of 100 bales of lint and above per shift. Very little improvement had been made since their erection. The various suggestions for their improvement in regard to administrative as well as technical matters were made for adoption by the factories.

(6) Four batches of personnel working in the ginning factories were given training in the methods and techniques of ginning during the year under review. These persons felt that the all-round knowledge gained by them in the Laboratory would prove highly beneficial to them in carrying out their work efficiently in the factories.

(7) Work in connection with the investigation on the effect of conversion of bush bearings to ball bearings in the single roller gins which showed a saving of 30 to 40% in power consumption had been completed and was awaiting publication.

(8) A device of the ballistic type which was designed to simulate, as far as possible, the conditions obtaining in the actual ginning process, was fabricated, during the year, calibrated and its usefulness for the following three purposes was examined:

(i) work done in pulling out the fibres from the seed surface

(ii) the work of rupture of bundles of fibres, and

(iii) the work of rupture of single yarns.

(9) The construction of a small hand-operated card for determining the nep-potential of a sample of cotton was in progress.

(10) Preliminary investigations were carried out on double yarns prepared from three Indian cottons with a view to studying the mecerisability of Indian cottons.

(11) Tests were undertaken on selected progenies and also on fresh material of standard Indian cottons with a view to selecting strains which produce minimum neppiness.

(12) Work on the determination of oil content of different varieties of cotton seeds was in progress. This was done under a scheme approved by the Committee with the object of providing data for the Cotton Breeders in order to enable them to select cottons for higher oil content, besides possessing other desirable fibre and agricultural characteristics.

(13) Experiments were undertaken on the original *'Ambar Charkha'* and subsequent improved model of the same at the instance of the *'Ambar Charkha'* Committee appointed by the Ministry of Production. A report on the results obtained was written up and submitted to the Government of India.

(14) The X-ray equipment was fully conditioned and put into working order after standardising the experimental procedure and X-ray diffraction photographs of standard Indian cottons were taken and studied.

(15) Similarly, 'Uster' Evenness Tester received in the Laboratory was also set up, as also the micronaire intended for determining fibre-fineness.

(16) A number of investigations on which work was completed were written up for publication.

AGRICULTURAL RESEARCH

A. FUNDAMENTAL RESEARCH

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 described in the following paragraphs:—

1. GENETICS AND GENERAL BOTANY

During the season under report, the inheritance studies were carried out in respect of various characters of the cotton plant. A brief summary of the same is as under:—

(i) Fuzz and lint colour.—F_1s of the crosses KG (khaki lint/green fuzz) with GG (green lint/green fuzz), WG (white lint/green fuzz), WW (white lint/white fuzz) and KK (khaki lint/khaki fuzz) were grown and their phenotypic effects recorded. The F_1s were further backcrossed to WW (white lint/white fuzz). The F_2s and backcrosses would be grown in the ensuing year. These investigations are expected to show that both lint colour and fuzz colour are controlled by genes at the same locus.

(ii) Seed fuzz intensity.—In this connection F_1s of crosses between the naked seeded Indian Asiatic types and Chinese naked and fuzzy types were grown. The F_1s were tufted, mostly intermediate. F_2s will be grown next year to observe the segregation.

(iii) Spot size in Asiatic cottons.—During the year under report, F_1s of crosses between (1) large spot, (2) normal spot, (3)

small spot and (4) dilute spot were grown and observations recorded with regard to petal spot and its size. The F_1s were intermediate. F_2s would be grown in the following season.

(iv) Transference of *anomalum* lint genes to Asiatic cottons with the use of single and double recessive lintless types.—During the year under report, G. *anomalum* was crossed to the various hairy lintless mutants of G. *arboreum* and G. *herbaceum* and also with a number of extracted double recessive lintless types. Attention, at present, is directed to transference of $L\text{-}Li_d$ chromosome segment of *anomalum* to G. *herbaceum*.

F_1s of the various crosses of *anomalum* to lintless types were raised and enough seed was obtained for raising the first backcross to in the ensuing season.

2. Interspecific hybridisation :

Nineteen types, as per following extraction, were tested against the controls Malvi 9 and Indore 2 in replicated trial in 4 blocks, individual plot size being 1/200 acre.

4 – (*G. arboreum* x *G. thurberii*)—doubled x *G. hirsutum*

1 - (Co2 x 1027 ALF) doubled

14 – (Co-Tom = Co2 x *G. tomentosum*) x Indore 2

Of these, four *viz.*, TH 146, SH 22, CTI 1-4 and CTI 1-6 were found to be promising.

These strains of economic importance, developed from fundamental studies will now be tested at Badnawar for their suitability in the tract.

2. PHYSIOLOGY

(i) Scheme for cotton physiological research, Indore.—The effects of application of trace elements on the growth and yield of cotton and on 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 from 1-3-1944.

The results of the experiments designed to study the effect of trace elements like manganese, boron, zinc, etc. in small as well as high doses on the yield of seed cotton were found to be negative both in the case of *desi* and American varieties of cotton used in the

trial. It is felt that there is no need to continue the experiment using high doses since it has already been evident from trials conducted during 1947 to 1951 that the yield increases resulting from higher doses of the trace elements, were uneconomical.

From seed soaking experiments, the indications obtained were that the trace element requirements of manganese and copper can be partly met by soaking the seeds in solutions of these salts but that those of the salts of major elements like nitrogen, potassium or phosphorous cannot be so met as they did not penetrate the embryos even when used in high concentrations. The work is to be continued in a new scheme sanctioned by the Indian Council of Agricultural Research.

In the study on the effect of spraying chemical hormones on the morphological characters and yield, it was observed that while 2-4D continued to produce morphological abnormalities, the use of α-naphthalene acetic acid resulted in higher yields in *desi* cotton. The increase in the yield ranged from 68 lbs. to 130 lbs. per acre and the cost of spraying the chemical including the cost of the chemical worked out at Rs. 3/- per acre only. The optimum concentration of the chemical was found to be 10 p.p.m.

It was observed that the intake of potash by the cotton plant was maximum when 40 lbs. N was applied. In nitrogen efficiency also, that is, the quantity of seed cotton produced per gram of nitrogen absorbed per plant, this dose is stated to be the best. A beginning has now been made to determine the fertilizer requirements of the cotton crop by first determining the total nutrients present per acre foot of the soil and later on by plant tests and analyses. It was found that there was more nitrogen but relatively less potash and phosphorous in the three fields examined so far.

(ii) Scheme for cotton physiological research, Bombay.—The scheme was sanctioned by the Committee in February, 1949, and was 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.

The usual sowing time at Dharwar and Gadag is the 4th week of September and early October respectively and one of the reasons for low yield in this tract was attributed to the very short growing period and the inadequate number of bolls that were produced. Sowing date experiments with Laxmi cotton in the Gadag area have revealed that sowing cottons in the last week of August and the first fortnight of September produced better vegetative growth and resulted in significantly better yields than the normal sown crop. The mean increase in the yield due to early sowings for four years was 193 lbs. per acre. By mere changing the date of sowing, it was observed that the yields of Laxmi cotton could be increased by 50 to 90%. Similar results were obtained at Dharwar with Laxmi cotton when late July or early August sowings were done in preference to the normal sowings.

A similar experiment in respect of the *desi* variety, Jayadhar, indicated that Jayadhar planted from the 3rd week of July to the 2nd week of August gave higher yields than the normal sowings in the 3rd and 4th week of August, for four years. The mean increase in yield was 111 pounds per acre.

With a view to investigate the causes of low response to nitrogen, the chemical analysis of the leaves, stems, etc., of plants at both the centres had been undertaken. The results of the analyses which have been completed for leaves and stems showed that while at Dharwar the concentration of nitrogen in the leaves of Laxmi cotton declined at the bolling stage, which is a normal feature of the cotton plant, at Gadag the concentration of nitrogen in the leaves remained high in the bolling period in 1953-54. This, however, was not the case in 1954-55. The potash content of the leaves of cotton grown at Gadag and Dharwar appeared to be below normal. At the same time, the potash content of the stem was as high or higher than that of the leaves. The P_2O_5 content of the leaves and stems at Gadag was lower than at Dharwar. It is, therefore, considered that there is some disturbance in the nitrogen and potash metabolism of Laxmi crop at Gadag. In order to test the findings, an experiment involving all combinations of potash, nitrogen and phosphorus was arranged at both the centres. At none of the centres, the application of potash or phosphorus had produced any effect on yield while at both the centres, nitrogen application gave significant increase in yield. It was further found that at Gadag the application of nitrogen in combination

with potash gave higher yield than the application of nitrogen alone, but the difference was small and not significant.

(iii) Scheme for cotton physiological research, Mysore.—This scheme was sanctioned by the Committee at its meeting in February, 1949, and was 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.

Repeated trials conducted at the V. C. and Babbur farms have revealed that the application of N. at the rate varying from 33 to 100 lbs. gave no increase in yield. This is contrary to the findings obtained at Mandya farm before the inauguration of the present scheme. Chemical analysis of the leaves indicated that N. absorbed by the plants remained accumulated in the leaves and that added through fertilisers was not utilised for the formation of bolls. Potash and phosphate deficiencies were also confirmed by the trials undertaken at the two farms. Application of 100 lbs. of P_2O_5 or 50 lbs. K_2O significantly increased the yield and the full combination of N., P. and K. increased the yield to 480 lbs. as against 217 lbs. of seed cotton in the control plots. At the Babbur farm, phosphate alone increased the yield to 500 lbs. per acre as against 476 lbs. of the control while potash alone had no effect. The complete fertilizer N + P + K raised the yield to 620 lbs. per acre.

In spite of the fact that significant increases in yield were obtained by the application of the three nutrients, the undermentioned drawbacks yet remain to be remedied, *viz.*, (1) lack of increase in the number of seed per boll(2) the weakness in lint (3) accumulation of N. in the leaves despite lowering of the N/P ratio.

As the sowing period of these cottons is either summer or winter, its fruiting period coincides with the rains and hence an attempt to find a quick maturing variety or shifting the time of sowing is being made.

(iv) Co-ordinated crop weather scheme.—The scheme was sanctioned by the Committee in August, 1946, and was 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.

During the year under report, a number of observatories were established in the various States of India, to work under the technical guidance of the Director of Agricultural Meteorology. Technical instructions, giving full details of the meteorological, micro-climatological and crop observations to be recorded under the scheme were prepared and supplied to the co-operating farms. Instructions were also prepared, describing the methods to be adopted for recording the incidence and intensity of attack by pests and diseases. All observations, relating to the crop including incidence of pests and diseases, were recorded on random sampling basis according to a sampling technique specially developed for the purpose at Poona.

Experiments were conducted at the Central Agricultural Meteorological Observatory, Poona, to find out the loss of water by evaporation from the ground. The object was to develop a suitable equation which, when available, would be very useful for estimating the loss of water by evapo-transpiration from cotton fields.

A study of the crop-weather data relating to the year 1949-50 showed that there was a partial failure of the cotton crop over a large area comprising North Hyderabad, Bombay-Deccan, Berar and West Madhya Pradesh, due to excessive rainfall during the flowering period.

3. AGRONOMY

(i) Manurial trial on cotton with organic manures.—The organic manures, *viz.*, Farm compost, F.Y.M., Groundnut cake and 'K' manure were applied on equal nitrogen basis at 20 and 40 lbs. N per acre with and without superphosphate at 30 lbs. P_2O_5 per acre. The application of 40 lbs. N in the organic form increased the yield of seed cotton significantly over 20 lbs. N and control. The yields obtained from different manures did not differ significantly although the highest yield was obtained with the application of groundnut cake. The application of superphosphate also increased the yield significantly over control.

(ii) Residual effect on cotton of the manures applied to preceding crops of *jowar, tuer* and groundnut.—The preceding *kharif* crops, *viz.*, *jowar*, *tuer* and groundnut were manured with ammonium sulphate at 20 lbs. N, superphosphate at 20 lbs. P_2O_5 and

farm compost at 40 lbs. N per acre singly and in combinations. The yield differences of *kapas* were significant due to the effects of farm compost and superphosphate applied to preceding *jowar*, and *tuer* respectively. The yield of *kapas* was the highest after groundnut.

(iii) Residual effect on cotton of mixed cropping of wheat and gram, with and without manuring.—Wheat and gram were grown alone and mixed into different proportions, *i.e.*, 3:1, 2:1 and 1:1 of the two components. These crops were manured with farm compost at 40 lbs. N per acre and superphosphate at 40 lbs. P_2O_5 per acre singly and in combination and were then followed by cotton. The results have shown that the *kapas* yield was significantly the highest under the residual effect of N and P in combination. The yield from superphosphate did not differ significantly from that of control or farm compost which showed significant effect on cotton yield. The yields obtained from the plots of preceding crops did not show significant variation.

(iv) Two-course rotation.—The trial was carried out to study the economics of a two years' rotation where *mung, jowar, tuer* and groundnut were grown during *kharif* and these were followed by gram and linseed in the *rabi* (after *mung* only). In the next season these plots were sown with cotton and it was found that the differences in the yield of seed cotton when obtained from different sequence were not significant. The highest income was obtained with the sequence of *mung*-linseed-cotton and then in order were from groundnut-cotton and *mung*-gram-cotton.

(v) Varietal response to manuring.—Ammonium sulphate at 50 and 100 lbs. N per acre was applied to *desi* (Bhoj, Maljari and 197-3) and American (Indore 1, Indore 2 and Bhoj-72) varieties to study their differential response to manuring. *Desi* types gave higher yield of seed cotton than American although the difference was not significant. Within each type the varieties also did not differ significantly. The interaction between varieties and doses was not significant but it was found to be significant between types and doses where American gave significantly lower yield than *desi* at 100 lbs. N. per acre.

(vi) Intercropping of cotton with groundnut.—One, two and three rows of cotton were grown alternating with 5, 4 and 3 rows

of groundnut respectively and their economics was compared with a control plot of groundnut alone. The yield of groundnut pods and money returns from one row of cotton with 5 rows of groundnut was not significantly lower than control unlike those obtained from the other two treatments.

4. STATISTICS

(1) Statistical study of genetics of quantitative inheritance

(a) Genetic variability and response to selection.—This experiment has been in progress since 1940 and was modified in 1954 on the basis of the responses in staple length of selected *arboreum* cotton crosses. The modified experiment involved four crosses, one having high and low lines, two with high lines and one with low lines of maximum halo length. It was observed that the maximum halo length of selected progenies of high lines were continuously increasing upto F_9 generation. In F_{10} and F_{11} generation, however, these values dropped down in comparison to the preceding seasons. This decrease in the staple length was ascribed to the seasonal conditions and was confirmed by a similar decrease in the parental progenies. In F_{12} generation there was again an increase in the mean values of all the crosses. From F_{13} to F_{15} generations the maximum halo length of high lines of crosses generally had a decreasing tendency. The deviations of the mean values of crosses from parental means were studied during the year to see whether there is progress or retardation in the maximum halo length of the selected crosses. It was observed that the excess of maximum halo length over parental means has an increasing trend for high lines of the two crosses, *viz.*, D77 x Gao. 115 and B8 x Shan 764. In the low lines the cross B8 x Jarila had also the same tendency as was observed for the two crosses in high lines.

(b) Genetic relation between high and low lines.—Three categories of crosses, *viz.*, between high and low, within high and within low lines of selected progenies were made in the F_{11} generation of the above experiment. In order to find out what fraction of the gross variability in the three categories of crosses was genetic, F_3 generation of selected progenies of crosses was grown in 1954-55 season, and the data collected were analysed in the year under report.

The genetic variability of the three categories of crosses was estimated by two methods, *viz.*, (a) adjustment of progeny values over parental means and (b) by subtracting the variation due to environmental causes from that of progenies. The results showed that the genetic variability was high in crosses made between high and low lines as well as within low lines indicating a further scope for selection.

In 1955 *kharif* season the F_4 generation of selected progenies from F_3 material of the above crosses was sown along with pure lines in a replicated trial, but at the time of picking the produce was bulked and the staple length was recorded on ten random seeds. It was observed that some of the progenies gave higher yields and staple length has compared to the two local strains, *viz.*, Bhoj and Virnar (197-3). It is proposed to conduct a small bulk trial of the above progenies in the next *kharif* season.

(2) Response surface for cotton yields from past manurial trials.

An examination of the co-ordinated cotton manurial trials carried out at different stations in peninsular India from 1943-44 to 1947-48 showed that the rate of response of cotton crop to application of nitrogen in the form of ammonium sulphate and groundnut cake increased with the increasing levels of soil fertility, and that it will always be more paying to manure rich soils as compared to medium and poor soils. The response curves corresponding to the three levels of soil fertility were, however, in a single plane formed by the dose of nitrogen and yield of cotton. On account of the relationship between the magnitude of response with increasing levels of soil fertility it was thought worth studying the rate of response as influenced jointly by the dose of nitrogen and the level of fertility as measured by the yield of untreated plots in the indidvidual trials. The response curve fitted in this manner will then be a resultant of two planes, *viz.*, (1) yield and soil fertility and (2) yield and dose of nitrogen. These studies were started in the year under report.

In order to set up the regression equation for predicting the magnitude of response the following five independent varieties were

included for correlating the yield of cotton crop available from the data collected from the trials referred to above:—

(1) Dose of nitrogen, lbs. per acre (x1)
(2) Square of dose $(x1)^2$ (x2)
(3) No manure yield, lbs. per acre (x3)
(4) Square of no manure yield $(x3)^2$ (x4)
(5) Production of dose (x1) and no manure yield (x3) (x5)

With these variates it was thought that there will be substantial reduction in the residual variation and the regression line will be a close fit. It was observed from the analysis of variance that the mean square for joint regression was significant as compared to residual variation. The percentage variation removed by the joint effect of the factors studied above was of the order of 86 per cent and the multiple regression coefficient had a value of 0.9252. This showed that the five factors when taken jointly can predict the cotton yields with a fairly good level of accuracy.

(3) Meteorological studies

An examination of the maximum temperatures recorded at the Institute of Plant Industry, during a period of 4 months from 1st March to 30th June from 1931 to 1954 season was carried out. The maximum temperature recorded daily was grouped in 3-days period and fifth degree polynomial curves were fitted to group totals of individual seasons. It was observed that the fifth degree fit to the group total was quite satisfactory in most of the cases. Further examination of the data is in progress.

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 the 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.

The season was unfavourable both in the East and West Khandesh districts marked by excessive rainfall which caused immature development and physiological shedding of bolls. Prevalence of anthracnose and attack of spotted and pink bollworms occurred in the wake of these rains and the resultant damage was heavy.

The improved variety Virnar continued to be popular in the tract and the area under it rose from 7.5 lakh acres of the previous season to 9 lakh acres during the current season. Further breeding work to improve upon this variety resulted in the isolation of a strain known as Y-1, which proved to be promising in respect of its productivity.

Further selection has been made for resistance to physiological shedding in strains Virnar, Y-1, W-81 (old) and W-81 (superior bulk). Individual plant selections have also been made for long and fine staple in the progeny of crosses between Virnar and Gaorani. Virnar has also been crossed with types C.J.73 from Amreli and 35-3 from Kanpur which were noted to suffer less from physiological shedding. Four out of 8 bulks of the crosses between Virnar x Coimbatore *arboreums* have also been retained for further study and for selection of individual plants.

With regard to breeding for wilt-resistance under optimum conditions at Poona, Dhulia-2 bulk was noted to record immunity for wilt. High degree of resistance was also manifested by 3 progenies of (4G x Dhulia-2 selection), 5 of [(Madras *arboreum* x Virnar) x Dhulia-2 Selection] and 6 of cross (7070 B-14 x V)-6-8.

2. Scheme for improvement of Wagad cotton at Viramgam and Bavla (Scheme for improvement of cotton in North Gujerat at

Viramgam and Bavla).—This scheme was sanctioned in August, 1935. The object of the scheme was the improvement of Wagad cottons in the matter of quality, yield and earliness.

As a result of work done, an improved variety, *viz.*, Kalyan was evolved and is being distributed, to replace the improved strain of Wagad.

The synthetic material derived from crosses between Kalyan and W-87, with early Russian (H.8-1 and 18-1) and Persian types (47-A and 13-4) and a few other quality types from Dharwar, Broach and Madras was tested with Kalyan as the control. Of the different selections, 280-1 combined equal yield and significantly better ginning outturn than the control, Kalyan. This selection also possessed 0.93" mean fibre length compared to 0.86" of Kalyan. In fibre length, 3 other strains, *viz.*, 348-5, 394-3 and 509-4 were also found promising with the last strain recording a spinning capacity of 25's against 21's of Kalyan. Further promising breeding material, particularly in respect of earliness, ginning percentage and fibre length, is stated to be under trial in the small bulk trial and fifteen of them have been earmarked for larger trials based on the overall performance.

3. 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 in respect of all economic characters.

The work on the evolution of a strain superior to Pratap 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 five years and was found to give significantly higher yield than Pratap in spite of the fact that the first two years, *i.e.*, 1951-52 and 1952-53 proved

to be droughty. As regards ginning outturn, it was on par with, if not better than Pratap and was definitely superior to it in fibre length. It has also proved to be equally suitable in Saurashtra State, where it was tested in Junagadh and Sansora. It possesses 0.91" fibre length combined with 38% ginning outturn and gives a count strength product of 1978, as compared to 0.83", 38% and 1526, respectively for Pratap.

Further, a few progenies derived from crosses and back-crosses between Pratap and Coimbatore *arboreums* and between Amreli selections and *arboreums* from Madhya Pradesh and Khandesh, appeared to be promising compared with "C.J.73" and Pratap in respect of ginning outturn and fibre length.

In a large scale yield trial with Indo-American strains of Surat and other American types from Dharwar and Kadayo of Saurashtra, the Surat and Dharwar strains proved to be better than Kadayo types as regards ginning outturn and fibre length. The Kadayo selection, besides being significantly better in respect of yield, was also earlier maturing than the other strains included in the trial.

4. Scheme for improvement of Dharwar-American cotton.—This scheme was started in April, 1942, with a view to improving the Dharwar-American cotton crop grown in the Kannada districts of the Bombay State and the adjoining areas of the States of Madras, Hyderabad and Mysore. This was sought to be achieved by the production of an early maturing type of cotton superior to Gadag 1 in respect of yield, staple length, ginning percentage and resistance to the red leaf blight.

As a result of the work carried out in the past an improved variety of cotton 'Laxmi' has been evolved which is superior to Gadag-1 in almost all respects. Due to its superior quality, Laxmi has covered the whole of the Upland area and also encroached upon the Kumpta area covering nearly 50 per cent of the entire cotton area.

Though "Laxmi" represents a substantial improvement over Gadag 1, in all economic characters, further improvement over Laxmi is required in respect of fibre length and strength and better capacity for resistance to *black-arm* and red leaf blight diseases.

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Though "Laxmi" represents a substantial improvement over Gadag 1, in all economic characters, further improvement over Laxmi is required in respect of fibre length and strength and better capacity for resistance to *black-arm* and red leaf blight diseases.

Any strain to be evolved in this tract for replacement of Laxmi should, therefore, combine, in addition to yield and better quality, high degree of resistance to *black-arm* and red leaf blight diseases. The work during the present extension was started with the object of (a) either substituting Laxmi with any of the exotic types or interspecific types evolved at Surat, or (b) synthesising a new desirable strain at Gadag. In the trials conducted with Indo-American cottons, a few cultures were noted to be promising not only in respect of earliness and fibre characters but also in the degree of resistance to *black-arm* and read leaf blight. The resistant cultures were also utilised for hybridisation with Laxmi and the resultant synthetic material is undergoing trials in the various stages of breeding. Large scale trails on the Farm and in cultivators' fields with the two promising sub-selections from Laxmi, *viz.*, A-7 and B-2 were repeated during the year. Both these sub-selections have been found to be slightly superior to Laxmi in yield.

5. Scheme for cultivation of Perennial cottons 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 can be grown in grass and waste lands. They can also be grown in backyards, in bungalow compounds, etc. and the produce can be utilised for extra-factory consumption.

First generation hybrids of the most promising of the *hirsutum-barbadense* crosses *viz.*, (Co.4-B40 x Quebradinho) were grown on large areas but the yields obtained were not of the expected order due to heavy shedding of buds, flowers and bolls. The hybrids recorded a mean halo length of 30.5 mm. and a ginning outturn of 37%. Poor germination appears to have handicapped the trials with this hybrid at Arbhavi, Bagalkot and Devihosur.

Six F_1's of crosses of Jahagirdar, a perennial drought resistant variety with *black-arm* resistant types, *viz.*, 2196 BK, B.C.134-CW, XAB 5, 125-Co2-18, 170-Co2 and Jinja recorded high yields as 2nd year ratoons but their lint was noted to be coarse. Among the fresh crosses planted, two hybrids, *viz.*, Gajjar white x 2087 and Gajjar white x G6 have been observed to be promising.

6. Scheme for improvement of Kumpta cotton in Bombay-Karnatak.—This scheme was sanctioned by the Committee at its meeting held in October, 1949 and was put into operation with effect from the 1st 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.

Of the four outside types *viz.*, Early 22 from Broach, 77-2 from Surat, Virnar from Jalgaon and N.14 fom Nandyal and three local hybrid segregates *viz.*, B.C.1, 15-39 X and 16 X tested during the season, strain B.C.1 was noted to be the best as in the previous season. This strain not only yielded significantly higher than Jayadhar with fibre characters on par or superior to it but was also earlier than both Jayadhar and K.F.T. Next in order of merit was found to be the strain 15-39 X which excelled Jayadhar and K.F.T. in yield with other characters on a par or superior to Jayadhar.

All the six *herbaceum* varieties tried *viz.*, Vijay from Broach, Suyog, 1027 ALF, 2334, 77-2 and 2087 from Surat, were found to be lacking the productive capacity and the early maturing habit, though all of them recorded higher ginning outturn than Jayadhar. The four *arboreum* strains tested, *viz.*, Pratap, P-34 and C.J. 73 from Amreli and Seg.29-7-6 from Jalgaon also behaved likewise.

Promising material has been selected from hybrid derivatives of crosses involving Kumpta types. Gujerat *herbaceum*, Virnar and Gaorani for further studies.

7. 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 com-

bining 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-Americans 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 Gujerat. 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 Ahmedabad, Sabarkantha and part of Kaira district where soils are sandy and well drained. Strain 68 x 22, though found promising in yield, is slightly inferior to 170-Co.2 in spinning quality. The enthusiastic cultivators of Gujerat and Ahmednagar district in Deccan canals area have taken to the growing of the strain 170-Co.2 and 134-Co.2-M on a large scale, and it is estimated that these two strains were grown over an area of about 2,66,000 acres during the year under report.

During the current year's trials, conducted over 22 centres representing the three cotton zones of Gujerat comprising the different soil types, the two strains, *viz.*, 170-Co.2 and 68 x 22 yielded either equal to or slightly higher than the local improved types used as controls in the middle and North Gujerat cotton zones in black as well as *goradu* or lighter soils. In South Gujerat, however, their yields were slightly of a lower order than strain 2087 under rainfed conditions. The performance of 134-Co.2-M was disappointing during the year as it yielded very low even under irrigation except on light and very well drained soils. Though yielding high, strain 68 x 22 has been poor in spinning quality and hence it has been decided to drop this strain from further tests.

In the trials conducted on the Research Station, none of the nine superior long staple Indo-American strains excelled the *herbaceum* strain 2087 in yield but two of them yielded more or less on a par with it. This poor performance was plausibly due to the severe *black-arm* attack during the year.

Of the seven extra long staple cotton strains (1-3/16" and above) tested during the season one, viz., 68-G-4, in addition to being resistant to *black-arm*, outyielded strain 170-Co.2 which is now under distribution. Further breeding work is on hand with Indo-American cottons, *hirsutum-barbadense* hybrid derivatives, *inter se* crosses and annual-perennial crosses which show promise to yield useful strains possessing better fibre qualities than the existing strain 170-Co.2, combining at the same time superior yield potential and higher degree of resistance to *black-arm*. Promising material derived from crosses involving Indo-American cottons and useful wild species like G. *tomentosum* and G. *anomalum*, designed particularly to fortify the Indo-American cottons against pests and diseases and impart fibre strength and fineness to them, are also being exploited for evolution of suitable strains.

In the work directed towards the utilisation of hybrid vigour for the production of extra long staple cotton, five *intra hirsutum* and *hirsutum-barbadense* hybrids were studied in small scale tests. Of these, cross B.C.68 x S.I. was found to be the best in all respects, yielding significantly higher than the control Co.2 x S.I. with a ginning outturn of 33.5% against 31.8% recorded by the control. In spinning capacity it recorded 75's counts compared to 70's of cross Co.2 x S.I. Due to this superior behaviour this cross is proposed to be tested on a large scale in cultivator's fields.

8. Scheme for breeding of American cotton resistant to *black-arm* 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 affecting American cottons.

The trials were conducted under ideal conditions by creating the *black-arm* disease artificially by spraying the plots with bacterial

inoculum periodically as a result of which there was a heavy incidence of the disease. The observations on the resistance to the disease manifested by the several selections were made under these conditions.

Out of 25 promising types tested, 17 showed high degree of resistance to *black-arm* during the year. Of the varieties received from Surat, types 134-Co.2-M.-21-1 and 21-2 and BC-68-G4 proved to be highly resistant to *black-arm*, in addition to possessing very good staple.

A large number of plants which were apparently immune have been selected for further study and were also examined for their economic characters. Their performance next year would be watched with interest.

9. 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 was 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 in cultivators' fields in the three cotton growing tracts of Karnatak, Gujerat and Maharashtra of Bombay State.

The seasonal conditions were satisfactory in Surat and Dharwar districts but in East Khandesh district, the crop was seriously affected due to heavy rains in October.

The chemical analysis conducted on soil samples from experimental plots in Dharwar district showed that in general they were rather poor in fertility but free from any adverse growth factors like high alkalinity etc. The soils were expected to respond to fertiliser treatments.

In all 230 experiments were carried out in 40 villages in Surat, 40 villages in East Khandesh, and 35 villages in Dharwar.

The six fertiliser treatments were the same as last year, *viz.*, O, N1, N2, N1P, N2P, N2PK, quantities of which are shown below:—

O — Control.

N1 — 20 lbs. N. per acre as sulphate of ammonia

N2 — 40 lbs. N. per acre as sulphate of ammonia

P — 20 lbs. P_2O_5 per acre as superphosphate

K — 40 lbs. K_2O per acre as potassium sulphate

The varieties of cotton used were Laxmi and Jayadhar in Dharwar, Virnar in East Khandesh and No. 2087 in Surat.

The results of the three trials in Surat district indicated that the response to N was good. The increases in yield per acre due to 20 to 40 lbs. N over the control were 56 and 167 lbs. or 14.9 and 44.3% respectively, which were statistically significant. The response to P_2O_5 in the presence of 20 and 40 lbs. N. per acre was negligible. The application of 40 lbs. K_2O, 40 lbs. N and 20 lbs. P_2O_5 per acre did not result in giving significantly better yields, the additional yield obtained being only 26 lbs. per acre or 4.7%.

The results of trials in East Khandesh indicated that the application of 20 lbs. N. per acre had not materially improved the yield as compared with the control, the additional yield being only 15 lbs. (or 7.6%) per acre. The increased yield obtained with the application of 40 lbs. N per acre was, however, significant. Addition of 20 lbs. P_2O_5 to 20 and 40 lbs. N per acre has been found to significantly increase the yield in each case. Further, addition of 40 lbs. K_2O, 40 lbs. N and 20 lbs. P_2O_5 per acre has significantly enhanced the yield. The results obtained at Dharwar indicated that application of 20 and 40 lbs. N per acre gave 67 and 84 lbs. of *kapas* per acre respectively over the control. The response to 20 lbs. P_2O_5 per acre in the presence of 20 lbs. N. per acre was small but significant. No response was observed to application of K_2O. In the case of Jayadhar, the response to N at 20 lbs. level was as high as 100 lbs. of *kapas* per acre and was highly significant; but the addition of another 20 lbs. per acre increased the yield only by 20 lbs. of *kapas*. No response was observed to application of 20 lbs. P_2O_5 per acre in the presence of the lower dose of N but there was an increase in yield of 49 lbs. of *kapas* per acre or 11.6% in the presence of 40 lbs. N per acre which was statistically significant. No response was observed to K_2O.

In the case of Laxmi very little response was noticed at both the levels of N. The addition of 20 lbs. P_2O_5 per acre to 20 lbs. N increased the yield of *kapas* by 41 lbs. per acre or 14.4% which approached 5% level of significance; but in the presence of 40 lbs. N per acre its response was observed to be non-significant. There was no response to K_2O in this case also.

10. **Scheme for production of hybrid seed.**—This scheme was approved by the Committee at its meeting held in February, 1955, and was 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 total hybrid seed produced during 1954-55 was about 410 lbs. and the area sown with this hybrid seed during 1955-56 was 545 acres.

The season during 1955-56 was very favourable for the growth of cotton particularly in Gujerat. The hybrid cotton, however, suffered mainly from boll worms and aphids.

A few bales of hybrid cotton produced during the year were sold at Rs. 1,365/- per *khandi* of 784 lbs. Since the work is in the initial stages, sufficient quantity of lint has not yet been produced to attract prospective buyers. A total quantity of 1119 lbs. of seed has now been produced which is expected to cover atleast 1000 acres during the next season.

Results of mill tests conducted on three bales of hybrid cotton from Dakor indicated that they gave a lea strength of 30.2 lbs. for 60's counts.

PUNJAB

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

The original object of the scheme was to breed improved strains of *desi* and American cotton for Hariana 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 breeding of high yielding strains of *desi* cotton capable of spinning 15-20 counts.

During the year under report, in the work for the improvement of American cotton, 17 strains along with two long linted strains from Abohar were tested in the Main Strain Trial. Though none of these strains was significantly better than 216F and H.14 in yield, quite a few among them exhibited better fibre properties and all of them possessed a higher ginning outturn than H.14. Particular mention may be made of A.C.79 which recorded a mean fibre length of 1.02", Pressley Strength Index of 9.7 and spun 47 H.S.W.C. Reselections have been effected in all the promising strains with emphasis on yield improvement. All the 9 hybrid strains tested in the Preliminary Strain Trial, exhibited superior fibre properties and higher ginning outturn than H.14 though only one *viz.*, A.C.88 was equal to it in yield. Of the 653 progenies tested during the year, 14 progenies have been bulked into 8 new strains. Further reselections have also been effected in the desirable progenies. One promising jassid resistant progeny among the reselections of the otherwise promising strain A.C.53 has been bulked for further test. The two strains 216F and H.14 released during the currency of the scheme were quite popular in the tract.

In the work for the improvement of *desi* cottons, the improved strain 231 Rosea has been established to be superior to the old strain M60-A2 in yield and ginning outturn, its average acre yield of seed cotton being 1,124 lbs. compared to 997 lbs. of M60-A2 and ginning outturn being 42.4 as against 38.5 of M60-A2. It is proposed to distribute 231 R in those sub-montane parts of the State where the possibility of growing American cottons is limited.

Of the 3 new strains tested in the Preliminary Strain Trial, one *viz.*, DC.98 was found to be superior to M60-A2 in mean fibre length, ginning percentage and lea strength at 14's though poorer to it in yield.

2. Scheme for breeding long staple cotton in Punjab.—The work of the scheme was commenced at Abohar in April, 1948, with the object of breeding American varieties of cotton having 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 $1\frac{1}{8}$″ and above.

During 1955-56, six promising strains *viz.*, LL.43, LL.51, LL.52, LL.53, LL.54 and LL.56 were tested on cultivators' holdings with 320F and L.S.S. as controls in 22 centres out of which only 16 trials were considered fit for estimating relative yields. In average acre yields, strains LL.53, LL.54 and LL. 43, were on a par with 320F. In view of this, it is proposed to undertake in 1956-57, more extensive trials of the above three strains, on cultivators' fields. In the Main Strains Trial, 17 strains were tested of which two *viz.* LL.53 and LL.54 outyielded the control 320F significantly combining also good fibre lengths of 1.13″ and 1.09″ respectively, compared to 0.96″ of the control. Particular mention may be made of LL.53 which possessed a staple length of over $1\frac{1}{8}$″, the targetted staple length set for the scheme. The spinning tests for 1954-55 showed seven strains *viz.* LL.43, LL.45, LL.48, LL.51, LL.54, LL.55 and LL.56 to be capable of spinning 50 to 58 H.S.W.C. against 39 counts of 320F. Eighteen strains were tested in the Preliminary Strain Trials of which twelve yielded on a par with the control 320F while ten strains recorded higher ginning percentage than the control. In fibre length five strains approached the $1\frac{1}{8}$″ mark. In the Progeny Row Trials, promising material with fibre lengths ranging from 1.14″ to 1.33″ was available. One of the progenies from this material have been bulked into a new strain for trial in the next season.

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 season under report, on the whole, was very unfavourable for cotton crop, particularly in the later stages. In spite of this, some of the new strains came up well, thus indicating that they might be able to withstand adverse conditions better than even 320F.

In the first trial, two strains J-34 and J-2 outyielded the control 320F significantly for the third successive year. Both these strains also possessed higher ginning percentage and greater mean fibre length than 320F. Strain J-2 came upto the mark of 320F in spinning capacity also. In the second trial, none of the new strains differed significantly in respect of yield from the 320F control. However, all of them recorded higher ginning outturn and greater mean fibre length than 320F.

Under Preliminary Strains Trial, out of the 34 new strains tested, 15 outyielded the control 320F significantly. Most of these strains, in addition, exhibited higher ginning percentage and staple length and earliness in maturity.

From a study of new crosses raised during the year, the exotic types (particularly U.K. 48) were found to exhibit great combining ability with the local Punjab-Americans.

4. Scheme for manurial trials in Punjab.—This scheme was put into operation from 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, nine sets of multifactorial experiments were conducted at all the three centres. Responses to nitrogen were found to vary considerably with season and soil types. The optimum doses during 1955-56 were 125 and 97 lbs. of ammonium sulphate at Abohar and Hansi, respectively, while no response was obtained at Jullundur due to heavy shedding of buds and flowers caused by unusually heavy and late rains. Higher doses of ammonium sulphate were not only found to increase the yield of

cotton but they had also a beneficial residual effect on the succeeding crop. In the experiment to study the effect of manuring in relation to sowing date and spacing, the results obtained during the year, were in line with those obtained in the previous years namely that early sowing and closer spacing are conducive to obtaining high yields at all the 3 stations. Optimum sowing time for Jullundur and Hansi is last week of April and for Abohar the month of May while the optimum spacing is 2′ × 1′ for Jullundur 2′ × 1′ or 2′ × 1½′ for Abohar and Hansi. The best time of nitrogen application at Abohar and Hansi was found to be full dose at thinning time. At Jullundur earlier application *i.e.*, half at sowing plus half at flowering gave higher yield than late applications of the nitrogen. Regarding the effect of phosphate, direct application of superphosphate to cotton crop did not increase the yield significantly but the residual effect was evident in case of rotations, *guara*-cotton, gram-cotton, berseem-cotton and fallow-cotton at Abohar and in the case of gram-cotton and berseem-cotton at Hansi. As regards the effect of rotational crops, cotton crop sown after fallow and leguminous crops like berseem, *guara* and gram gave higher yields than that sown after wheat. In an experiment designed to study the effect of 6 trace elements on yield, it was found that zinc gave significantly higher yields at Hansi.

MADRAS

1. 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.—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.

The year under review was characterised by heavy incidence of jassids, aphids, stem-weevil and bollworm.

As a result of the work which has been carried on under the scheme since 1949, two promising cultures, *viz.*, 9030 and 0734, were isolated and these have proved to be cosmopolitan in their habit and consistent in their yield performance. Subsequently, the breeding

work more or less concentrated round the study of 9030. In 1953-54, another culture, 01545-C, was found to combine all the desirable characters. The spinning test conducted during 1953-54 on samples of 9030 indicated that it is capable of spinning 50's H.S.C. In a co-ordinated yield trial conducted during the year with three reselections of 9030 and the other promising culture 01545-C, culture 9030-G recorded the highest yield and proved to be equal to MCU-1 in respect of lint yield per acre. It also excelled the control in fineness and ginning outturn. A review of the mean performance of 9030 in 23 trials spread over 7 seasons in four centres revealed that the cultivation of this quality type would fetch on the average a net profit of Rs. 67/- per acre. The yield data obtained from 9030-G and MCU-1 from 13 scattered block trials conducted during the season on cultivators' holdings in Coimbatore and Salem districts, confirmed the high return that could be expected from this strain. Exploratory trials to determine the optimum conditions for the cultivation of Cambodia cottons were under way in the Bhawani Project Area. Data from the agronomic trial involving the time of sowing indicated that sowings done in early September would result in maximum yield per acre under the Bhawani Project conditions. There were no significant differences between the spacing treatments of 1½′, 2′ and 2½′ between rows and 6″ and 9″ in the row, though two plants per hole gave significantly better yields under late planting at Avanashi alone. This result confirmed the local practice prevalent in that zone. A similar trend of high yield in favour of two plants per hole was also noticed at Tiruchengode under similar late sown conditions.

The work on Sea Island cotton in the West Coast of Madras during 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. The work conducted during the year has shown that the variety 'Andrews' is highly promising recording a phenomenally high yield of 1614 lbs. of *kapas* per acre, which could compare with the very best varieties in West Indies. It exceeded the yield of 'Montserrat', used as control, by 44% and was superior to it in ginning outturn by 3%. In fibre properties, it was better than the commercial standard of the imported variety 'Karnak' and was adjudged capa-

ble of spinning over 60's in small scale tests. It appears to meet the modified objective of the scheme in full both in quality and yield. In the study of agronomic trials of Sea-Island cottons in the West Coast, it was found that a basal application of farm yard manure, superphosphate and potash in combination with a top dressing of 40 lbs. Nitrogen per acre gave the best yields. A study on the cost of raising the Sea-Island cotton at Pattambi was also undertaken which showed that a net profit of Rs. 440/- per acre could be obtained on the basis of a mean yield of 724 lbs. per acre, the cost of cultivation per acre being Rs. 284/. In addition to these studies, a Pilot scheme for testing the problems of hybrid seed (hybrid between Sea-Island x Cambodia) was also undertaken. The hybrid cotton crop was raised in 8 cultivators' holdings in South Malabar and a mean yield of 525 lbs. of *kapas* giving a net profit of Rs. 286/- per acre, was recorded. The response of the cultivators in raising this hybrid crop was very encouraging.

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 $5\frac{1}{2}$ 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 view of the superiority of the new strain MCU-2 over MCU-1, the seed of this new strain had been distributed to the cultivators in the summer cropped area and it was expected that it would cover the major part of the zone during 1956. This scheme has been in operation for the past eight years and a review of the work indicates that notwithstanding certain handicaps by way of unfavourable seasons etc. in the early years, the objectives of the scheme have more or less been attained. Certain selections derived from crosses of MCU-2 with the East African type Kampala have been found superior to MCU-2 in fibre length and ginning outturn. Selection 0484, derived from the cross between MCU-1 x 7727 and two selections, *viz.*, 119 and 0603 from the cross of MCU-2 x 7733 or Giza 36, were found to be promising as regards fibre length. They, however, require further improvement in respect of maturity. In addition, two other cultures, *viz.*, L 0440 and L 0509, possessed a mean fibre length of 1.06" with a fibre maturity of 60 and 66 per cent, respectively. These are proposed to be studied further in the coming year.

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.

During the year under review, district trials with promising cultures, 9030-8-5(G.1 x Co.2) 4-4-1-1, MCU-1 and MCU-2 and local bulk were arranged in Madurai, Tiruchirapalli, Salem and Coimbatore districts with four trials in each.

In the Main Strains Trial, 10 cultures including MCU-1 and local bulk as controls, were tested and it was observed that PK.719, a reselection from (G.1 x Co.2) 4-4-1-1 gave the highest yield of seed cotton. It combined with high yield, ginning outturn and fibre properties equal to MCU-1. Four other cultures had given yields on a par with MCU-1. Of these, 9030-8-5 had recorded the highest value of ginning outturn, *viz.*, 35.8 and cultures PK.485 and 9030-8-5 definitely gave a lower value of fibre weight than that of MCU-1 indicating their superior fineness. Thus, from their overall performance, it would appear, that cultures 9030-8-5, PK.485 and PK.179 deserve to be tested further. In the Preliminary Strains Trial, PK.924 combined high yield, lint length and fineness superior to MCU-1. Next in order of merit were PK.599, PK.860 and PK.863. About 436 cultures were tested in the progeny rows and 40 cultures were found to be superior to MCU-1 in respect of yield and 66 were equal to it. Several crosses with promising types have been effected. Fifty-five second generation progenies derived from 9 combinations of crosses were raised during the year. Out of these only one progeny, *viz.*, MCU-2 x 9030-8-5 combined high values both in respect of lint length and ginning outturn.

4. Scheme for improvement of Tinnevelly and Karunganni cottons in Madras State.—The object of the scheme is to isolate a strain with a staple of over 15/16" by a synthesis of long staple *desi* cottons, capable of cultivation in the cotton areas of the Central and Southern districts of Madras State.

Based on the recommendations of Dr. Harland, the possibility of evolving a 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.

In the preliminary strain trials for yield at Kovilpatti and duplicated at Coimbatore, it was found that out of 34 cultures tested, 14 were pure for all the three attributes, *viz.*, yield, halo-length and ginning percentage. Among these, the best 8 cultures, 9430-B, 9877, 9967, 9987, 9705-C, 9784-C, 9558-B and 9589-E were found to fulfil or exceed the objective of the scheme in respect of staple length and ginning outturn.

In the Main Strain Trials the new culture, 7704 gave the highest yield of *kapas* and possessed an improved fibre length of 1.02″. Two other cultures, *viz.*, 8005-A and 6383-1-A were also found promising.

With the object of combining earliness, good productivity and superior fibre properties, about 2,625 fresh crosses involving 207 parental combinations have been effected during the season and about 1,500 crossed bolls were secured.

5. Scheme for the evolution of an early variety of cotton suitable for cultivation as an off-seasonal crop in the rice fallows.—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 follows of Madras State.

The season under report was highly favourable to the cotton crop at Coimbatore, normal at Aduthurai and abnormally unfavourable at Palur where, a rainfall of 20″ distributed over a fortnight in the months of April and May caused mortality (60-85%) of plants, incidence of root-rot and very poor yields of the survivals. The yield of Punjab-American variety 216F at Coimbatore was as high as 1,480 lbs. of *kapas* per acre yielding 1-1/4 bales of lint.

Three reselections *viz.* 1002-1, 1005-1 and 1019-1 from P.216F appeared to possess potentialities for higher yield ranging from 20 to 46% over the control, although they did not reach the level of statistical significance. In addition, they possess a combination of significant superiority in halo length of 1.2 to 1.5 m.m. and ginning percentage from 2 to 2.5. Although the yields of the other 3 strains,

viz., 649, 655 and 822 derived from P.23F manifest lower yield increase, ranging only from 5-11% over the control, they were significantly superior in halo length by 1.1 to 1.9 m.m. and in ginning by 2.5 to 3.2%. In the "Preliminary Strain Trials" comprising 6 strains with P.216F as control, all proved equal in *kapas* yield, as well as halo length. As regards ginning percentage, strain P.23F-C 1005 alone had a significantly superior value of 37.3% compared with 33.8% of the control. The "Main Strain Trials" were conducted at Coimbatore as well as at Aduthurai, with P.216F, P.23F and MCU-1. P.216F gave a significantly higher yield of 1,480 lbs. of *kapas* per acre than MCU-1 which gave only 749 lbs. at Coimbatore. At Aduthurai again, P.216F gave significantly higher yield of 812 lbs. over that of P.23F and, therefore, appears to be the best suited for cultivation in the rice fallows.

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 Northerns tract, possessing a longer staple, higher ginning percentage of over 30 with higher productivity and capable of spinning upto 40's highest standard warp counts with fineness and strength equal to N.14.

As a result of breeding work carried out, four hybrid selections *viz.*, 4996, 5001, 5202 and 5289 were isolated and these were tried on cultivators' holdings in the districts along with N.14 and local as controls. Of these, 4996 and 5202 were found to yield better than N.14 but the laboratory examination of these two promising types revealed that 4996 possessed a low ginning outturn coupled with inferior quality. Subsequently another new selection, 5975, which combined a ginning outturn of 33% with halo-length of 25m.m. was included in the district trials along with 5001, 5202, and 5289 of the first batch of promising strains.

During the year under report the crop suffered slightly in the early stages owing to drought but on receipt of rains later, it recovered and in the end the yields proved to be above normal. The trials conducted on the cultivators' holdings included in addition to the

four strains previously tested, another culture known as 6224. The trials were conducted at 18 centres of which the crop at 8 centres only was satisfactory as regards germination and growth. At none of the centres, however, the differences in the yield of *kapas* and lint were found to be statistically significant. The strains, 5975, 5289 and 6224 proved to be better than local and N.14, in lint characters. In another bulk yield trial at the research station, culture No. 122, was found to be superior to N.14 in respect of lint yield. Five other cultures were better in ginning percentage and staple length. Furthermore, 7 progenies out of 117 tested were found to be significantly better than N.14 in *kapas* yield. These have been retained for further study. 1348 desirable selections from hybrid progenies have also been retained for study in the ensuing season.

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).

The seasonal conditions during the year were favourable during the early stages but unfavourable during the productive phase. In addition, there was a heavy attack of boll-worm causing bud and boll-shedding which diminished the yield considerably. As in the previous year, the season proved to be most favourable to *desi* cottons and Cambodia types fared the worst. One selection, *viz.*, 327 was subjected to district trials at fifteen centres of which only nine centres yielded valid data. The yield differences obtained at these centres were, however, not significant between the selection and the controls M.A.II, Laxmi and local. All the five selections tested in the Main Strains Trial were inferior to the controls, *viz.*, Laxmi or N.14, in respect of yield. This was ascribed to the unprecedented boll-worm attack. In halo length, selection 4012 was equal to the best control, Laxmi, while all the rest were inferior to it. Selection

4012 had combined desirable ginning outturn also. All the seven families tested in Compact Family Block and contemporary Small Bulk Trial proved to be inferior to the control N.14 in yield. With regard to purity, one family *viz.*, 4169, was pure for all the three economic characters, yield, halo length and ginning outturn. Out of the 52 progenies studied in detail from among a total of 181 raised, eight proved equal to N.14 in yield and to Laxmi in fibre characters.

3. Scheme for evolution of white linted cotton for Cocanadas 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 Northerns grown in the Kurnool district. During the year. 9 varieties *viz.*, 197-3, H.420, Pratap, M.5A, B.5, K.19, K.21, K.22 and K.32 were tested in the Main Strain Trial against appropriate controls *viz.*, C.2, the coloured cotton strain and Anakapalle white (Chinnapathi local) in three sowings, *viz.*, in July, August and September. The growth behaviour of these types showed that five types, *viz.*, 197-3, H.420, Pratap, M.5A, and B.5 were highly sympodial and as early as Chinnapathi local. The variety Pratap was found to be on a par with both the controls in yield in the July sowing. Not only the lint outturn of most of the types was better than both Chinnapathi and C.2 but they also possessed a better staple. A large collection of extra-State types consisting of 5 *herbaceums* from Dharwar and 157 *arboreum* and 100 *hirsutum* types from Hyderabad, Rajasthan, Nagpur, Madhya Bharat and Madras were grown in the observation plots against the control C.2. Of these, the North Indian types were found to be promising in the July sowing. In the later sowings done in August and September all were poor and unproductive. The more promising types like B.32.48 51. K.28. 3943 B, 122, Pratap, 197-3 and a few Gaorani types were utilised for extensive hybridisation work with a view to improving earliness, adaptability, staple length, ginning outturn and spinning capacity. In an yield trial of 6 types from Adoni, type 3930 A yielded significantly better than

Chinnapathi in July sowing while in the subsequent sowings of August and September all the types registered downward trends in yield and were inferior to C.2. Out of the seven selections obtained from Nandyal and tested in bulk trials, two selections *viz.*, 6234 and 122 appeared to be promising, the former possessing a staple of full one inch by sorter.

MADHYA PRADESH

1. Scheme for breeding *desi* cotton in Madhya Pradesh.—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.

Due to unfavourable seasonal conditions during the year under report coupled with severe incidence of pests and diseases the crop growth was affected adversely. The outturn, on the whole, was only 48 per cent of the normal. From the overall performance of the varieties studied under Varietal Trial, varieties 13A, B 12A and No. 16 were found to be promising with regard to ginning percentage and mean fibre length. The first two of these *viz.*, 13A and B 12A which gave a superior spinning performance of 36's H.S.C. in 1954-55 are proposed to be advanced to district trials. 10 out of the several varieties tested in Preliminary Varietal Trial for the past 3 years, six varieties *viz.*, 84A, B 14, 34, N 462, AK 127 and B 12A appeared promising. Two of them, *viz.*, 84A and B 12A are also found suitable for spinning 32's H.S.C. In the Strains Test conducted at four centres Akola, Buldana, Yeotmal and Nagpur, a good number of strains approached the targets of economic characters specified in the object of the scheme.

2. Scheme for breeding American cotton in Madhya Pradesh.—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 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.

The season on the whole was unfavourable to the cotton crop owing to which the outturn was low. Incidence of blackarm and bollworm was heavy. Out of the 6 varieties tested during the year at four centres, *viz.*, Achalpur, Nagpur, Yeotmal and Buldana, two *viz.*, 0296-7 and 147 were found promising and are proposed to be included in the district trials next year. Of these two types, 0296-7 was significantly better than the control B.0394 in all the three characters, yield, halo length and ginning outturn while 147 surpassed the control in halo length and ginning percentage. In a Preliminary Variety Trial conducted with 14 varieties, two, *viz.*, Y.20 and 485, were found to be superior to the control in one or two economic characters at one or more centres. Variety Y.20 possessed a mean ginning outturn of 35.5% and was adjudged suitable for spinning 41's H.S.C. In Progeny Row Trials conducted to study the comparative resistance of cultures to blackarm and jassid attack, sixteen cultures were found to be very promising, combining resistance to blackarm and jassid attack together with desirable economic characters.

3. Scheme for the study of Agronomy of long staple American cotton in Madhya Pradesh.—The scheme was put into operation on the 1st March, 1954, and aims at studying the agronomy of long staple American cotton and to obtain the maximum *kapas* yield.

During the year under report, two major experiments involving the study of the effect of spacings, sowing dates, post-monsoon irrigations, application of nitrogen and methods of sowing on the yield and other characters of Buri 0394 and *desi* strain No. 91, were undertaken. The results of the first experiment confirmed the previous findings that pre-monsoon sowing is more advantageous than the normal sowing both in respect of yield of seed cotton and enhancement of ginning outturn. It had, however, little or no effect on other characters of the cotton varieties tested. Narrow spacing, post-monsoon irrigation and the application of Nitrogen at 40 lbs. and 80 lbs. proved to be conductive to giving higher yields than wide spacing, absence of post-monsoon irrigation and nil application of N

respectively. Of the two doses of Nitrogen applied, *viz.*, 40 lbs. and 80 lbs., it was observed that though there was no significant difference, the response to the bigger dose was better than smaller dose of 40 lbs. N. Comparing the two varieties of cotton, it was found that the Buri variety, 0394, appeared to be better than the *desi* type No. 91 from the point of yield of *kapas*, staple length and seed weight. In respect of ginning outturn, however, it was poorer than the *desi* variety. In the second experiment which included, in addition to the above two varieties, two more strains *viz.*, 597 and B.147, it was again confirmed that Buri 0394 was the best as regards yield of seed cotton and strain 597 was the poorest. In a comparison between dibbling and drilling of seed, it was found that the dibbling method of sowing was only slightly more advantageous than the latter method—drilling. It had, however, resulted in a better development of cotton seeds than in the case of drilling, as evident from the increase in the seed weight.

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 a superior long stapled cotton from *desi* and American varieties suitable for cultivation in Western and Central Uttar Pradesh.

The work consists of two parts, *viz.*, that relating to *desi* cottons and that on American cottons. In the work on *desi* cottons, the strain known as 35/1, isolated a long time back is now under large scale distribution in the districts of Meerut, Muzaffarnagar and Saharanpur in the North West and partly in Manipuri, Etawah, Farrukhabad and Kanpur in the central region. Further work aims at the evolution of a strain better than 35/1, either through re-selection from 35/1 or by extensive hybridisation between promising strains.

The seasonal conditions were adverse in the later phase of crop growth due to heavy rainfall together with a severe attack of pink boll-worm.

In the work for the improvement of *desi* cotton, three of the best hybrids *viz.*, 35/4 x Parb. G.703, C.520 x C.402 and 25/6 x

G.4.M-11 x 35/6 were tested on a field scale against 35/1 as control on Government Farms in the *desi* cotton region of the tract. From the results obtained, it was found that the first two hybrid derivatives compared favourably with 35/1 in yield. Out of the 23 strains tested in the Main Strain Trial, 10 were equal to 35/1 in yield. One strain *viz.*, 51/50 was also noticed to be capable of spinning up to 19's H.S.C. This strain is being further improved for yield. In the Preliminary Strain Trial, 19 promising strains, derived from the crosses of 197-3 x 35/1 and 197-3 x C.520 were under trial out of which two yielded equal to 35/1. In mean halo length all the strainss surpassed 35/1. But of these, 6 are significantly superior to 35/1. Five American and 11 *desi* types were tested in a 3-row trial under *barani* conditions out of which four from the *desi* group and three in the American group showed promise for further test. With regard to American cotton improvement work done at Raya Station, the new varieties obtained from the U.S.A. were observed to possess superior quality indicating their usefulness for hybridization. Eleven promising selections from the standard strains were included in the Main Strain Trial all of which yielded equal to the control 216F. The new strain H.14 from the Punjab was tested on a number of Government Farms against 216F, 100F and M.4. The results did not reveal any significant difference between the four in yield, but in quality H.14 and 216F were lower at both Bulandshahr and Raya.

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 season was unfavourable due to receipt of heavy rainfall and incidence of jassids and pink bollworms.

The work under this scheme is being carried on at three centres *viz.*, Nagina, Hempur and Kiserwa. The results from the trials at Nagina indicated that 12 strains were equal to 35/1 as regards yield but superior to the control in staple length. In another trial, a segregate from 35/4 x Parb. G-703 gave higher yield than 35/1 and

combined superior staple length. It was observed at Hempur that the *desi* types fared better than American types under the heavy rainfall conditions. In a comparative trial at the 3 stations intended to study the comparative performance of *desi* and American varieties, it was found that the late maturing American types gave better yields at Nagina than the *desi* control; at Nagla, however, the *desi* type 35/1 gave distinctly superior yield than all the American varieties whereas at Hempur the American strain 320F was equal more or less to the Khandesh strain 197-3 which was included in the trial. In another trial at Nagina and Kiserwa, though the strain 35/1 proved to be the best in respect of yield, it was surpassed in respect of quality by strains derived from crosses 35/4 x Parb. G.703 and (35/6 x G.4.M-11) x 35/6.

ASSAM

Scheme for improvement of Hill cotton in Assam.—This scheme was approved by the Committee at its meeting held in January, 1944, and it came into operation in February, 1947. The object of the scheme is (i) the production of high yielding types of short stapled coarse cotton with high ginning percentage and (ii) introduction of improved methods of cultivation.

The seasonal conditions during the year proved to be unfavourable to the cotton crop owing to the occurrence of three hailstorms of considerable intensity and the receipt of heavy rainfall during the flowering phase of the crop which caused considerable shedding of flowers and bolls. Three district trials were conducted with two strains in each, using local bulk as control during the year. But all the six strains were found to be equal to the local in yield and ginning percentage. The results obtained in other trials indicated that none of the new strains was superior to the local.

A manurial trial was conducted to study the relative merits of the application of the three manures, *viz.*, ammonium sulphate, mustard oilcake and cowdung, each to give 60 lbs. N, in comparison to non-manure. No significant differences in yield were obtained. There was also no indication of any advantage gained by using any of the seed rates ranging from 4 to 12 lbs. per acre, nor by treating seeds with Perenox before sowing.

HYDERABAD

1. Scheme for improvement of cotton in Parbhani district.—This is an offshoot of the scheme for improvement of cotton of Oomras tract in Hyderabad. It was started 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" which combined all the desirable qualities and proved to be superior to Gaorani 12, was released and has soon gained popularity in the Parbhani taluk. As a result of further work to isolate a strain better than Daulat, five strains, *viz.*, 4166, 5018, 5169, 5177 and 5274 have proved to be superior to "Daulat" in respect of yield. While 4307 possessed a staple of .95″ against .89″ of "Daulat", strains 4059 and 4307 were outstanding in quality, both of them being adjudged suitable for spinning 40's H.S.C. Another batch of four strains, *viz.*, 4822, 4823, 4831 and 5167 recorded a ginning outturn of 40%. The strains superior to "Daulat" in quality were wanting in respect of productivity besides being late in maturation and those giving a higher yield showed a tendency to increase fibre weight. Only two strains, *viz.*, 5177 and 5274, which were as high yielding as "Daulat", proved to be earlier maturing than 2204. Strain

5378 which under optimum conditions of wilt infection had proved to be 100% resistant at Poona was found to give stronger yarns than "Daulat".

2. Scheme for improvement of cotton in Aurangabad and Bhir districts.—The scheme was put into operation on the 2nd May, 1952 and 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.

Among the three strains, *viz.*, PII-45-2513, PII-47-3591 and N.1422 included in the district trials with Gaorani 12, 197-3 and the local as controls in 6 centres in Aurangabad and Bhir districts, the strain P.II-47-3591 recorded high yields as in the previous years. The above three strains were also tested in the Main Varietal Trial on the Research Station where the results indicated that, though they were as good as Gaorani 12 in spinning capacity with a ginning outturn higher than 5%, they did not compare favourably with 197-3 which, although low yielding, was much appreciated by the cultivators on account of its high ginning percentage. In the Preliminary Varietal Trial one variety, *viz.*, 4829 gave significantly higher yield of *kapas* and lint than the controls. All the other varieties tested were promising with regard to ginning percentage and resistance to wilt under field conditions. In the Main Strains Test, 8 strains out-yielded the control 197-3 though all of these were only equal to the local in yield. Two of them, *viz.*, strains 45 and 47 gave strongest yarns in the micro-spinning tests. All the varieties and strains in the advanced stages of breeding were tested for wilt resistance under field conditions at Parbhani. The results indicated that the promising variety 2513 and the improved strain with the strongest yarn, *viz.*, 47 showed resistance to wilt also. On the agronomic side, early sowing in May supplemented with four irrigations or dry sowing before the break of monsoon was found to give very high yield than normal sowings. From the manurial experiment it was found that application of ammonium sulphate @ 20 lb. N per acre augmented the yields significantly and this dose was as good as 30 lb. and 40 lb. N.

PEPSU

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

During the year under report, 320F/35, a new selection from 320F, showed comparatively better performance in yield, ginning outturn and resistance to jassid attack. From the other agronomic experiments, the following results were obtained:— (1) sowing done in the middle of April, recorded higher yield. (2) Closer spacing of $2\frac{1}{2}' \times 1\frac{1}{4}'$ was found to be optimum for enhancing yield of American cotton. (3) Application of 50 lbs. and 100 lbs. nitrogen per acre as Ammonium Sulphate alone and in combination with farm yard manure at flowering stage proved very profitable. Judicious combination of irrigation and manure was found instrumental in increasing the yield of American cotton. (4) Intercropping of leguminous crops like 'Moth' and 'Guara' resulted in additional income of Rs. 24/11/- and Rs. 14/9/- respectively.

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 was put into operation in November, 1944. The objects of the scheme are (i) the acclimatisation and breeding of Egyptian and Sea Island cottons and (ii) the testing, in large scale trials of Mysore-American strains evolved under the Doddahathi Scheme (iii) to evolve strains of upland American cottons superior to those already under cultivation and resistant to *red-leaf* disease and further to evolve 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 resulted in the evolution of a

superior variety, *viz.*, M.A. V. which now occupies almost all the rainfed areas growing Upland cotton in the State. Seven pure strains were tested in the Main Strain Trial of which all the strains except one, *viz.*, 4-1 were on a par with the control M.A.V. in yield. All the strains were superior to the control in halo length. The full scale spinning tests conducted on three of the best strains indicated that they were capable of spinning 34's to 40's H.S.C. against 32's of M.A.V. In respect of resistance to *red leaf*, all the strains were of the same level as M.A.V. of the nine pure strains tested in the Preliminary Strain Trials, one, *viz.*, 18-2-2, outyielded the control M.A.V. significantly, the respective acre yields of seed cotton being 1412 and 1252. Five out of the nine strains gave stronger yarns than the three control strains M.A.V., M.U.1 and M.U.2 in micro-spinning tests. Of the 80 progenies tested in Progeny Row Trials, 74 proved to be better in one or more characters than the control. Among the new Upland introductions, Empire cotton showed some promise while the rest proved highly susceptible to pests and diseases. In comparative trials of M.A.V. and Laxmi in areas bordering Bombay Karnatak, the former proved better in red soils and the latter in black soils. In trials with five short duration Punjab varieties in the rice fallows at the Agricultural Research Stations Mandya and Hiriyur, H.14 was found to be the most suitable for rotation in rice fallows.

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 part is located at Siruguppa and that of the second at Hagari.

The rainfall received during the year under review was the highest during the past twenty years. The continuous wet spell and the severe blackarm and bollworm attack reduced crop yields considerably.

Out of the 14 promising cultures tested for yield against the control M.A.2, two cultures, *viz.*, 5067 and 5216 outyielded the control in lint outturn, the increases over control being 21 and 28 percent respectively. The culture 5216 also revealed a low attack of Blackarm.

The culture 2196-4 was on a par with the control M.A.2, in respect of yield but superior to it in ginning outturn and staple length. Unlike in the last season, Laxmi yielded well and possessed good fibre properties, thus regaining its past standards of economic characters. Twenty-one families consisting of hybrids and single plant derivatives of the adaptable types were studied for their purity and yield performance. Out of these, only eleven families were found to be promising in respect of *kapas* yield. The laboratory examination of these families for purity of economic characters is in progress. An elaborate programme of hybridization was also undertaken with a view to synthesise types possessing resistance to Jassids, Thrips and Blackarm. In addition, the adaptable types have been crossed with long linted quality types like M.C.U.1, M.C.U.2, Ingold, I.V.G., etc., to improve their staple length and fineness. District trials were conducted at 40 centres with the strains Laxmi, M.A.2 and 2196-4. Culture 2196-4 which fared well during the past two years under the irrigated condition was tested for suitability to rainfed conditions. This culture, though late in duration, was found quite satisfactory in its performance. As this is the first year of its introduction in the districts its performance under unirrigated conditions remains to be studied in further trials. Under the comparative trials at Hagari, nine promising American cotton cultures were studied with the *desi* type W-1 as control. None of them was found superior to control in respect of *kapas* yield but all were on a par with it in lint outturn except culture 4994. All the fifteen promising families studied in Compact Family Block and Small Bulk Trial for purity and yield performance were superior to the control in staple length and ginning outturn.

3. Scheme for improvement of Westerns cotton in Mysore State.—The 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.

The season was characterised by the unusually heavy and continuous rains coupled with severe incidence of Boll-worm causing considerable shedding of early set squares and buds.

Under the comparative trials sixteen promising cultures were tested. The results obtained from the tests indicated that none of

them was superior to Westerns-1, the control, in respect of yield of seed cotton but three cultures, *viz.*, 3870-IV/1, 4287 and 4509, were better than the control in respect of lint yield, staple length and ginning outturn. The study of twenty-two families in Small Bulk Trial showed that five cultures, *viz.*, 2-3-68-4, 2-3-68-9, 4940, 4870 and 4868 were on a par with the control, Westerns-1 in yield and superior to it in respect of ginning outturn and staple length. During the year under review, 296 promising hybrid selections were studied in four sets of Progeny Row Trial. The results obtained indicated the all-round superiority of 12 hybrid progenies over the control, Westerns-1. In addition, 616 selections were tested under the non-replicated observation plots against the control, Westerns-1, out of which 218 have been selected for detailed study. 407 crossed bolls were secured. The results from the district trials conducted in 10 centres with two improved strains, *viz.*, 2-3-68 and 2-3-69 have indicated the superiority of both the strains over Westerns-1 in staple length and ginning outturn while being equal to Westerns-1 in yield.

RAJASTHAN

Scheme for improvement of cotton in Mewar.—The scheme commenced working on the 16th June, 1948, with a view to evolving a strain of American cotton (G. Hirsutum) superior to C. Indore-1 for growing under irrigated conditions and also to find out an indigenous improved variety superior to local *desi* cotton for *barani* tract of Mewar.

Two varietal trials on promising American strains under irrigation were conducted with C.Indore-I as control. In the first trial, wherein six promising types were included, four of them were on a par with the control, as regards yield of seed cotton; three were superior to the control in halo-length and one was significantly earlier maturing than Indore-1. M.48-4 which combined high yield equal to the control and superior lint length also possessed significantly superior ginning outturn. The Punjab variety, 216F, which was tested along with the Rajasthan strains proved to be significantly inferior in respect of yield of *kapas* to the control Indore-1. The types M.48-46, M.48-6 and M.51-902 previously mentioned as promising, did not exhibit during the year any significant improvement over Indore-1, as regards yield, lint length and earliness. In

the Main Strains Trials conducted with *desi* cotton types, it was found that 35/1 was significantly superior to all the varieties in yield and earliness. Jarila, 35/1, Pratap and Indore-1 were significantly superior to local *desi* in mean fibre length. In the agronomic trials involving spacing and date of sowing of American cottons, are stated to have been conducted under the scheme. The results appear to have indicated that sowings done between the 16th May and 15th June gave better yields than sowing after 15th June. It was also found that in the spacing trial the yield of *kapas* tended to increase in the closely spaced plantings; the differences between the different spacings were, however, not significant.

MADHYA BHARAT

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 Bharat. In addition to evolving improved strains of the different crops, fundamental research work on the genetics of cotton is also in progress.

Unfavourable *Kharif* season affected the growth of plants and depressed the yields of all the crops in general and cotton in particular.

The varietal trial with the interspecific crosses, involving the wild *thurberii* and *tomentosum* yielded four promising strains characterised by early maturity, jassid resistance and yield and fibre properties significantly superior to those of Indore-2. Perennial bushes of one year old F_1 hybrids of *Quebradinho* x *tomentosum*, hybrid selection CTI 4-22, combined good yield with a halo-length of 31 m.m. and a ginning percent of 39. Studies on cotton genetics of lint/fuzz colour (with special reference to the Khaki lint/green fuzz phenotype) in American cotton, and for petal spot and seed fuzz intensity in Indian types of Asiatic cottons, were continued. A new item of study to transfer the lint fineness and strength of *anomalum* to *herbaceum* has been initiated during the year under report.

The entomological investigations involving the testing of various insecticides against other pests indicated that D.D.T. and B.H.C. mixture were the best insecticides against jassids and they ultimately

increased the yield. Against spotted bollworms and leaf caterpillars, the Dieldrin spray at 0.09% proved to be the most effective and D.D.T. 0.2% B.H.C. 0.1% spray the next best. In the trials for testing for wilt resistance all the thirteen strains from last year's test and six new ones were found to record a high degree of resistance.

2. Scheme for improvement of Nimar cotton in Madhya Bharat.—The 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 Bharat, superior to Buri 107 in yield staple length and ginning percentage.

From the district trials conducted at six centres with Maljari and D.46-5 against the Khandesh strain, 197-3 (Virnar) the superiority of Maljari was once again confirmed over all other strains in its suitability to the Nimar tract. It gave a gross extra income of Rs. 38/- more per acre than what the cultivators obtained by growing 197-3. This new strain, Maljari, is being multiplied under a separate seed scheme financed by the Committee. In the varietal trials, the yield of two strains, *viz.*, D.46-5 and D.47-47, was found to be numerically better than Maljari. As regards spinning capacity and early maturity, D.47-47 and D.48-104 had been found to be the best. D.48-104 also possessed a mean fibre length superior to 197-3. K.52-462 was found to be promising in respect of spinning capacity.

As regards work on American cottons suitable for Nimar tract, two types, *viz.*, A.51-9 and A.51-10, had been tried against 0394 at 6 centres in the Nimar district on cultivators' fields. The average results of the different centres showed that A.51-9 gave a higher yield than 0394, both in respect of seed cotton as well as lint. The ginning outturn of this strain was 35.5% against 32% of 0394. In halo length it is on a par with the control. It is proposed to multiply the seed of A.51-9. Further promising material in the different stages of testing includes strains A.51-5, A.51-24, A.341 F3, A.349 F3 and A.52-51.

In conformity with the re-orientation of the objective of the scheme, a large number of selections were made from hybrid bulks,

(*viz.*, Maljari x Jarila) and (Jarila x Bhoj), in 1953-54. The progeny of these, was grown in 1954-55 and 166 progeny bulks derived from these two high ginning bulks, it was found that 72 of the former and 11 of the latter group were found to be consistent for the characters they had been selected for. These are proposed to be tested further. Similar work has also been undertaken in regard to breeding of American cottons. Four American strains from Madhya Pradesh, one from Dharwar and six from Indore are stated to have been grown for study under Nimar conditions.

3. Long staple American cotton breeding scheme, Badnawar.—This scheme was sanctioned by the Committee at its meeting in July, 1952, and was 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.

Thirty-eight types were tested against Dhar Cambodia in the preliminary varietal trials, which included *hirsutums, thurberii,* Surat and C.T.I. (Co2-x Tomentosum x Indore-2) hybrids. Of the 38 types, 16 have been retained for further trials in the coming season. Considering the results groupwise according to the origin of these types, the *tomentosum* hybrids were found to be the best; the *thurberii* hybrids coming next with *hirsutum* types, *viz.*, M.U.4, Indore-1 and Indore-4 ranking last but better than the control, Indore-2.

From the point of maturity, the *desi* type was extremely early compared to Indore-2. C.T.I. types were also much earlier than Indore-2, *thurberii* and *hirsutum* types being almost on a par with the control. C.T.I. types were superior to Indore-2 in respect of halo length and two of them, *viz.*, C.T.I. 1-1 and C.T.I. 1-3 also possessed significantly better ginning outturn than Indore-2. It was finally concluded that C.T.I. types are adaptable like *desi* varieties to adverse conditions. Four types, *viz.*, C.T.I. 1-4, C.T.I. 1-6, C.T.I. 4-19, and C.T.I. 4-21, were equal to or better than *desi* in yield and were very good in their over-all performance. In another strains test, 58 progenies of single plants re-selected last season from established *hirsutum* types were tested against Indore-2, Dhar Cambodia and 197-3. 14 were retained for further trial.

In a trial to test the suitability of 64 progenies derived from *hirsutum* x *barbadense* x *hirsutum,* involving parents like sea Island V 135, Early Pima, Sakel, Malaki and Menoufi, it was found that 26 of them were worth further study. The type HB 2, HB 8, HB 49, HB 52 and HB 44 were found to be outstanding among them. In another trial where a number of varieties from different sources were tested, it was found that only the Madras type, *viz.*, 7727, was very good in staple with 33.6 m.m. halo length against the average of 27.5 m.m. for the control. This was, however, found to be late maturing and poor in yield.

ORISSA

Scheme for research on cotton in Orissa.—This scheme was approved by the Committee at its meeting held in March, 1952 and was put into operation on the 20th September, 1954.

The objects of the scheme are (i) to undertake a Botanical Survey of cotton areas of Orissa and (ii) to acclimatise American and other varieties of cotton in Orissa under irrigation for eventual cultivation of suitable varieties under Hirakud Dam Project.

In varietal trials conducted during the *kharif* season, varieties Buri 0394, M.C.U.1 and Parbhani American appeared promising in that order in the irrigated series while varieties Buri 0394, Parbhani American and Laxmi proved to be the best in the unirrigated series. High ginning percentage of over 39 was recorded by M.C.U.1 and Virnar in the irrigated and unirrigated trial respectively. In the Preliminary Strain Trial, varieties Buri 0394, M.C.U.1, Parbhani American, Indore-2 and Pratap have shown promise, of which Indore-2 is proposed to be advanced to varietal trial during the next season. The variety, Quebradinho, was found to be the most prolific among the perennial types and crosses of this type with M.C.U.1, M.C.U.2, M4 and 170-Co.2 have been effected.

Botanical survey of cotton areas in Bolangir district was undertaken and the samples collected from cultivators' fields are to be grown on the station for further study. The studies on floral biology in varieties Gaorani 6, Laxmi, M.C.U.1 Buri 0394, 35/1, and local *desi* were also conducted.

CHAPTER IV

EXTENSION WORK IN THE STATES

The results of the crop improvement work financed by the Committee are carried to the cultivators through the agency of various seed distribution and extension schemes that function in different States. The schemes for multiplication and distribution of improved seed on a large scale form a real link between the experimental station and the cotton farmer. This work has been greatly intensified in recent years. The total expenditure incurred by the Committee so far on such schemes amounts to some Rs. 37.5 lakhs. The present annual expenditure on this account is of the order of Rs. 1.69 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 105,32,481 acres proposed to be covered ultimately by improved varieties of cotton in different cotton tracts, an area of 65,64,111 acres has been covered during the year 1955-56 *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 1955-56 is estimated at Rs. 13.7 crores. A brief report on the working of these schemes is given below:—

BOMBAY

(i) 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. This scheme was launched on a self-supporting basis from the 1st March 1954. A

summary of the 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	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1951-52 ..	11,371	52,214	..	52,214	84 7 3	4,578,151
1952-53 ..	69,638	2,80,000	1,70,000	4,50,000	41 0 0	18,450,000
1953-54 ..	78,200	3,68,051	3,11,149	6,79,200	50 0 0	33,960,000
1954-55 ..	54,415	2,64,184	4,90,454	7,54,638	20 0 0	15,092,760
1955-56 ..	59,484½	2,95,733	6,61,260	9,56,993	20 0 0	19,139,860

Even though the area under Virnar in the tract had increased from 7.55 lakh in 1954-55 to 9.57 lakh acres during 1955-56 season, the production of cotton had gone down from 2.65 lakh bales in 1954-55 to 2.00 lakh bales in 1955-56. The certified Virnar lint fetched on an average Rs. 10/- more per bale than non-certified Virnar during the year under review.

The grading of cotton under Agmark as advised and permitted by the Marketing Adviser to the Government of India was introduced for the first time in the tract during the year under report. Accordingly, 3362 bales were agmarked under the black label representing 97% or more purity. In addition, purity certificates (representing purity of 95% or more) for 3584 bales were also issued. The Cotton Control Act, the Cotton Transport Act and the Cotton Ginning & Pressing Factories Act were rigidly enforced during 1955-56.

(ii) 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. A 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	Non-Departmental	Total	Per acre Rs.	Total Rs.
1953-54 ..	11,182	93,315	..	93,315	30	27,99,450
1954-55 ..	56,991	1,08,603	2,64,910	3,73,513	25	93,37,825
1955-56 ..	60,055	3,81,043	1,06,877	4,87,920	15	73,18,800

The cotton acreage (districtwise) during 1955-56 season in the Surat tract was as shown below:—

Sr. No.	District	Improved strain 2087 (acres)	Natural spread 2087 (acres)	Local (Non-Descript) (acres)	Total (acres)	Area to be ultimately covered with improved cotton 2087 (acres)
1.	Surat	3,04,073	60,080	55,847	4,20,000	4,20,000
2.	Broach*	1,70,787	20,000	19,213	2,10,000	2,10,000
3.	West Khandesh† ..	13,060	20,000	6,940	40,000	40,000
	Total ..	4,87,920	1,00,080	82,000	6,70,000	6,70,000

* Lying south of river Narmada.
† Nawapur and Akkalkuwa talukas.

It will be seen from the above that the area covered in the tract to date by the improved type 2087 works out to 88% of the total acreage under cotton.

The seed cotton from the controlled area (upto Stage IV) was pooled and ginned stage-wise at ginning factories under the Departmental supervision. 1,25,000 bales of 2087 were agmarked during

the season, out of which 1,20,000 had been sold at an average premium of Rs. 50/- per candy in case of black labels (representing 97% and above purity) and Rs. 60/- in case of red labels (representing 98% and above purity) over local. Out of 29,000 full pressed bales of 2087 variety certified, 28,000 have been sold at an average premium of Rs. 40/- per candy over local.

The whole of the Surat cotton tract was included in the Surat protected area under the Cotton Transport Act, 1923. The notification had been issued by the Bombay Government for fixing 2087 cotton variety as standard variety under the Bombay Cotton Control Act.

(iii) Scheme for multiplication and distribution of Vijay cotton seed in Middle Gujerat.—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 Gujerat. The scheme has been taken up on a progressive self-supporting basis with effect from the 1st March, 1955. The progress made under the scheme since its inception is summarised in the table 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	Relates to Broach Section only upto 1953-54. 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	8,07,345	9,78,345	Broach and Baroda Sections.	
1955-56 ..	31,255	3,12,550	5,48,822	8,61,372		
Dig-Vijay	*cotton seed.*					
1955-56 ..	5,263	52,630	..	52,630	Estimated additional income of Rs. 4,67,100/- @ Rs. 8-14-0 per acre.	

The Committee at its meeting held in September, 1956, approved of the proposals for switching over to 'Dig-vijay' cotton (98-41) from 'Vijay' cotton commencing from the year 1955-56 and completing in the course of 3 years by 1958-59.

Out of the estimated production of about 5 to 5¼ lakh bales of Vijay cotton during 1955-56 in the Vijay cotton zone of Middle Gujerat, the Agmark and certified bales were as shown below:—

Variety	Agmark bales	Certified bales
Vijay	80,600	10,000
Dig-Vijay	19,540	.....

The cotton (lint) of Vijay and Dig-Vijay fetched on an average Rs. 890/- and Rs. 936/- per candy (784 lbs.) respectively. The cultivators got tendered premium varying from Rs. 3/- to Rs. 10/- per Bhar (12 Bg. Mds.—960 lbs.) of certified Vijay seed cotton from the traders. The prices obtained by cultivators varied from Rs. 425/- to Rs. 500/- per Bhar (12 Bg. Mds.) of certified Vijay *kapas*; and Rs. 450/- to Rs. 525/- per Bhar of certified Dig-Vijay *kapas*. The prices of Vijay lint fluctuated from Rs. 820/- to Rs. 960/- per candy (784 lbs.) including "Ons". The Agmark F.P. bales of Vijay fetched a premium of Rs. 10/- to Rs. 27/- per candy.

The cotton acreage (districtwise) in the tract during 1955-56 was as shown below:—

Sr. No.	District	Improved strains (Vijay, Dig-Vijay & Indo-American types) (acres)	Other varieties (acres)	Total (acres)
1.	Baroda	4,63,128	....	4,63,128
2.	Broach	2,65,177	....	2,65,177
3.	Kaira	1,01,113	8,000	1,09,113
4.	Panchmahals	46,417	....	46,417
5.	Sabarkantha	1,43,872	....	1,43,872
6.	Ahmedabad	14,250	....	14,250
	Total ..	10,33,957	8,000	10,41,957

(iv) 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 has for its object the multiplication and distribution of pure seed of Kalyan cotton in the Wagad tract of Ahmedabad and Mehsana districts of North Gujerat. The scheme is being operated on a self-supporting basis with effect from the 1st April, 1954. The progress made under the scheme since its inception is indicated by the following table:—

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	1,06,481
1949-50 ..	9,441	35,400	..	35,400	13 0 0	4,60,200
1950-51 ..	25,445	84,945	15,000	99,945	19 4 0	19,23,941
1951-52 ..	73,003	2,30,935	50,000	2,80,935	*15 0 0	42,14,025
1952-53 ..	51,389	2,70,664	45,000	3,15,664	25 0 0	78,91,600
1953-54 ..	1,07,245	85,275 (Reserved area.)	3,55,400 (General area.)	4,40,675	24 0 0	1,05,76,200
1954-55 ..	23,832 (Reserved area.)	1,19,900 (Reserved area.)	5,30,100 (Approx. general area.)	6,50,000 (Approx.)	15 0 0	97,50,000 @1,60,770 99,10,770
1955-56 ..	27,990 (Reserved area.)	1,25,998 (Reserved area.)	4,24,002 (Approx. general area.)	5,50,000 (Approx.)	14 0 0	77,00,000 ‡ 1,35,000 78,35,000

* Due to scarcity of rainfall during the year 1951-52 the average yield was low and so also the market price due to depression in cotton markets during the marketing season.

@ Extra premium for 32.154 agmarked bales of the Reserved Area at the rate of Rs. 5/- per bale on an average.

‡ Extra premium for the estimated produce of about 27,000 agmarked bales of the Reserved Area at the rate of Rs. 5/- per bale on an average. Estimated additional income during this year is less as compared to that of the last year due to reduction in cotton area and low yield.

Out of the total production of 1,75,000 bales of Kalyan cotton in North Gujerat during 1955-56 cotton season, 27,000 bales obtained from the Reserved Area produce were agmarked. On an average the agmarked bales of Kalyan cotton from the Reserved Area fetched a premium of Rs. 10/- per candy of lint over that of the bales from the General Area. Due to a general rise in prices of cotton during the year under report, the prices of Kalyan cotton had practically reached the ceiling and as no special allowance for agmarked bales of the Reserved Area was granted to this variety, the premium was reduced considerably.

The cotton acreage in the tract during 1955-56 was as shown below:—

S. No.	District	Improved strain of Kalyan cotton (acres) (approx.)	Local		Total (acres) (approx.)
			Vijay cotton (acres) (approx.)	Mathio cotton (acres) (approx.)	
1.	Ahmedabad	3,65,000	15,000*	20,000*	4,00,000
2.	Mehsana	1,85,000	....	....	1,85,000
	North Gujerat	5,50,000	15,000	20,000	5,85,000

* The area under Vijay and Mathio cottons was outside the Protected zone of Kalyan cotton.

(v) Scheme for multiplication and distribution of Jayadhar and Laxmi cottons in Bombay-Karnatak.—This scheme was put into operation in March, 1950. The object of the scheme is to cover the stipulated area of 12,00,000 acres under the improved strains Jayadhar and Laxmi cottons in the Karnatak tract of Bombay State. This scheme has been put on a self-supporting basis with effect from the 1st March, 1954. A summary of the progress made under the scheme since its inception entailing the area under both Jayadhar

and Laxmi 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.
1	2	3	4	5	6	7
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	6,07,808	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

The acreage under Jayadhar and Laxmi cottons (districtwise), during the year 1956-56, was as shown in the table on next Page.

District	Estimated area covered in acres STAGES III	IV	V	VI	Total	Natural spread (acres)	Grand total (acres)	Area proposed to be covered (acres)
JAYADHAR								
1 Dharwar ..	322	2,702	57,706	1,21,351	1,82,081	35,130	2,17,211	2,45,590
2 Belgaum ..	260	1,372	20,520	65,072	87,224	30,100	1,17,324	1,51,882
3 Bijapur ..	428	3,003	24,986	71,535	99,952	1,60,221	2,60,173	1,97,978
4 S. Satara ..	..	..	..	4,500	4,500	2,800	7,300	1,390
5 Kolhapur ..	..	..	..	2,300	2,300	3,000	5,300	3,160
Total ..	1,010	7,077	1,03,212	2,64,758	3,76,057	2,31,251	6,07,308	6,00,000
LAXMI								
1 Dharwar ..	459	10,282	87,572	2,43,567	3,41,880	57,620	3,99,500	4,33,792
2 Belgaum ..	..	1,092	1,192	2,316	4,600	2,180	6,780	6,350
3 Bijapur ..	..	1,266	13,494	23,220	37,980	94,173	1,32,153	1,59,858
4 S. Satara ..	..	..	..	..	..	..	..	..
5 Kolhapur ..	..	..	..	..	..	..	..	..
Total ..	459	12,640	1,02,258	2,69,103	3,84,460	1,53,973	5,38,433	6,00,000
Grand Total ..	1,469	19,717	2,04,470	5,33,861	7,60,517	3,85,224	11,45,741	12,00,000

It will be seen from the above statement that 95% of the area had been covered with improved varieties of cotton upto the year 1955-56.

The total quantity of improved cottons marketed in full pressed bales of lint during 1955-56 was as shown below:—

Variety	Reserved area	General area	Total
Jayadhar	9,846	1,080	10,926
Laxmi	15,490	3,497	18,987
Total ..	25,336	4,577	29,913

The average premium realised per *Nag* of 1344 lbs. of Reserved Area certified *kapas* over non-certified was as follows:—

Jayadhar Rs. 20/- to Rs. 30/-
Laxmi Rs. 50/- to Rs. 70/-

MADHYA PRADESH

(i) Scheme for distribution and marketing of H.420 in Madhya Pradesh.—This scheme was sanctioned by the Committee in October, 1949, and it 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 Madhya Pradesh in general would be of a high standard of purity. A summary of the progress made under the scheme since its inception is given below:—

Year	Quantity of seed distributed (Mds.)	Estimate of area covered (acres)			Estimated additional income	
		Departmental	Natural	Total	Per acre Rs.	Total Rs.
1951-52 ..	77,838	4,11,197	1,37,369	5,48,566	10 0 0	54,85,660
1952-53 ..	85,883	4,48,141	5,18,411	9,66,552	15 6 0	148,50,737
1953-54 ..	83,430	4,30,000	6,00,000	10,30,000	5 8 0	56,65,000
1954-55@ ..	84,708	4,74,632	7,29,368	12,04,000	7 6 0	77,29,000
1955-56@ ..	66,340	3,74,834	3,53,228*	7,28,061	3 12 0	24,91,691

* Natural area under the strain is reducing due to popularity of 197-3 variety.
@ Includes figures for Nagpur and Wardha districts also.

The cotton pool work during the season under review was managed by the Madhya Pradesh Marketing Society with the help of the local Agricultural Associations. In all 2974 khandies of H.420 from rogued area equivalent to about 1982 bales were pooled at 21 centres in the districts of Amravati, Akola, Yeotmal, Wardha, Nimar and Nagpur under direct and premium sale systems. The comparative prices obtained by improved and local varieties were as given below:—

District	Average price per khandi of *kapas* (784 lbs.)		Premium obtained over local Rs.
	H. 420 Rs.	Local Rs.	
Amravati	290	277	13
Yeotmal	291	285	6
Akola	290	280	10
Wardha	300	282	18
Nimar	300	290	10
Nagpur	299	290	9
Average ..	295	284	11

It was observed that the premium obtained by H.420 cotton was rather low in comparison to that realised in the previous year owing to the popularity which the Khandesh variety 197-3 was gaining with the trade.

The cotton acreage (districtwise) in the tract during 1955-56 was as shown below:—

District	Area in acres under H. 420	Area in acres under other varieties including local.		Total
		American	*Desi*	
Amravati	1,54,250	1,71,544	4,74,406	8,00,200
Akola	2,17,245	12,717	5,75,338	8,05,300
Yeotmal	2,45,480	73,445	3,35,675	6,54,600
Wardha	50,158	36,626	4,55,664	5,55,900
Nagpur	13,452			
Nimar	47,476	1,11,656	1,77,568	3,36,700
Total ..	7,28,061	4,05,988	20,18,651	31,52,700

(ii) Scheme for distribution and marketing of Buri 0394 cotton in Madhya Pradesh.—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 Nimar and other districts of Madhya Pradesh. The scheme was put into operation on the 1st April, 1953. A 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	Natural	Total	Per acre Rs.	Total Rs.
1953-54 ..	18,266	1,10,000	50,000	1,60,000	41 0 0	6,560,000
1954-55 ..	18,411	1,26,000	65,000	1,91,000	16 12 6	3,205,209
1955-56 ..	14,662	1,06,940	85,030	1,91,970	19 4 6	3,701,421

The total cotton acreage in the tract (districtwise) during 1955-56 was as shown below:—

S. No.	District	Area under Buri 0394 in acres	Area under other American varieties in acres	Total acres	Area under *desi* varieties in acres	Total acres
1	2	3	4	5	6	7
1.	Amravati	53,895	1,17,649	1,71,544	6,28,656	8,00,200
2.	Akola	2,717	10,000	12,717	7,92,583	8,05,300
3.	Yeotmal	52,076	21,369	73,445	5,81,155	6,54,600
4.	Wardha	8,335	25,000	36,626	5,19,274	5,55,900
5.	Nagpur	3,291				
6.	Nimar	71,656	40,000	1,11,656	2,25,044	3,36,700
	Total ..	1,91,970	2,14,018	4,05,988	27,46,712	31,52,700

It will be seen from the above that out of the total area of 31,52,700 acres in the six districts of the State about 405,988 acres or 13% of the area was under American varieties; of the total area under American cottons (*viz.*, 405,988) 191,970 acres or 47% was under Buri 0394.

The cotton pool work was conducted by the Taluq Agricultural Associations under the direction of the Madhya Pradesh Marketing

Society. Facilities for pooling of Buri 0394 cotton were offered at 23 centres under auction and premium systems. 1687 khandies of *kapas* from the rogued area equivalent to 1139 bales were marketed through the cotton pool during the year 1955-56. As will be seen from the under-mentioned table Buri 0394 on an average fetched a premium of about Rs. 23/- per khandi of *kapas* over that of local.

District	Average price per khandi of *kapas*		Premium obtained over local in Rs.
	Buri 0394 Rs.	Local Rs.	
Amravati	315	295	20
Akola	310	290	20
Yeotmal	323	286	37
Wardha	310	285	25
Nagpur	310	295	15
Nimar	305	285	20

(iii) Scheme for seed distribution and marketing of improved variety of cotton No. 91 in Nagpur-Wardha tract of Madhya Pradesh.—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 progress made under the scheme during the first year of its working was as shown below:—

	Seed distributed in B. Mds.					Area covered in acres				
	Stages					Stages				
	III	IV	V	VI	Total	III	IV	V	VI	Total
Target ..	57	418	532	..	1,007	300	2,200	2,800	..	5,300
Actual position	90	116	..	2	208	530	740	..	10	1,280
Position in previous year	183	..	..	..	183	977	..	..	..	977

The reason for not reaching the proposed target of area in stage IV of the scheme was attributed to the limited supply of cotton seed for sowing. The cotton seed in small quantity was distributed to Seed Farmers in previous year and hence an area of 10 acres under stage VI was covered during 1955-56.

Facilities for pooling *kapas* of the variety were offered at all the pooling centres in Nagpur and Wardha districts. *Kapas* of No. 91 variety was pooled only at 3 centres *i.e.*, Nagpur, Kotal and Arvi, to the extent of 28 kh. 16 md. 1 lb. equivalent to 19 bales. The *kapas* was sold under auction sale system at a premium varying from Rs. 15/- to 20/- over local Oomra.

The total area covered during the year under report, district-wise, was as shown below:—

Districts	Area covered under No. 91 (acres)
Nagpur	1040
Wardha	240
	1280
Natural Spread	85
Total	1365

The estimated gross extra income to growers of No. 91 cotton during the year was to the tune of Rs. 6,313-2-0 @ Rs. 4-10-0 per acre.

(iv) Scheme for seed distribution and marketing of M.5A (Malini) cotton in Chikhli taluka of Buldana district in Madhya Pradesh.—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 variety 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.

The progress of seed distribution and extension of area during the year 1955-56 was as shown below:—

	Seed distributed in B. Mds.					Area covered in acres.				
	Stages					Stages				
	III	IV	V	VI	Total	III	IV	V	VI	Total
Target ..	19	190	1,900	9,500	11,609	100	1,000	10,000	48,890	60,000
Actual position	76	1,020	1,535	972	3,603	425	5,350	8,300	5,100	19,175
Position in previous year.	61	252	..	2,096	2,409	305	1,160	..	10,535	12,000

Seed of VI and General stage was not procured in full for distribution as from the reactions of the cultivators due to unfavourable rates they secured in sale of M.5A *kapas* in the market, it was observed that the seed will not be in demand. The seed of III, IV and V stages produced as per scheme was to be distributed in Chikhli tahsil only. There was very inadequate demand for this seed in Chikhli tahsil and as such the operational area was extended to the whole of Buldana district. The seed distribution and area figures given in the above statement relate to the whole of the district and not to Chikhli tahsil alone.

The marketing facilities for the variety M.5A were offered in the pools at all centres in Buldana district but only 55 kh. 7 md. of cotton equivalent to 38 bales was pooled at Jalgaon and Buldana centres and was sold under premium sale system with Rs. 14/- premium on local *kapas*. In open market M.5A fetched about Rs. 30/- to Rs. 40/- less per khandi than 197-3.

The new strain M.5A could not gain popularity with the cultivators, particularly because of its lack of adaptability to adverse climatic conditions and also because the rival strain from Khandesh, *viz.*, 197-3, known as "Virnar" had caught the imagination of the cultivators and was making headway owing to its higher ginning outturn and better monetary return.

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 (Mds.)	Estimate of area covered ('000' acres)			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1948-49 ..	178	1.2	..	1.2	16 1 0	19,275
1949-50 ..	980	3.0	7.0	10.0	32 12 0	3,93,000
1950-51 ..	4,894	30.0	87.0	117.0	21 9 0	2,522,812½
1951-52 ..	5,021	50.7	99.5	150.2	13 10 0	2,046,478
1952-53 ..	9,928	60.0	200.0	260.0	13 2 0	3,412,500
1953-54 ..	7,273	50.0	200.0	250.0	6 4 0	1,562,500
1954-55 ..	9,282	47.6	210.6	257.6	9 4 0	2,382,800
1955-56 ..	13,142	65.2	200.0	265.2	13 2 0	3,487,444

Madras Combodia Uganda 1
(since replaced by M.C.U. 2 from 1955-56)

Year	Quantity of seed distributed under the scheme (Mds.)	Estimate of area covered ('000' acres)			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1948	304	1.3	31.7	33.0	95	3,135,000
1949	3,166	13.0	26.0	39.0	115	4,485,000
1950	8,738	31.5	21.2	52.7	110	5,797,000
1951	11,320	31.5	35.3	66.8	100	6,680,000
1952	14,133	59.3	5.7	65.0	90	5,850,000
1953	9,783	41.1	22.251	63.354	108	6,842,232
1954	6,110	25.1	38.3	63.4	116	7,354,400
1955	11,059	44.2	20.890	65.090	111	7,224,990
1956	9,144	37.5	29.0	66.5	100	6,645,000

In the summer cropped zone the work of multiplication and distribution of M.C.U. 2 cotton seed has been entrusted to the Co-operative Marketing Society at Srivilliputtur in Ramanathapuram district of Madras State during the 1955 season.

(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. Though there were timely rains at sowing times the crop suffered very much for want of adequate rain at the growing period with the result that production was much affected resulting in short procurement of the targetted quantity.

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

Year	Quantity of seed distributed under the scheme (Mds.)	Estimate of area covered (acres)			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1953-54 ..	12,068	39,300	60,019	99,319	90	89,38,710
1954-55 ..	7,768	39,572	64,100	1,03,672	33	34,21,176
1955-56 ..	8,592	38,500	66,400	1,04,900	40	41,96,000

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.

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, for a period of five years. The object of the scheme is to distribute seed of the new variety 320F for cultivation

over 3,80,000 acres in five years to replace L.S.S. cotton in Ferozepur district and *desi* cotton in Amritsar, Ludhiana and Jullundur districts of Punjab State. The scheme was put into operation on the 1st September, 1953. A summary of the 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 to grower	
		Departmental seed	Other seed	Total	Per acre Rs. a. p.	Total Rs.
1953-54 ..	22,567	1,48,942	15,944	1,64,886	42 8 0	63,30,035
1954-55 ..	34,121	2,25,198	89,256	3,14,454	21 13 0*	1,08,40,800
					78 4 0‡	
1955-56 ..	40,205	2,65,353	83,302	3,48,655	37 6 0*	2,67,81,435
					133 14 0‡	

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

‡ Over *desi* cotton in other districts.

The cotton acreage (districtwise) in the tract during 1955-56 was as shown below:—

District	Area in acres.			
	Desi	320F	L. S. S.	Total
1. Ferozepur	57,350	1,97,914	94,304	3,49,568
2. Amritsar	19,700	85,500	....	1,05,200
3. Jullundur	10,427	27,161	....	37,588
4. Ludhiana	7,605	38,080	....	45,685
Total ..	95,082	3,48,655	94,304	5,38,041
Area in 1954-55	81,960	3,14,454	1,30,000	5,26,414
Increase (+) or decrease (−)in area during 1955-56	+13,122	+34,201	−35,696	+11,627

There were well-organised markets in all the four districts where *kapas* was auctioned daily in the presence of officials of Market Committees. Besides this, cotton Development and Co-operative Societies were also functioning. In addition, auctions were conducted by the Agriculture Department for the sale of *kapas* of rogued area and from good lots, cotton seed was purchased by the Department for further distribution. During the year, under review, 20 such auctions were held, where produce of rogued area fetched good premium over ordinary lots. The details of the transactions are given below:—

Total quantity of *kapas* sold	Average market price per md. of *kapas*	Average rate per md. of auctioned *kapas*	Premium per maund
(mds.) 79,352	Rs. a. p. 33 11 0	Rs. a. p. 35 2 0	Rs. a. p. 1 7 0

The owners of the auctioned lots obtained an additional income of Rs. 1,21,389/-.

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

District	Bales (392 lbs.)
Ferozepur	1,69,794
Amritsar	35,565
Ludhiana	44,875
Jullundur	18,705
Total ..	2,68,937

(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, for a period of 2 years and 8½ months 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.

HYDERABAD

(i) Scheme for multiplication and distribution of Gaorani 12 cotton seed in Hyderabad 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 Mds.	Estimate of area covered in acres			Estimated additional income in Rs. OS upto 1952-53 and in IG Rs. from 1953-54.	
		Departmental seed	Non-Departmental seed *i.e.*, natural spread	Total	Per acre Rs.	Total Rs. a. p.
1951–1952	10,961– 3½	R.A. 15,303– 0	..	15,303– 0	31 5 10	4,80,097 10 10
		G.A. 40,693– 0	..	40,693– 0	24 13 10	10,11,814 7 10
1952–1953	47,962–38	R.A. 57,000– 0	..	57,000– 0	20 13 0	11,87,500 0 0
		G.A. 1,30,000– 0	..	1,30,000– 0	16 10 8	21,66,666 10 8
1953–1954	48,400– 3	R.A. 39,500– 0	..	39,500– 0	13 11 0	5,40,656 0 0
		G.A. 2,17,428– 0	43,072– 0	2,60,500– 0	10 7 9	27,31,179 11 0
1954–1955	26,866–43½	R.A. 14,858– 8	..	14,858– 8	10 3 0	1,51,365 14 0
		G.A. 1,28,373–32	9,4875– 0	2,24,248–32	7 12 3	17,41,432 14 9
1955–1956	14,160–19	R.A. 11,252–17	..	11,252–17	1 1 3	12,131 1 0
		G.A. 64,347–23	2,03,434–15	2,67,781–38		
	8–33	1422* 58–25				

*It has got Rs. 14–8–0 premium over G. 12 G.A. per *palla*.
R.A. = Reserved Area.
G.A. = General Area.

The total quantity of improved cotton marketed in full pressed bales of lint during the year under review was as shown below:—

District	Market	Total quantity of improved cotton marketed in *pallas*.			Bales pressed		
		G. 12 R. A.	G. 12, G.A. & natural spread.	1422	G. 12 R.A.	G. 12, G.A. & natural spread.	1422
Osmanabad	Latur	723–46	31,970–23½	13–101	142	6774	3
,,	Kallam	..	4,821–0	..	No press	..	..
Bidar	Udgir	260–118	20,234–49¾	..	47	3749	..
,,	Bhalki	..	631–42½	..	..	51	..
	Total	984–44	57,656–115¾	13–101	189	10,574	3

The total cotton area in the tract (districtwise) during 1955-56 was as shown below:—

District	Improved Strain			Natural spread			Total acres
	G. 12 acres	G. 6 acres	1422 acres	G. 12 acres	G. 6 acres	Local acres	
Osmanabad	25,600	..	56– 0	63,015–10	..	8,694–12	97,365–22
Bidar	46,800	900	2– 5	1,12,459– 0	3,466–32	9,082– 9	1,72,710– 6
Bhir (Mominabad)	3,200	..	0–20	27,960– 5	..	352–16	31,518– 1
Total	75,600	900	58–25	2,03,434–15	3,466–32	18,128–37	3,01,588–29

(ii) Scheme for multiplication and distribution of 2204 (Daulat) cotton seed in Parbhani district of Hyderabad 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.

A summary of progress made under the scheme during 1955-56 is given below:—

Year	Quantity of seed distributed under the scheme	Estimate of area covered (acres)			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1955-56 ..	Mds. Srs. 981 24	3,800	—	3,800	10/-	38,000/-

During the year under review, 30 villages were selected so as to cover about 4,000 acres to be grown under Daulat cotton and 982 maunds of seed was procured and distributed through Departmental staff on cash and *Taccavi*. A compact block of 3,188 acres was thoroughly rogued in 28 villages round about Parbhani. The rogueing certificates showing area and approximate output were issued to the cultivators with instructions to produce the same in Parbhani market at the time of disposal of the same.

In the season 1955-56, auction for the premium of Daulat cotton was held at Nanded and Messrs. N. S. Gajdar and Co. Ltd., Bombay, offered Rs. 14-8-0 as premium on and above the daily pre-

vailing rate of Gaorani 12 General Area in Parbhani market. The premium of Rs. 14-8-0 offered for Daulat cotton was the highest. The cotton brought by the cultivators was examined by the Departmental staff and was heaped according to generation which was later ginned and pressed under the departmental supervision. During 1955-56 season, 125 full pressed bales of 2204 cotton were marketed.

(iii) Scheme for establishment of Gaorani 6 cotton seed multiplication farms at Bhainsa and Nanded in Hyderabad 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 object of the scheme is to establish two seed farms with a total area of 200 acres—100 acres at Nanded and 100 acres at Bhainsa—with the object of covering the Gaorani 6 cotton area of about 1.5 lakhs of acres, with the Vth generation seed in five years.

RAJASTHAN

Scheme for multiplication and distribution of Indore-1 cotton seed in Rajasthan.—This scheme was sanctioned by the Committee in September, 1948, for a period of four years 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. A summary of the 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	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1951-52 ..	642	2,568	..	2,568	..	..
1952-53 ..	771	3,084	..	3,084	..	..
1953-54 ..	1,294	5,164	..	5,164	20/- to 40/-	..
1954-55 ..	3,327	13,368	36,632	50,000	18/- to 36/-	9,00,000
1955-56 ..	3,252	13,008	46,992	60,000	15/- to 30/-	9,00,000

The cotton acreage in the tract during the season under report was as shown below:—

S. No.	District	Improved Strains		Local	Total	Area to be ultimately covered
		Pure	Mixed			
1.	Udaipur ..	5,000	....	....	38,540	22,737
2.	Chittore ..	10,000	....	....	99,685	14,137
3.	Bhilwara ..	13,500	....	....	90,707	54,181
4.	Jhalawar ..	2,000	....	....	97,890	....
5.	Bundi ..	200	....	....	4,946	688
6.	Kotah ..	320	....	....	8,090	....
7.	Jalore ..	350	....	....	2,787	2,211
8.	Sirohi ..	700	....	....	1,011	890
9.	Pali ..	4,500	....	....	17,410	17,044
	Total ..	36,570	23,430	3,01,066	3,61,066	1,11,883

SAURASHTRA

(i) Scheme for multiplication and distribution of Pratap cotton seed in Saurashtra State.—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 State. A 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 (Rs.)	
	Deptl.	Non-Deptl.	Total	Deptl.	Non-Deptl.	Total	Per acre	Total
1953-54 ..	2½	690	692½	21	4,140	4,161	9	37,449
1954-55 ..	24	1,250	1,274	231	7,500	7,731	9	69 579
1955-56 ..	753½	1,800	2,553½	3,000	5,000	8,000	5*	40,000

*The estimated additional income per acre was less, as the yield per acre was low as compared to previous years.

During the year under review 315 full pressed bales of agmarked Pratap cotton lint and 500 fully pressed bales of uncertified

Pratap cotton lint were marketed. The certified Pratap cotton fetched a premium of Rs. 2/- per Bengal maund over local Mathio cotton.

(ii) Scheme for multiplication and distribution of Kalyan cotton seed in Saurashtra State.—This scheme was sanctioned by the Committee in July, 1954 and it came into operation on the 1st April, 1954.

The object of the scheme is to cover the entire area of 9 lakh acres in Wagad tract of Saurashtra State by Kalyan cotton by the end of 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.	Total	Deptl.	Non-Deptl.	Total	Per acre	Total
1954-55 ..	3,500	3,000	6,500	35,000	31,500	66,500	15/-	9,97,500
1955-56 ..	8,212	5,000	13,212	55,000	35,000	90,000	10/8	9,45,000

The cotton acreage in the tract in 1955-56 was as shown below:—

S. No.	District	Improved Kalyan Strain (acres)	Local Wagad (acres)	Total (acres)
1.	Madhya Saurashtra ..	3,000	1,86,000	1,89,000
2.	Gohilwad	2,000	9,100	11,100
3.	Sorath	15,000	98,900	1,13,900
4.	Zalawad	70,000	5,22,225	5,92,225
5.	Halar	....	50,800	50,800
	Total ..	90,000	8,67,025	9,57,025

The total quantity of Kalyan cotton marketed (in F.P. bales of lint) was as shown below:—

		Bales
i)	Certified bales (estimated)	8,000
ii)	Uncertified bales (estimated)	10,000
	Total ..	18,000

The certified *kalas* of Kalyan cotton had fetched Rs. 3/- more per B. Md. over those of the local Wagad cotton.

(iii) Scheme for multiplication and distribution of superior long staple cottons in Saurashtra State.—This scheme was sanctioned by the Committee in February, 1956, and it 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 Saurashtra State with a view to producing superior cotton of about 50,000 bales.

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 it 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 progress made under the scheme since its inception is given below:—

Year	Quantity of seed distributed in Maunds.			Estimate of area covered in acres.			Estimated additional income.	
	Departmental	Non-Departmental	Total	Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1950–51	60	..	60	309	..	309	20 0 0	6,180
1951–52	284	50	334	2,458	400	2,858	20 0 0	57,160
1952–53	540	400	940	3,126	2,400	5,526	20 0 0	1,10,520
1953–54	464	2,500	2,964	2,824	14,794	17,618	20 0 0	3,52,360
1954–55	1,046	2,080	3,126	5,327	12,521	17,848	14 8 0	2,58,796
1955–56	885	6,000	6,885	4,786	40,559	45,345	17 12 0	80,48,731

The total cotton area in the State (districtwise) during 1955-56 was as shown below:—

S. No.	District	Improved strains area in acres		Local *desi* area in acres	Total area in acres
		35/1	Americans		
1	Saharanpur	6,900	967	5,444	13,311
2	Muzaffarnagar	11,229	3,870	..	11,563
3	Meerut	11,643	7,681	..	19,063
4	Bijnor	4,742	131	6,090	10,963
5	Moradabad	4,370	164	14	4,548
6	Bulandshahr	4,500	6,037	17,503	28,040
7	Aligarh	510	3,704	8,589	12,803
8	Mathura	..	14,353	9,078	23,431
9	Agra	..	1,249	2,329	3,578
10	Etah	..	784	1,001	1,785
11	Mainpuri	263	145	..	366
12	Etawah	40	312	307	659
13	Farrukhabad	108	146	113	367
14	Kanpur	119	193	940	1,252
15	Rampur	143	100	737	980
16	Nainital	118	62	707	887
17	Badaun	618	307	315	1,240
18	Bareilly	42	68	219	329
	Total ..	45,345	40,273	..	1,35,165
	Rest of U. P.	..	237	720	957
	Total U. P.	45,345	40,510	50,267	1,36,122

There were no problems of marketing for 35/1 cotton so far. The growers mostly kept back their produce as they never wanted to part with the seed of this variety. The cultivators who sow comparatively larger areas, mostly sell their produce to the Agricultural Department at a premium of 12½% over the prevailing rates of the *desi* cotton. During the season under review the following prices prevailed in the tract:—

35/1 cotton—From Rs. 25/- to Rs. 30/- per maund.

Desi cotton—From Rs. 23/- to Rs. 28/- per maund.

Arrangements were made to declare the two districts of Muzaffarnagar and Meerut as "protected area" for 35/1 cotton and the Cotton Control and the Cotton Transport Acts were intended to be passed as soon as sufficient seed in the two districts referred to above had been collected.

PEPSU

Scheme for multiplication and distribution of American cotton seed in Pepsu.—This scheme was sanctioned by the Committee in October, 1949, and it 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 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 (Mds.)	Estimate of area covered in acres			Estimated additional income	
		Departmental seed	Non-Departmental seed	Total	Per acre Rs.	Total Rs.
1952-53 ..	4,000	32,000	48,800	80,800	80/-	64,40,000
1953-54 ..	12,000	96,000	64,000	1,60,000	85/-	1,36,00,000
1954-55 ..	18,000	1,44,000	72,000	2,16,000	40/-	1,00,00,000
1955-56 ..	16,000	1,28,000	1,22,000	2,50,000	42/-	1,05,00,000

The cotton acreage in the tract during 1955-56 was as follows:

Improved American Strains (Lakh acres)	*Desi* cotton (Lakh acres)	Total (Lakh acres)
2.5	1.8	4.30

It is proposed to cover ultimately an area of 3.2 lakh acres in Pepsu, with improved American cottons by 1957-58.

The improved cotton seeds were distributed to the cultivators through a net work of about 50 departmental cotton seed agents spread over the entire State.

MADHYA BHARAT

Scheme for multiplication and distribution of D-48-154 (Maljari) seed in Nimar tract of Madhya Bharat.—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 Bharat with the strain D.48-154 within a period of three years.

CHAPTER V

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON

The progress made during the year in introducing improved varieties of cotton in the different major cotton growing States is summarised below:—

1. BOMBAY

(a) North Gujerat.—Practically, the entire area of 5.5 lakh acres has been covered by 'Kalyan' in this tract. On an average, agmarked bales of the reserved area produce fetched a premium of about Rs. 10/- per candy (784 lbs.) of lint over the general area produce. The gross extra income earned by the cotton growers is estimated at Rs. 78.35 lakhs.

(b) Middle Gujerat.—'Vijay' and 'Dig-Vijay' are the twin varieties which claim to have covered a total area to the tune of 9,14,000 acres or 88% of the total area under cotton in the tract. Out of this, 52,630 acres were covered by 'Dig-Vijay'. The premium obtained for *Bhar* (about 960 lbs.) of certified 'Vijay' seed cotton was Rs. 3/- to Rs. 10/- and an average premium of Rs. 10/- to Rs. 27/- per candy of lint. The gross extra income earned by the cotton growers by cultivating these strains was estimated as Rs. 8.5 crores.

(c) Surti Tract.—The new variety 'Vijalpa' (2087) has replaced the former improved varieties 'Suyog' and '1027 ALF' in the tract. The area covered by the strain during the year under review was 5,88,000 acres or 88% of the total area under cotton in the tract. The premium obtained for agmarked certified bales of the improved variety over the trade variety for candy (784 lbs.) was Rs. 50 and Rs. 40, respectively. The gross extra income earned by the cotton growers during the year was estimated at Rs. 1.12 crores.

(d) Khandesh Tract.—'Virnar' occupies the pride of place in this tract as is evident from the area covered by it during 1955-56, *viz.*, 7,57,000 acres. The certified 'Virnar' cotton fetched on an average a premium of Rs. 20/- more per acre than non-certified 'Virnar' against Rs. 16/- in the previous year. The total gross extra

income earned by the cultivators of this strain during the year under report was reported to be about Rs. 1.91 crores.

(e) Bombay-Karnatak.—The varieties under distribution in this tract were 'Jayadhar' and 'Laxmi'. The two varieties during the year under report were spread over 6,07,308 and 5,38,433 acres, respectively. The average premium realised on certified reserved area cotton per *nag* of 1,344 lbs. of *kapas* over non-certified cotton was about Rs. 20/- to Rs. 30/- for 'Jayadhar' and Rs. 50/- to Rs. 70/- for 'Laxmi'. The gross extra income earned during the year under review by the cotton growers of these varieties is stated to be Rs. 71.72 lakhs.

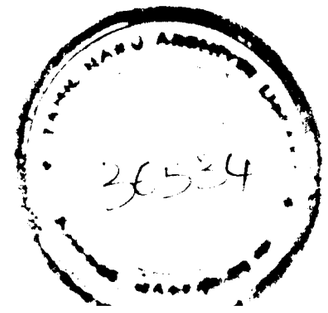
(f) Indo-American Strains.—'Devi-Tej' (134-Co. 2-M) and 'Devi-Raj' (170-Co.2) which are the outstanding achievements of the interspecific hybridisation scheme and have acquired a popularity amongst the coterie of long staple cottons were distributed in scattered areas throughout the State occupying an area of nearly 2,34,000 acres (*i.e.* 4.8% of the total cotton area in the State). The extra income, by growing these superior long staple cottons in place of the local cotton under irrigated conditions is reported to vary from Rs. 75/- to Rs. 90/- per acre as against Rs. 150/- to Rs. 180/- of last year.

2. MADRAS

It is reported that 56% of the total area *viz.*, 5,47,545 acres out of the total cotton area in the State during 1955-56, *viz.*, 9,78,500 acres, was covered by the improved varieties. The gross extra income earned during the year under review by the cultivators of the different improved strains in all the tracts was estimated at Rs. 2.33 crores against Rs. 2.25 crores in the previous year. The details of these varieties are given below:—

(a) Cambodia.—Cambodia is grown both as a summer and a winter crop in Cambodia tract. The improved American varieties grown in this tract area:—

1. Cambodia–2
2. Cambodia–3
3. Madras-Cambodia-Uganda-1
4. Madras-Cambodia-Uganda–2



While the area under Co.3 has practically gone out of cultivation, that under Co.2 is slowly decreasing. The most popular variety, M.C.U. 1 (othewise known at Rajapalayam) is replacing these two varieties. Yet another improved variety, M.C.U. 2, superior to M.C.U. 1, in all respects, is expected to replace the latter.

Another strain 216F, which is early maturing, has been introduced from the Punjab; and is confined to the area left fallow after the harvesting of the paddy crop in the Cauvery delta. The area under this variety is 3,957 acres.

The total area under the various improved Cambodia strains during the year under report was 2,78,000 acres. The growers of these strains are stated to have obtained an extra income of 143.2 lakhs of rupees.

(b) Tinnevellies.—Two strains of Karunganni, K.2 and K.5, have almost replaced the Tinnevellies cotton. The area covered by these two varieties during the year was 2,65,000 acres and the total extra income earned by the growers of these strains during the year under review was reported to be Rs. 90.2 lakhs.

3. ANDHRA

The improved strains recommended for cultivation in four distinct tracts in the State are given below:—

1. C.1 and C.2 in the Cocanadas tract.
2. Westerns Farm (Hagari-1), 881F and 'Laxmi' in the Westerns tract.
3. N.14 and H.420 in the Northerns tract.
4. H.420 in the Chinnapathi tract.

In all, they covered 4,30,000 acres or about 48% of the total area of 8,89,000 acres under cotton in the State in 1955-56. The gross extra income earned by the growers was estimated at about a crore of rupees.

4. PUNJAB

In keeping with the progress of cotton cultivation recorded in the previous years, the area under cotton in the State during the year

under review increased from 7.59 lakh acres in 1954-55 to 8.26 lakh acres. The varieties distributed for cultivation in the different districts of the State were as tabulated below:—

Variety	Area covered during 1955-56 ('000' acres)	Districts where grown
1. 216 F 2. H. 14	131	Hissar, Rohtak, Karnal and Gurgaon.
3. L. S. S.	100	Ferozepur (areas irrigated by Eastern Canal).
4. 320 F	389	Ferozepur, Ludhiana, Jullundur, Amritsar and parts of Gurdaspur and Ambala
Total ..	620	

The area covered by the American strains was 6,20,000 acres (or 75% of the total) against 6,33,000 acres (or 83.4% of the total) in the previous year. On an average, the improved strains of American cottons fetched a premium of Rs. 5/- to Rs. 8/- per maund over commercial *desi kapas*. The gross extra income earned by the growers of these varieties during the year under report was estimated at about Rs. 3 crores.

5. MADHYA PRADESH

The cotton area in the State of Madhya Pradesh in 1955-56 was 38,99,000 acres against 36,56,200 acres in the previous year. The distribution of improved strains in the different tracts is indicated below:—

S. No.	Name of the tract	Varieties
1.	Nagpur-Wardha	H. 420, No. 91 and Buri 0394
2.	Akola-Amravati	H. 420 and Buri 0394
3.	Ghat	H. 420 and Buri 0394
4.	Buldana	197 3 and M. 5A
5.	Nimar	H. 420 and Buri 0394

The area covered by each of the above varieties in the respective tracts during the year was as under:—

S. No.	Name of Variety	Acreage
1.	H. 420	5,48,300
2.	M. 5A	19,729
3.	No. 91	2,208
4.	197/3	8,06,700
5.	Buri 0394	2,48,300
	Total ..	16,20,237

In all, they covered 16,20,237 acres which constituted 41.53% of the total cotton area. The gross extra income earned during the year by cotton growers of the different tracts of the State is stated to be about 159 lakhs of rupees.

6. UTTAR PRADESH

As against 1,20,000 acres in the previous year the total cotton area in the State during 1955-56 was 1,36,000 acres. The improved *desi* cotton variety 35/1 was distributed in Meerut, Muzaffarnagar, Saharanpur, Bijnor and Moradabad districts, while 216F was distributed in the districts of Bulandshahr, Aligarh, Mathura, Agra, Etah, Badaun, Etawah, Manipuri, Farukhabad and Kanpur. Besides, trials of 320F were laid out in the *Tarai* areas of Badaun, Rampur and Nainital districts and of H.14 in Mathura district. The area covered by the improved varieties in the different tracts of the State during the year under report was 99,493 acres (or 73% of the total) as against 54,210 acres (or 45% of the total) in 1954-55. It is reported that a premium of Re. 1/- to Rs. 2/- and Rs. 2/- to Rs. 3/- per maund over the price of *desi kapas* was obtained by the variety, 35/1 and 216F, respectively.

The gross extra income earned during 1955-56 by the cultivators from growing of 35/1 and 216F was about Rs. 1.13 and 4.33 lakhs, respectively.

7. HYDERABAD

Out of a total area under cotton in the State during year under report *viz.;* 33,30,300 acres, the area covered by the strains mentioned below, was 16,97,000 acres constituting 51% of the total cotton area:—

S. No.	Variety	Area covered during 1955-56 ('000' acres)	Districts where grown
1.	Parbhani American	134	Adilabad (West).
2.	Laxmi	332	Raichur district.
3.	Jayadhar	34	Nanded, Nirmal taluka of Adilabad district, Basmat, Kalamnuri and Hingoli talukas of Parbhani district and Narayankhed taluka of Bidar district.
4.	Gaorani 6	578	
5.	Gaorani 12	430	Parbhani, Jintur and Gangakhed talukas of Parbhani district, Osmanabad and Bidar districts, Mominabad taluka of Bhir district and parts of Aurangabad district.
6.	Virnar	184	Aurangabad district (Soyagaon Mahal).
7.	Daulat (2204)	5	Parbhani taluka of Parbhani district.
	Total ..	1,697	

The gross extra income earned by the growers of these varieties during 1955-56 was estimated at about Rs. 51.69 lakhs as against Rs. 69.09 lakhs in 1954-55.

8. MYSORE

During the year under report the area under cotton in the State had decreased from 4.36 lakh acres in the previous year to 4.10 lakh acres. Laxmi, H.420 and Westerns 1 were grown in Western tract (Bellary district) while Selection 69, Jayadhar, M.A.V. and M.C.U. 1 in the rest of the State. The area of 3.08 lakh acres covered by the improved strains constituted 75% of the area under cotton. The cotton growers of these varieties in the State are stated to have earned a gross extra income of Rs. 21.72 lakhs.

9. MADHYA BHARAT

In the year under review cotton was grown over an area of 17.72 lakh acres as compared to 15.62 lakh acres in the previous year. The area covered by the improved varieties *viz.*, Buri 0394, 197-3 (Virnar) and Maljari (D-48-154) in the Nimar tract and Malvi-9, Bhoj (Dhar 43), 197-3 (Virnar) and Indore 2 in the Malwa tract was 7.92 lakh acres (or 44% of the total). It is estimated that the extra income earned by growing them was about Rs. 79.20 lakhs.

10. RAJASTHAN

The improved varieties distributed in the various tracts which are indicated below covered about 25% of the total area, *i.e.*, 1.36 lakh acres out of 5.45 lakhs against 1.21 out of 4.83 lakh acres in the previous season:—

S. No.	Name of the tract	Varieties
1.	Ganganagar	320F and Ganganagar-1
2.	Jaipur-Tonk	C. 520 and Ganganagar-1
3.	Mewar	C. Indore-1
4.	Jhalawar	Virnar
5.	Banswara-Bungarpur	134-Co. 2-M and C. Indore-1.

It was estimated that the gross extra income earned by the cotton growers during the year was about Rs. 25.51 lakhs against Rs. 18.75 lakhs in the previous year.

11. SAURASHTRA

Though there was a slight improvement in the spread of improved strains of cotton, the area under them in the different tracts as indicated below, constituted only 8.3% of the total area under cotton *i.e.*, 1.08 lakhs out of 12.99 lakhs:—

S. No.	Names of improved strains	Names of the tract
1.	Kalyan	Wagad tract comprising of Zalawad, part of Madhya Saurashtra and Sorath districts.
2.	Pratap	Mathio tract comprising of Gohilwad and part of Madhya Saurashtra districts.
3.	170-Co. 2	Irrigated areas around the irrigation projects.

It is reported that the produce of the following three pure varieties obtained premia as shown against each:—

'Kalyan'—Rs. 100/- more per candy over local 'Wagad'

'Pratap'—Rs. 50/- more per candy over local 'Mathio'

170-Co.2—Rs. 500/- more per candy over local cotton.

The gross extra income earned by the cotton growers of these improved strains, during the year under report, was estimated at Rs. 16,85,000/-.

12. PEPSU

The area covered by the following varieties in the respective tracts during the year was 2.5 lakhs out of 4.3 lakh acres as against 2 lakh acres out of 3.76 lakhs in 1954-55, constituting 58.1% against 53% in the previous year:—

216F— In Southern parts of district Sangrur and Mansa and Maur circle of district Bhatinda.

320F— In districts Patiala, Sangrur and Kapurthala besides the circles for 216F.

The gross extra income earned by the cultivators of these improved strains was of the order of over 1½ crores of rupees.

CONSOLIDATED STATEMENT SHOWING THE PROGRESS MADE IN THE IMPROVED VARIETIES IN THE INDIAN UNION DURING 1955-56.

S. No.	State.	Names of improved varieties.	Total cotton area in the State ('000')	Total area covered by improved varieties acres)	Percentage of Col. 5 over Col. 4.	Gross extra income by the growers (in lakhs of Rs.)
1	2	3	4	5	6	7
1.	**Bombay.**					
	(*a*) N. Gujerat	Kalyan	5,388	550	10.0	78.85
	(*b*) Middle Gujerat	Vijay, Dig-Vijay		914	17.0	850.00
	(*c*) Surti tract	Vijalpa, 1027ALF		588	11.0	112.00
	(*d*) Khandesh tract	Virnar		757	14.0	191.00
	(*e*) Bombay-Karnatak	Jayadhar, Laxmi		1,146	21.0	71.72
	(*f*) Indo-American	Devi-Tej (134-Co. 2-M), Devi-Raj (170-Co. 2), Co. 4/B. 40		234	5.0	..
			5,388	4,189	78.0	1,303.07

S. No.	State.	Names of improved varieties.	Total cotton area in the State ('000')	Total area covered by improved varieties acres)	Percentage of Col. 5 over Col. 4.	Gross extra income by the growers (in lakhs of Rs.)
2.	Madras	*Cambodia cotton* Co. 2, Co. 3, M.C.U. 1, M.C.U. 2 and P. 216 F *Tinnevellies* Karunganni 2 Karunganni 5	979	547	56.0	233.00
3.	Andhra	C. 1, C. 2, 881F, N. 14, H. 420, Westerns 1 and Laxmi	898	430	48.0	100.00
4.	Punjab	320F, 216F, LSS and H14	826	620	75.0	300.00
5.	Madhya Pradesh	H. 420, Buri 0394, M. 5A and No. 91	3,899	1,620	41.5	159.00
6.	Uttar Pradesh	35/1 and 216F	136	99	73.0	5.46
7.	Hyderabad	Parbhani-American, Laxmi, Jayadhar, Gaorani 6, Gaorani 12 and Daulat (2204)	3,330	1,697	51.0	51.69
8.	Mysore	Laxmi, H. 420, Westerns-1, Selection 69, Jayadhar, M.A.V. and M.C.U. 1	410	308	75.0	21.72
9	Madhya Bharat	Buri 0394, Virnar, Maljari, Malvi 9, Bhoj, and Indore 2	1,772	792	44.0	79.20
10.	Rajasthan	320F, Indore-1, C. 520, Ganganagar-1, and 134-Co. 2-M.	545	136	25.0	25.51
11.	Saurashtra	Kalyan, Pratap and 170-Co. 2	1,299	108	8.3	16.85
12.	Pepsu	216F and 320F	430	250	58.1	150.00
		Total ..	19,912	10,796	54.2	2,445.50

CHAPTER VI

COTTON MARKETING, LEGISLATION AND OTHER PROTECTIVE MEASURES

(i) Cotton Import Policy

Since India has achieved self-sufficiency in its requirements of cotton up to 1-1/16″ in staple, imports of foreign cotton continued to be restricted to cotton of staple length 1-1/16″ and above. During the year, the world supply position of cotton was easy and India could import its requirements as and when necessary. Accordingly, licences for imports of Dollar-and non-Dollar cottons were issued, taking into consideration the supply and distribution position of cotton in the country from time to time. The total quantity imported during the year ending 31st August, 1956, was 610,000 bales (11,000 from Dollar area and 599,000 from non-Dollar areas).

(ii) Cotton Export Policy

During 1955-56, exports of cotton, mainly of short varieties, were allowed, after meeting the needs of the Indian textile industry in respect of such cotton. The total quantity allowed for export during the year, classified by varieties and staple length was as under:—

Bengal *Deshi*	95,000	bales
All varieties stapling 25/32″ (except Cocanadas)	25,000	,,
All varieties stapling 3/4″ and below ..	3,00,000	,,
Concanadas	5,000	,,
	4,25,000	bales

Exports of Assam/Comilla, *Zoda*, Yellow pickings, pickings and sweepings were allowed freely. During the season there was no change in export duty, which remained as follows:—

1. All varieties of cotton except Assam Comilla	Rs. 50/- per bale
2. Assam/Comilla	No export duty
3. *Zoda*, yellow pickings, sweepings etc.	30% *ad valorem* or Rs. 50/- per bale whichever was lower.

The total quantity of cotton actually exported during the year, which includes some quantity licensed in the previous season, was 612,000 bales.

(iii) Control on Prices, Trade and Movement

Control over cotton was continued during the 1955-56 season and the floor and ceiling prices fixed under the Cotton Control Order were the same as those fixed for the previous season. In view of the easy supply position, there was no control on movement and distribution of Indian cotton.

(iv) Revision of Hedge Contract

The Indian Cotton Contract was revised in June, 1956. In place of a single contract with Fine Jarila 13/16″ as basis, two new hedge contracts have been established, Fine Jarila 25/32″ and the Fine Vijay 27/32″. Jarila, Virnar (197-3), Verum, M. P. Cambodia, M. B. Cambodia, M. B. Upland, Gaorani *(Bani)*, Malvi, Bhoj, H.420, Dholleras, Kalyan, Rajasthan American, Westerns and Northerns are tenderable under the Jarila Contract, while Vijay, Surti-Suyog, 2087, Punjab American, LSS, 216F and 320F (roller ginned and saw ginned), Jayadhar, Laxmi, Gaorani 6 and 12, Buri American, Parbhani American, Cambodia (including Co.2, Co.4, Co.4/B40, M.C.U.1 and 2 and Indo-American strains, *viz.*, 170-Co.2 and 134-Co.2-M.) and Karunganni are tenderable under the Vijay Contract. Months of delivery for Jarila Contract are March, May and July and those for Vijay Contract are April, June and August. Trading was permitted on the 18th June, 1956, in Jarila, March delivery and Vijay, April delivery.

(v) Regulated Cotton Markets

Legislation for the establishment of regulated markets for cotton (and other crops where necessary) has been enacted in the cotton growing 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 1955-56 in these States is given below:—

Name of State	*No. of regulated markets for cotton.*
Bombay	64
Madras	8
M. P.	34
Punjab	47
Hyderabad	32
M. B.	35
Pepsu	34
Mysore	5

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

Several legislative measures have been enacted by the Central and State Governments on the recommendation of the Indian Central Cotton Committee with a view to maintaining the purity of the cotton crop and checking the spread of insect pests and diseases and other malpractices in marketing. A brief account of the working of these measures during the year under report is given below. For more details, previous annual reports may be referred to.

(a) **Cotton Transport Act.**—This Act was in force in the States of Bombay, Madras and Madhya Pradesh and the following areas were notified as protected areas under the respective State Acts:—

Bombay State	North Gujerat, Vijay, Surat, Khandesh, Kumpta-Dharwar, Bijapur and Bagalkot areas.
Madhya Pradesh	Whole of the cotton growing areas.
Madras State	Cambodia and Tinnevelly areas.
Andhra State	Northerns and Westerns (The question of introducing suitable amendments to continue this area as protected is under the consideration of the State Government).

The matter is under consideration of the Mysore Government to continue as protected that part of Bellary district in the Northerns and Westerns area merged in that State.

Under the Hyderabad Cotton Cultivation and Transport Act (Act No. 6 of 1337F), Hyderabad Gaorani and Raichur areas are declared as protected.

The question of enforcing the Act in the Punjab is proposed to be taken up after the re-organisation of the State.

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 Governments of A States, other than Bombay and Madras, to enforce the Act in their respective areas.

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

1. **Bombay Cotton Control Act, 1942** is in operation in North Gujerat, Khandesh, Narbada-Sabarmati zone and Bombay-Karnatak (Kumpta-Dharwar, Bijapur and Bagalkot areas). The varieties specified for exclusive cultivation in these areas are Kalyan in North Gujerat, 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.

The question of specifying the variety 134-Co.2-M for cultivation in North Gujerat 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 that Act does not contain provisions similar to those in Cotton Control Act, the question of issuing under the Essential Commodities Act a Cotton Control Order on the lines of the Cotton Control Act is under their consideration.

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 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. This will not now be necessary as this State has merged in Bombay State.

5. **Bhopal State Cotton Control Act, 1936** continued to be in operation during 1955-56.

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 and the projected enforcement of the Cotton Transport Act.

6. **East Punjab Improved Seeds and Seedlings Act,** which provides for compulsory sowing of seed of certain varieties in specified areas, was in force in the following areas of the State during 1955-56.

Variety of cotton	*Districts*
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.
L. S. S. ..	Fazilka and Muktsar tehsils of Ferozpore 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.

8. 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 :—	
Nanded	All talukas
Parbhani	(1) Basmath (2) Kalamnuri (3) Gangakhed (4) Hingoli
Adilabad	Nirmal taluka
Gaorani : *12*—	
Parbhani	Parbhani district, excluding Pathri and Partur and the four talukas included under Gaorani 6
Osmanabad	All talukas
Bidar	All talukas
Bhir	Mominabad taluka

(c) Cotton Ginning and Pressing Factories Act.—(i) During the year under report, the Government of Punjab have issued rules under Punjab Cotton Ginning and Pressing Factories Act, 1953, which incorporate provisions regarding admixture, watering and mixing and fixation of charges for ginning and pressing. The question of including provision regarding licensing of gins and presses is under consideration.

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

(iii) 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.

During the year under report, number of cases of malpractices relating to admixture, watering and mixing were brought to the notice of the Committee. It was mentioned that mixing of seed and *kapas* may be either deliberate, due to resetting of the ginning

machinery or due to the machinery being old. As such malpractices would spoil the reputation of Indian cotton, the Governments of Punjab and Pepsu have agreed to appoint a State Committee to survey the facilities available in the State for ginning and pressing of cotton. With a view to prohibiting such malpractices and maintaining the quality and reputation of Indian cotton, the Committee recommended that a review of existing legislation in the various States should be undertaken with the object of closing any loop-holes in the existing provision. Accordingly, a special Sub-Committee has been appointed to examine the working of the various Acts in respect of cotton 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. A technical survey of the ginning and pressing factories was also conducted by the Director, Technological Laboratory, of the Committee and the report of the survey is being published for general information. The Director has recommended that (1) the machinery of the factories which are old should be scrapped; (2) cleaning machinery should be installed at the factories and proper price paid for such cleaned cotton; (3) appointment of technical personnel for the management of factories; (4) provision for warehouse and proper marketing.

(vii) Agmarking

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

Labels	*Purity percentage*
Agmark certified pedigreed (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 Bailing Hoops

The arrangements for the distribution of cotton bailing hoops were continued on the lines of the past year. During the year under report, 2,000 tons of controlled indigenous hoops were actually released to pressing factories in the country by the Committee's office working in conjunction with the Iron and 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 (Dist.), Calcutta, as in the previous year and about 1,96,561 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 in the previous season owing to transport bottlenecks, with the concurrence of the Deputy Coal Controller, recommendations for supply of coal for the 1955-56 season were made well in advance of the commencement of the season to ensure timely despatch of coal.

In addition, assistance was given to the factories in the matter of obtaining cement and 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, sponsored by the Government of India and put into operation in 1950-51 were continued in the various States for the sixth year during 1955-56 season. In 1951-52, these schemes were merged with the cotton plan under the First Five Year Plan. A target of production of 42.3 lakh bales of cotton was fixed for achievement by the end of the Plan in 1955-56.

For the implementation of the plans, drawn up in consultation with the various States, an outright grant to the extent of Rs. 9.72 lakhs for staff and other expenditure and loans to the extent of Rs. 24.0 lakhs for the purchase of improved seeds were sanctioned by the Government of India. The following measures were adopted, as in the previous years, under the Cotton Extension Schemes for increasing the production of cotton:—

(i) Expansion of cotton area by reclamation of waste and fallow lands, by replacement of food and other crops by cotton and by 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 manure and fertilisers (e) adoption of plant protection measures and (f) adoption of improved cultural methods, and

(iii) Propaganda and technical advice to cotton growers.

The targets of additional area and production of cotton fixed for 1955-56 season under the above measures together with their esti-

mated achievements as per reports received from the different States are shown below:—

Particulars	Additional area		Additional production	
	Targets	Achievements	Targets	Achievements
	(In lakhs of acres)		(In lakhs of bales)	
(A) By expansion of area	5.85	12.42	1.26	2.41
(B) By intensive cultivation measures.—				
(*i*) By provision of irrigation facilities	1.85	3.84	0.44	0.97
(*ii*) By intercropping of cotton with other crops	4.31	3.78	0.42	0.30
(*iii*) By manuring	3.89	1.69	0.28	0.08
(*iv*) By use of improved seed ..	38.27	47.69	0.41	0.45
(*v*) By plant protection measures	0.82	0.06	0.04	..
(*vi*) By improved cultural methods	0.03	0.52	0.01	0.03
Total ..	..	..	2.86	4.54**

** Includes 0.3 lakhs relating to Punjab, details not available.

Improved seed to the extent of 719,000 maunds and fertilisers to the extent of 19,000 tons were distributed during the season.

The weather conditions during the season were, in general, favourable for the sowing and the germination of the crop. Heavy rains and floods during August to October in the States of Punjab, Pepsu, Rajasthan, Uttar Pradesh, low-lying areas of Madhya Pradesh, Khandesh tract of Bombay, Gaorani tract of Hyderabad and Bellary district of Mysore, affected adversely the growth of the crop and also caused shedding of buds, flowers and bolls. The rains also influenced the attack of insect pests like jassids, aphids, blackarm, leaf roller and pink boll-worm resulting in the deterioration of the quality of the crop to some extent in the States of Punjab, Pepsu, Rajasthan, Uttar Pradesh, Madhya Pradesh, Khandesh tract of Bombay, irrigated areas of Madras and Rayalaseema district of Andhra. Thus, the hopes entertained in the early stages, of a bumper crop for the season were not only not realised, but the crop was also short of the target by about 5%.

The production of cotton in the country during 1955-56 was officially estimated at 39.98 lakh bales showing a decrease of 2.29 lakh bales or 5% compared to that in the previous season. The

trade estimate of the crop for the season was around 46.00 lakh bales.

The attached statements show the area and production of cotton and the improved seed and manure distributed in the various States during 1950-51 to 1955-56. The year 1955-56 marks the end of the First Five Year Plan and the table below indicates the achievements during the Plan period.

(*Based on official estimates*)

Particulars	1950-51 Base Year	1955-56	Percentage increase (+) or decrease (—)
I. Area under cotton (million acres)			
Total area	14.6	20.2	+38
Improved varieties	7.2	12.5	+74
Irrigated	1.1	1.9	+73
II. Production of cotton (lakh bales)			
Long staple (7/8" & above)	6.84	15.22	+123
Medium staple (below 7/8" and above 11/16")	14.48	17.78	+23
Short staple (11/16" & below) ..	8.39	6.98	—17
Total ..	29.71	39.98	+35

It will, thus, be seen that the measures for increasing the production of cotton have met with outstanding success. Although the area under cotton had exceeded the anticipated figure of 18 million acres by 11%, due to favourable weather conditions at sowing time, the crop was lower than the target by about 5% due to adverse climatic conditions later in the season.

Though the deficit in the supply of Indo-Pakistan varieties of cotton required by cotton textile mills has been made up, there is still need for stepping up the production of cotton to meet the increasing requirements of the textile industry, the rising standards of living and the likely increase in population. Looking to these factors, it was proposed that a higher target of production should be fixed under the Second Five Year Plan. The Planning Commission had accordingly fixed a target of 55 lakh bales of cotton for achievement by 1960-61. As this target was considered inadequate it was raised to 58.58 lakh bales at a Conference of State Ministers of

Agriculture held at Mussoorie in June, 1956, with a recommendation that efforts should be made to raise it further to 61 lakh bales. The Indian Central Cotton Committee which considered this revised target expressed the view that the target should be revised further to 65 lakh bales, after taking into consideration the increased target of textile production and allowing for exports, extra-factory consumption and the need for a comfortable carry-over. This target has been accepted by the Planning Commission after further discussions with the States concerned. The emphasis is laid on the achievement of the new target more by the adoption of intensive cultivation methods. Increasing the area under irrigated cotton offers a good scope for raising the yield per acre. At present, such area is about 10% of the total and it is expected that the various irrigation-*cum*-hydro-electric projects after completion would add another 1.3 million acres. Considering that cotton is grown in India mainly under rainfed conditions, the use of improved seed and the adoption of plant protection measures and of improved cultural methods would raise the yield to some extent. However, the use of fertilisers which could also increase the yield substantially, is becoming increasingly popular, but this is limited to areas under irrigation or of assured rainfall.

B. L. SETHI,
Secretary,
Indian Central Cotton Committee

Bombay, February, 1957.

STATEMENT I

Statement showing the area and production of cotton in the various States during 1950-51 to 1955-56 (as per official estimates).

STATES	Area (in thousand acres)						Production (in thousand bales)					
	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56
Punjab	447	518	509	588	759	826	196	247	278	370	440	470
Pepsu	266	304	298	310	430	456	175	153	157	184	173	135
Rajasthan	350	365	345	410	483	548	114	86	96	113	120	146
Bhopal	46	44	71	55	59	69	4	4	8	6	8	7
Madhya Bharat	1,586	1,464	1,586	1,580	1,562	1,772	219	193	308	323	352	356
Uttar Pradesh	106	193	207	140	146	136	45	63	70	44	34	27
Madhya Pradesh	2,776	3,297	3,544	3,821	3,847	3,993	510	780	653	678	670	453
Saurashtra	1,075	935	934	1,053	1,182	1,299	216	102	159	202	253	249
Bombay	3,487	3,888	3,491	3,836	4,578	5,388	803	551	680	1,092	1,269	1,283
Hyderabad	2,418	3,137	2,856	3,307	3,048	3,330	260	430	316	404	381	328
Madras	1,730*	1,768*	728	859	872	979	348*	411*	213	265	271	300
Andhra			639	659	711	711			85	97	106	100
Mysore	108	134	336*	394*	436*	443*	33	71	58*	124*	85*	81*
West Bengal	..	3	2	1	..	..	..	1	1	..	..	..
Orissa	24	24	26	26	25	25	2	2	2	2	2	2
Other States	137	124	121	143	208	255	46	39	47	61	63	61
Total	14,556	16,198	15,693	17,182	18,346	20,230	2,971	3,133	3,131	3,965	4,227	3,998
Trade Estimates							3,334	3,893	3,605	4,648	5,460	4,600

* Includes parts of Bellary district merged with Mysore State.

STATEMENT II

Statement showing the quantities of Improved seeds targeted for distribution and those actually distributed in the various States during 1950-51 to 1955-56.

STATES	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56	
	Quantity targeted for distribution (Mds.)	Quantity distributed (Mds.)	Quantity targeted for distribution (Mds.)	Quantity distributed (Mds.)	Quantity targeted for distribution (Mds.)	Quantity distributed (Mds.)	Quantity targeted for distribution (Mds.)	Quantity distributed (Mds.)	Quantity targeted for distribution (Mds.)	Quantity distributed (Mds.)	Quantity targeted for distribution (Mds.)	Quantity distributed (Mds.)
Punjab	18,100	11,365	17,815	17,442	35,000	28,484	40,000	39,615	70,500	54,996	87,500	64,052
Pepsu	*	4,000	10,000	3,700	10,100	9,700	7,000	12,000	20,000	18,000	25,000	16,000
Rajasthan	..	..	3,200	1,470	2,500	1,659	2,700	2,666	13,200	6,334	12,000	9,938
Bhopal	*	3,220	250	3,163	500	500	**	**	**	**	**	**
Madhya Bharat	19,682	19,790	23,500	20,000	40,000	26,372	40,000	30,000	50,000	32,658	50,000	46,310
Uttar Pradesh	*	6,010	2,000	1,120	6,100	5,053	9,500	5,650	7,000	5,766	*	5,779
Madhya Pradesh	*	*	76,000	1,14,706	1,14,750	1,14,750	1,14,700	1,11,818	1,14,700	1,23,267	1,14,700	1,03,412
Saurashtra	..	..	2,000	366	2,000	2,044	4,000	4,368	7,200	8,150	10,000	12,288
Bombay	*	*	1,36,111	99,625	7,38,628	2,92,865	7,68,750	3,33,856	5,01,250	2,28,268	5,66,250	3,23,116
Hyderabad	*	1,18,842	1,78,650	1,48,413	2,67,700	2,35,416	2,21,700	2,25,810	3,10,500	1,79,262	1,34,650	1,06,928
Madras	30,030	26,558	87,250	42,032	1,20,000	35,522	40,500	25,190	44,450	21,296	54,450	22,749
Andhra							9,174	8,161	954	954	2,230	2,230
Mysore	..	*	11,521	7,020	4,383	3,035	11,801	8,276	9,240	6,840	7,655	5,745
West Bengal	..	..	*	600	*	295	250	218	**	**	**	**
Orissa	..	..	*	800	*	420	400	21	520	166	535	123

* Not available ** Scheme discontinued.

STATEMENT III

Statement showing the quantities of fertilisers (Ammonium Sulphate) targeted for distribution and those actually distributed in the various States during 1950-51 to 1955-56.

STATES	1950-51		1951-52		1952-53		1953-54		1954-55		1955-56	
	Quantity targeted for distribution (Tons)	Quantity distributed (Tons)	Quantity targeted for distribution (Tons)	Quantity distributed (Tons)	Quantity targeted for distribution (Tons)	Quantity distributed (Tons)	Quantity targeted for distribution (Tons)	Quantity distributed (Tons)	Quantity targeted for distribution (Tons)	Quantity distributed (Tons)	Quantity targeted for distribution (Tons)	Quantity distributed (Tons)
Punjab	1,000	437	1,500	1,015	2,000	1,500	3,000	3,500	4,000	4,893	5,000	5,000
Pepsu	250	100	400	50	200	*	200	400	600	1,000	1,000	1,500
Rajasthan	..	..	390	43	400	124	500	282	500	329	750	344
Madhya Bharat	500	107	1,100	426	530	184	530	222	540	183	500	173
Uttar Pradesh	1,230	100	200	150	400	317	500	420	1,000	554	1,200	854
Madhya Pradesh	2,500	*	2,500	2,445	3,000	978	6,000	6,000	8,000	5,955	7,000	5,237
Saurashtra	..	..	15	63@	100@	105@	200@	225@	300@	310@	400@	430@
Bombay	15,000	6,000	6,000	4,365	2,000	*	3,000	*	5,000	*	5,000	5,000
Hyderabad	..	..	1,450	100	3,000	80‡	3,925	631‡	2,000	629	1,350	433
Madras	5,000	863	5,000	822	4,275	349‡	3,000	765‡	5,000	*	3,000	*
Mysore	100	*	50	2	50	..	..	..	..	..	..	39
Total	25,580	7,607	18,605	9,481	15,955	3,637	20,855	12,445	26,940	13,853	25,200	19,010

* Not available @ Manure mixture ‡ Incomplete.

APPENDIX I

MEMBERS OF THE INDIAN CENTRAL COTTON COMMITTEE

(i) **President,** Shri 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 R. M. Sundaram
Bombay	..	Dr. T. G. Shirname
Uttar Pradesh	..	Dr. S. B. Singh
Madhya Pradesh	..	Dr. R. J. Kalamkar
Punjab	..	Shri H. R. Saini

(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. A. P. Darlow
The Indian Merchants' Chamber	..	Shri Chimanlal B. Parikh
The Ahmedabad Millowners' Association		Shri Surottam P. Hutheesing
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 Shri P. H. Bhutta
Madras	..	Shri D. C. Kothari
Punjab	..	Shri Chandi Ram Verma

(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 *vice* Shri N. Maribasavana Gowd
Bombay	..	Shri A. S. Desai Shri N. S. Patil
Uttar Pradesh	..	Kunwar Kushal Singh Shri Digambar Singh
Madhya Pradesh	..	Shri S. K. Wankhede Shri P. S. Patil
Punjab	..	Shri Kundan Lal Ahuja

(ix) **Representatives of Part 'B' States:—**

Mysore	..	Shri M. Mallaraj Urs
Madhya Bharat	..	Shri M. G. Karnikar
Rajasthan	..	Shri Samrath Raj
Patiala and East Punjab States Union	..	Dr. Arjan Singh
Saurashtra	..	Dr. B. S. Kadam
Hyderabad	..	Shri Rai Prithvi Raj
Travancore-Cochin	..	Shri N. Sankara Menon

(x) Additional Members nominated by the Central Government under 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 Sher Singh
Shri C. Jagannatha Rao

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

LOCAL SUB-COMMITTEE

The President (Shri M. S. Randhawa),
The 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,
Shri Madanmohan R. Ruia,
Mr. A. P. Darlow,
Dr. T. G. Shirname,
Mr. A. Mueller,
Shri A. S. Desai.

AGRICULTURAL RESEARCH SUB-COMMITTEE

I. **The President**—Shri M. S. Randhawa, *(ex-officio),*

II. **The Vice-President**—Shri Chimanlal B. Parikh, *(ex-officio),*

III. **Co-operative Banking Representative**—Shri R. G. Saraiya,

IV. **Cotton Grower's Representatives:—**
- Shri S. K. Wankhede
- Shri P. S. Patil
- Shri N. S. Patil
- Shri A. S. Desai

V. **Cotton Trade Representatives:—**
- Shri Madanmohan R. Ruia
- Shri Chunilal B. Mehta
- Mr. A. P. Darlow
- Mr. A. Mueller
- Shri P. H. Bhutta
- Shri D. C. Kothari

VI. **Agricultural Officers:—**
- The Agricultural Commissioner with the Government of India, *(ex-officio)*
- Shri R. M. Sundaram
- Mr. D. N. Mahta
- Dr. S. B. Singh
- Dr. R. J. Kalamkar
- Dr. T. G. Shirname
- Shri H. R. Saini
- Shri Rai Prithvi Raj
- Sardar Arjan Singh
- Shri Samarth Raj
- Shri M. G. Karnikar
- Shri M. Mallaraj Urs
- Dr. B. S. Kadam
- Shri C. Jagannatha Rao

VII. **Additional Members:—**
- Pandit Thakur Dass Bhargava
- Sardar Sher Singh
- Shri R. L. Sethi
- 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. C. Nanjundayya

VII. **Additional Members** (contd.):—
- Dr. R. D. Asana
- Dr. L. S. Negi
- Shri N. Kesava Iyengar
- Dr. R. S. Bhatt
- 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
- Shri B. M. Dabral

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

TECHNOLOGICAL RESEARCH SUB-COMMITTEE

The President, Shri M. S. Randhawa,
The Vice-President, Shri Chimanlal B. Parikh,
The Agricultural Commissioner with the Government of India,
(ex-officio)

Shri R. G. Saraiya,
Shri Chunilal B. Mehta,
Shri Vithal N. Chandavarkar,
Shri Madanmohan R. Ruia,
Mr. Neville Wadia,
Shri Bharat Ram,
Mr. D. N. Mahta,
Mr. A. Mueller,
Shri J. K. Srivastava,
Shri P. H. Bhutta,
Shri D. C. Kothari,
Mr. A. P. Darlow,
Shri R. M. Sundaram,
Dr. R. J. Kalamkar,
Dr. T. G. Shirname,

Shri H. R. Saini,
Shri R. V. Deshmukh,
Shri Rai Prithvi Raj,
The Director of Industries, Bombay,
Shri R. L. Sethi,
Dr. C. Nanjundayya,
Dr. V. G. Panse,
Dr. S. M. Sikka,
Dr. L. S. Negi,
Shri N. Kesava Iyengar,
Shri C. Jagannatha Rao,
Dr. R. S. Bhatt,
The Economic Botanist, Institute of Plant Industry, Indore,
Shri P. S. Patil,
Shri V. K. Bederker,
The Cotton Botanist, Bombay State,
Shri B. M. Dabral,
The Principal, Victoria Jubilee Technical Institute, Bombay,
Dr. G. M. Nabar,
Shri Babulal Bubna,
Shri B. D. Kulkarni,
Shri Madanmohan Ramanlal,
Shri Harshavadan Mangaldas,
Shri Manilal H. Patel,
Shri Jamnadas Ramdas,
Dr. B. K. Vaidya.

COTTON FORECAST SUB-COMMITTEE

The President, Shri M. S. Randhawa,
The Vice-President, Shri Chimanlal B. Parikh,
The Agricultural Commissioner with the Government of India,
(ex-officio)

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 R. G. Saraiya,
Shri Chunilal B. Mehta,
Mr. D. N. Mahta,
Mr. A. Mueller,
Shri D. C. Kothari,
The Director, Bureau of Economics and Statistics, Hyderabad-Deccan,
The Economic and Statistical Adviser to the Government of India, Ministry of Food and Agriculture,
Dr. V. G. Panse.

COTTON GINNING AND PRESSING FACTORIES SUB-COMMITTEE

The President (Shri M. S. Randhawa),
The Vice-President (Shri Chimanlal B. Parikh), *(ex-officio)*,
Shri Madanmohan R. Ruia,
Shri Vithal N. Chandavarkar,
Shri Chunilal B. Mehta,
Mr. A. Mueller,
Mr. A. P. Darlow,
Shri D. C. Kothari,
Shri Chandi Ram Verma,
Shri J. K. Srivastava,
Shri R. V. Deshmukh,
Shri R. G. Saraiya,
Dr. T. G. Shirname,
Dr. R. S. Bhatt,
Dr. C. Nanjundayya.

EXPERT SUB-COMMITTEE TO FILL TECHNICAL POSTS UNDER THE INDIAN CENTRAL COTTON COMMITTEE

The President,
The Vice-President,
The Director of Agriculture, Bombay State,
The Secretary.

RESEARCH STUDENTS SELECTION SUB-COMMITTEE

The President, *(ex-officio)*,
The Vice-President, *(ex-officio)*,
The Agricultural Commissioner with the Government of India,
Dr. C. Nanjundayya, Director, Technological Laboratory,
The Secretary, *(ex-officio)*.

தமிழ்நாடு ஆவணக்காப்பக நூலகம்,
எழும்பூர், சென்னை-600 008.

தவணைத்தாள்.

சே. எண் : [illegible] ப. எண் :

வழங்கிய நாள். (1)	திரும்பிய நாள். (2)	வழங்கிய நாள். (1)	திரும்பிய நாள். (2)
[illegible]	[illegible]		

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