

**TECHNOLOGICAL LABORATORY**

**INDIAN CENTRAL COTTON  
COMMITTEE**



**ANNUAL REPORT**

OF THE

**DIRECTOR**

**TECHNOLOGICAL LABORATORY**

FOR THE

**YEAR ENDING 31st MAY, 1964.**

Price Rs. 6.50.

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**FORTIETH ANNUAL REPORT OF THE DIRECTOR,  
TECHNOLOGICAL LABORATORY, MATUNGA**

FOR THE YEAR ENDING 31ST MAY, 1964

**INTRODUCTORY SUMMARY**

This is the Fortieth Annual Report of the Technological Laboratory, and deals with the work done during the year 1963-64. It is gratifying to record that the Laboratory continued to render valuable service to the Cotton Breeders and other research workers besides making considerable progress in the expansion and modernisation programme of the Laboratory, as will be borne out by the details presented below.

It will be noted from the figures given in Table 1 (page 3) that the number of samples received for all tests during the year under review was 5,761 as against 5,103 during the previous year. As already observed in the last report, this figure is round about the normal number that can be expected to be handled annually. The total number of samples received from the State Departments of Agriculture for full spinning, micro-spinning, fibre and standard tests was 3,005. The number of samples received for micro-spinning tests alone was 1,903.

The work done on these samples is summarised in Table 2 (page 4) from which it will be seen that during the year under review, 5,261 samples were tested as against 5,037 last year, registering a small increase. However, 2,826 samples were spun against 3,223 samples last year and 800 reports comprising the results for 5,261 samples were issued during the year as against 762 comprising the results of 5,037 last year. Further, the Cotton Breeders were provided with the technological data on their samples in time for the next sowing, in accordance with the scheduled programme. Laboratory reports proved very useful to the Breeders due to the determination of larger number of properties on each sample.

It will be noticed from the figures given in Table 7 (page 8) that 1,524 samples were received in the Testing House of the Laboratory from commercial and Government bodies as against 1,725 samples during last year.

During this year, mill tests were arranged to be carried out on 30 samples of improved varieties from various States, including their controls, and reports were sent to the concerned Officers.

As suggested by the President, a technical note describing the stage from which samples are to be sent to the Laboratory for testing was prepared and sent to all Cotton Breeders and Agricultural Officers of the different States for their guidance.

As mentioned in the last report, the research activities mainly on structural, development and agronomic aspects of the fibre were continued. Several investiga-

tions were completed and bulletins on them were published and some more are under publication.

The Laboratory continued to participate in the calibration programme of the United States Department of Agriculture for Micronaire and Pressley Strength tester. A proposal has been made by the Indian Central Cotton Committee for enrolling itself as a member of the International Cotton Calibration Committee and the matter has been taken up with the Government of India. After the Indian Central Cotton Committee is formally admitted as a member of the International Cotton Calibration Committee, the Technological Laboratory can be sponsored by it as a designated laboratory. A similar calibration programme for the Technological Assistants posted at the breeding stations in India was continued during the year.

A project for the "Investigation of the microbial decomposition of cellulose with special reference to the effect of Indian bacterial organisms on cotton and cotton fabrics, to provide basic information for the improvement of cotton products" was approved both by the P.L. 480 authorities in the U.S.A. and by the Government of India and started functioning from January, 1963. The required technical staff has been recruited and most of the necessary equipments procured. The report of the progress for the project for the first year has been submitted to the U.S.D.A. authorities and the Government of India. A second project, viz., "Investigation of the preparation of radio-resistant and radio-sensitive celluloses to obtain basic information on the chemistry of cotton cellulose" has also been approved and the grant agreement signed on behalf of the Government of India. A third project on "The effects of high energy radiation on the induction and half-life of excited, free and/or ionised radicals in cotton cellulose," which was prepared by the United States Department of Agriculture and offered for investigation at this Laboratory under the same programme is under the consideration of the Government of India.

The construction of a new block in connection with the expansion and modernisation of the Laboratory has been almost completed. It was opened by Shri A. D. Pandit, President, Indian Central Cotton Committee on the 18th March, 1964. Government of India have been requested to expedite their sanction for the necessary foreign exchange to provide controlled atmosphere for the testing section. Most of the new machinery for the blow room has arrived and arrangements are being made to install the same.

The work of the Laboratory during the period under review is described in detail in the following pages.

## II. TESTING WORK

### 1. GENERAL

Table 1 gives the number of samples received at the Laboratory for various tests under different heads during the year, together with the corresponding figures for the previous two years and averages for 3 five-year periods for purposes of comparison:—

TABLE 1  
Number of samples received

Type of sample	Average			1961-62	1962-63	1963-64
	1948-53	1953-58	1958-63			
1. Agri. Dept. Strains:						
(a) Full Spg. tests ..	807	728	896	902	880	735
(b) Micro Spg. tests ..	..	1,081	2,101	1,874	2,160	1,903
(c) Fibre tests alone ..	128	325	322	367	3	346
2. Standard cotton samples	17	20	21	20	26	21
3. Trade variety samples ..	37	41	74	114	79	88
4. Technological Research Samples	63	135	277	488	74	907
5. Commercial samples. (Tested on payment):—						
(a) Spinning tests ..	68	89	61	24	38	49
(b) Fibre tests .. ..	110	161	166	38	130	157
(c) Yarn tests .. ..	188	233	240	182	178	95
(d) Cloth tests .. ..	115	390	218	166	189	129
(e) Moisture tests ..	5	168	1,013	1,258	1,175	1,077
6. Fibre tests for E.I.C.A. ..	@	@	116	203	130	174
7. Miscellaneous .. ..	151	157	50	31	41	80
Total .. .. .	1,689	3,528	5,555	5,667	5,103	5,761

@ Included under item 7.

It will be seen from the figures given in the above Table that the total number of samples received during the period was 5,761, which is 13% more than that received last year.

Table 2 gives the number of samples tested at the Laboratory for various types of tests under different heads during the period under review together with the corresponding figures for the previous two years.

**TABLE 2**  
Number of samples tested

Type of test	1961-62	1962-63	1963-64
Full spinning .. .. .	926	929	1,101
Micro spinning .. .. .	2,029	2,194	1,874
Fibre tests alone .. .. .	471	299	597
Yarn tests .. .. .	171	185	92
Cloth tests .. .. .	170	195	130
Moisture tests .. .. .	1,471	955	1,257
Technological Research .. .. .	432	252	147
Miscellaneous .. .. .	19	28	63
Total .. .. .	5,689	5,037	5,261

It will be noted that 5,261 samples were tested during this year as against 5,037 last year.

It was mentioned in the last Annual Report that 2,145 samples of the previous year remained to be tested on the 1st June, 1963. It was decided at the meeting of the Indian Central Cotton Committee held in September, 1963 that the number of samples submitted for spinning tests at the Laboratory by the Cotton Breeders should be reduced and it was suggested that the Director might circulate a technical note on the subject to the Cotton Breeders indicating at what stage and what type of samples should be subjected to actual spinning tests so that the breeder could use his discretion in keeping the number of samples for spinning tests to a minimum. Action was taken accordingly. Further, as the number of samples pending tests were large, the officers



concerned were requested to indicate those samples which were considered to be more important. On the basis of the replies received, the less important ones were discarded. Moreover, a few samples which had been received either in a damaged condition, mixed up, or without proper identification marks had to be rejected. As a result, the number of samples which were pending tests was reduced to about 350, excluding the samples received for Technological Research work.

Table 3 gives the number of test reports, classified under various categories, issued during the period together with the corresponding figures for the previous two years and for the five year periods, 1948-53, 1953-58, and 1958-63.

**TABLE 3**  
Number of reports issued

Type of report	Average			1961-62	1962-63	1963-64
	1948-53	1953-58	1958-63			
Spinning test	220	328	432	478	489	531
Fibre test .. ..	73	104	116	88	81	94
Yarn test .. ..	109	92	105	97	77	50
Cloth test .. ..	56	189	102	96	83	68
Moisture test .. ..	3	11	31	35	25	44
Miscellaneous .. ..	2	9	7	7	7	13
<b>Total .. ..</b>	<b>463</b>	<b>733</b>	<b>793</b>	<b>801</b>	<b>762</b>	<b>800</b>

As will be seen from the above table, the total number of reports issued during the period remained practically of the same order as in the past two years.

## 2. SPINNING SECTION

Tables 4 and 5 give the distribution of samples and counts spun at the Laboratory during the year together with the corresponding figures for the previous two years and the recent three quinquennia.

TABLE 4  
Number of samples spun

State	Average			1961-62	1962-63	1963-64
	1948-53	1953-58	1958-63			
Maharashtra .. .. }				824	849	725
Gujarat .. .. }	429	1,038	1,547	1,012	847	895
Mysore .. .. }	—	80	383	329	337	300
Madras .. .. }	94	120	57	41	59	104
Uttar Pradesh .. .. }	29	84	194	124	256	256
Madhya Pradesh .. .. }	113	232	147	187	118	218
Punjab .. .. }	61	110	89	129	159	67
Rajasthan .. .. }	2	35	30	28	27	28
Andhra Pradesh .. .. }	@	70	125	149	107	103
Kerala .. .. }	—	—	84	1	251	—
Bihar .. .. }	—	—	10*	—	10	51
Others .. .. }	18	53	15	21	10	5
Total .. .. }	746	1,822	2,681	2,845	3,030	2,752
Standard cottons .. .. }	18	21	22	15	29	19
Trade tests .. .. }				92	119	119
Technological Research .. .. }	233	213	225	10	45	6
Grand Total .. .. }	997	2,056	2,928	2,962	3,223	2,896

\*For 1962-63 only.

@ Included in Madras State.

TABLE 5  
Number of yarns spun

State	Average			1961-62	1962-63	1963-64
	1948-53	1953-58	1958-63			
Maharashtra .. .. }				1,087	1,380	1,078
Gujarat .. .. }	728	1,508	2,478	1,763	1,317	1,487
Mysore .. .. }	—	153	664	538	473	432
Madras .. .. }	198	236	122	114	85	176
Uttar Pradesh .. .. }	71	169	324	204	384	356
Punjab .. .. }	112	221	155	210	248	129
Madhya Pradesh .. .. }	154	338	286	322	186	317
Rajasthan .. .. }	—	12	59	56	42	66
Andhra Pradesh .. .. }	@	48	168	205	153	156
Kerala .. .. }	—	—	98	3	251	—
Bihar .. .. }	—	—	16*	—	16	60
Others .. .. }	443	499	29	26	30	5
Total : .. .. }	1,706	3,184	4,399	4,528	4,565	4,262
Standard cottons .. .. }	115	139	112	96	88	114
Trade tests .. .. }				275	310	345
Technological Research .. .. }	753	564	480	23	152	18
Grand Total .. .. }	2,574	3,887	4,991	4,922	5,115	4,739

\* For 1962-63 only.

@ Included in Madras State.

These Tables show that the numbers of samples and yarns spun during the year were slightly less than those of last year.

### 3. FIBRE TESTING SECTION

The number of samples tested for fibre properties under different categories in the current year together with the corresponding figures for the previous two years and average for the period 1948-53, 1953-58 and 1958-63 for purposes of comparison are given in Table 6 which shows that during the period under review, fibre tests were made on 1,610 samples, against 1,551 samples tested last year.

TABLE 6  
Number of samples tested for fibre properties

Type of sample	Average			1961-62	1962-63	1963-64
	1948-53	1953-58	1958-63			
Agricultural (Large) ..	475	701	851	829	836	925
„ (Small) ..	190	447	835	693	287	239
Standard cottons .. ..	17	22	21	17	24	21
Trade Variety Cottons	197	315	340	53	72	64
Commercial (Paid tests)				64	154	173
East India Cotton Association				203	130	174
Technological Research ..	58	72	36	46	9	11
Ginning Investigations ..	64	51	28	28	28	—
Miscellaneous .. ..	27	24	20	23	11	3
Total .. ..	1,028	1,632	2,131	1,956	1,551	1,610

### 4. TESTING HOUSE

The Testing House of the Laboratory continued to receive a large number of samples of all types for various tests showing the usefulness of the Institution to the industry and the trade. The Table 7 shows the number of samples received during the period under review. It will be seen from the figures that the total number of samples received during the year was 1,524 which is slightly less than 1,725 received during the previous year.

**TABLE 7**  
**Number of samples received (Testing House)**

	Average			1961-62	1962-63	1963-64
	1948-53	1953-58	1958-63			
Spinning tests .. .. .	68	89	61	24	38	49
Fibre tests .. .. .	110	161	166	38	130	157
Yarn tests .. .. .	188	233	240	182	178	95
Cloth tests .. .. .	115	390	218	166	189	129
Moisture tests .. .. .	5	168	1013	1258	1175	1077
Miscellaneous tests .. .. .	6	29	22	22	15	17
<b>Total .. .. .</b>	<b>492</b>	<b>1070</b>	<b>1720</b>	<b>1690</b>	<b>1725</b>	<b>1,524</b>

It is gratifying to note that various Commercial and Government organisations are continuing to take advantage of the facilities offered by the Testing House for getting authoritative and technical reports on many items. Some of these are individual merchants, manufacturing concerns, foreign Government departments, Central and State Government departments, Bombay Municipal Corporation, etc.

Apart from the usual tests of routine nature, some of the special interesting investigations carried out by the Testing House in the year under report, are listed below:—

1. Two specially strong cotton cord yarns were received for tests of length of reel and breaking strength. The tests were carried out and reported.
2. Eleven samples of yarn were tested for identification of component fibres.
3. Two samples of cotton healds were tested for comparative performance for their wearing capacity and their comparative resistance to wearing.
4. Two samples of cotton seeds were tested for linter percentage and oil content.
5. Two samples of asbestos cloth were tested for their breaking strength both warpway and weftway.
6. Five samples of cloth were received for mildew resistance tests. The tests were carried out by Soil Burial method and their comparative resistance to mildew of each sample was determined.
7. Two samples of cloth were tested for shrinkage per cent, both warpway and weftway.

8. Eleven samples of cloth were received for determination of various properties such as tensile strength, and wear and tear tests in relation to their construction.
9. Sixteen samples of cottons were received from the Government of Burma for spinning tests.

The fees received for carrying out the tests during the year amounted to Rs. 32,154 as against Rs. 21,111 during the previous year.

#### 5. GINNING SECTION

Most of the work done in this section during the year under report is described under the head 'Research Investigations—Summary of work in Progress' and an outline of the chief items is given below:—

The pre-cleaning and ginning tests on Digvijay cotton were completed and the lint samples are under test for fibre quality and spinning value.

The fabrication of an extractor was continued and appreciable progress was made in this work.

About 17 trade varieties of 1962-63 season and about 35 varieties of 1963-64 season were ginned and their ginning percentages determined.

About 380 small samples obtained from the agronomic and other experiments were ginned in the Laboratory Gin and their ginning percentages determined.

Twenty roller ginned lint samples obtained from different factories in Gujarat State for the determination of percentages of cutseed and fullseed present in the samples were tested and the reports issued to the officers concerned.

Necessary help and guidance were given by the Senior Research Assistant (Ginning) to a local firm in Bombay entrusted with the fabrication of Laboratory gin. The firm supplied 7 gins during the period under report, which were tested and despatched to different cotton breeding and marketing centres.

#### 6. SOME IMPORTANT TEST RESULTS

Although the results contained in the test reports, mentioned earlier, were mainly intended for the Cotton Breeders and other research workers who had sent the samples, a few of them deserve particular attention, being of general interest. These are described below:

##### A. AGRICULTURAL SAMPLES

##### (a) Maharashtra

##### (1) *Mill tests on improved varieties:*

- i) Mill and Laboratory tests were carried out on samples of AK.277 raised at

Buldana and AK.235 raised at Akola with 197/3 (Virnar) as control in both the places. Their comparative test results are given below:—

Place	Variety	Mill test		Laboratory test	
		Count	Lea Strength (lb)	Count	Lea Strength (lb)
Buldana	.. .. AK. 277	22s	75.1	24s	69.3
"	.. .. 197/3	22s	68.9	24s	58.6
Akola	.. .. AK. 235	22s	73.5	24s	67.1
"	.. .. 197/3	22s	70.6	24s	62.4

It is observed that both AK. 277 and AK. 235 have given better spinning performance than 197/3 in the mill.

ii) Mill and Laboratory tests were carried out on samples of 1319 and G. 1422 raised at Badnapur. Their comparative test results are as follows:

Place	Variety	Mill test		Laboratory test	
		Count	Lea Strength (lb)	Count	Lea Strength (lb)
Badnapur	.. .. 1319	30s	49.7*	30s	40.9
"	.. .. G. 1422	30s	54.3*	30s	44.2

\* t.m.=4.45

The strain 1319 did not prove better than G. 1422.

(2) *Improved strains from Dhulia:*

A number of improved strains raised at the College Farm, Dhulia were received for tests. Among these strains 97-41, 97-63, 97-117, 97-187 and 200-107 were found to be promising. These samples had a staple length of 1.15" and above and were spinnable to 42s and above. They were found to be better than 170-Co. 2 sample which was used as control.

(3) *Improved strains from Parbhani:*

A number of samples received from the Cotton Breeder, Parbhani had been tested at the Laboratory. Eight strains viz., 97-41, 97-46, 97-63, 97-120, 97-187, 113-93, 113-128 and 113-181 were found to have staple length of more than 1.15" and were spinnable to 40s and above.

(4) *Desi Varieties:*

Ten varieties AK. 235, AK. 277, H. 1, H. 2, H. 4, I. 24, 331, Y. 1, C.J. 73, and 197-3 were tried at a number of places for their comparative performances. The samples received from Akola, Buldana, Nagpur, and Nimbala showed that on an average H. 4, H. 2 and C.J. 73 were better than 197-3 both in staple length and spinning capacity.

(b) **Gujarat**(5) *Mill tests on improved varieties:*

Four samples of I.S.C. 67 from four different places viz., Surat, Samni, Vanthali, and Talod were tested at the Mill and the Laboratory. Their test results are given below:—

Variety	Place	Mill test		Laboratory test	
		Count	Lea Strength (lb)	Count	Lea Strength (lb)
I. S. C. 67 .. .. .	Surat	30s	69.0	30s	61.6
„ .. .. .	Samni	30s	71.3	30s	61.2
„ .. .. .	Vanthali	30s	72.7	30s	56.2
„ .. .. .	Talod	30s	70.6	30s	54.5

ii) Two samples of Sea Island from Surat and Boriavi were received for mill test. The mill combed the samples to the extent of 30%. Their test results are given below:—

Variety	Place	Mill test	
		Count	Lea Strength (lb)
Sea Island .. .. .	Surat	100s	24.4
„ .. .. .	Boriavi	100s	23.9

iii) Two samples of 199 from Umalla and Bardoli and one sample of 115 from Bardoli were tested in the Mill and Laboratory. Their test results were as follows:—

Variety	Place	Mill test		Laboratory test	
		Count	Lea Strength (lb)	Count	Lea Strength (lb)
199 .. .. .	Umalla	30s	48.3	30s	51.8
„ .. .. .	Bardoli	30s	64.6	30s	52.3
115 .. .. .	„	30s	49.4	30s	53.1

All these samples have given satisfactory performance at the mill.

## (6) 394-3, 597-B, 797 and Kalyan:

Samples of 394-3, 597-B, 797 and Kalyan grown in different places of Gujarat were received and tested. The average performance indicated that 597-B was better than Kalyan in spinning performance while 797 from some of the places also had recorded good performance. The spinning performance of 394-3 was, however, not so good.

## (7) 115, 199, 92, 11-1, 11-2, Digvijay as compared to Vijalpa:

Samples of 115, 199, 92, 11-1, 11-2 Digvijay and Vijalpa were also received for tests from a number of places namely, Surat, Broach, Baroda, Derol and Ranjitnagar. The results showed that on an average, cultures 115, 199, 92 and 11-2 had longer staple than Vijalpa, while cultures 92 and 11-2 were also better in spinning quality.

## (8) I.S.C. 67, Deviraj and Devitej:

The samples of these three varieties grown in experimental trials at Bardoli, Kholwad, Kim, Halwad, Sagdividi and Dabhoi, were received for tests. It is observed that both I.S.C. 67 and Devitej were longer in staple than Deviraj, but all the three were almost of the same spinning value.

## (9) Hybrids:

A number of hybrid selections raised at various research stations had been received for tests at the Laboratory. Some of the promising selections and their important test results are given below:

Place and Variety	Mean fibre length	Micronire value	Millitex	Maturity co-efficient	P. S. I.	H. S. C.
Thasra						
B. C. 68 × Moco .. ..	1.18	3.0	117	0.63	8.4	> 50s
134-Co. 2M-21 × Moco ..	1.20	2.8	112	0.61	8.6	„
B. C. 68 × Giza .. ..	1.29	2.7	108	0.59	7.6	„
B. C. 68 × S. I. .. ..	1.30	2.8	110	0.60	8.3	50s
Chanasma						
B. C. 68 × Moco .. ..	1.17	3.1	122	0.65	8.8	> 50s
I. S. C. 67 × Moco .. ..	1.12	2.9	114	0.62	8.9	„
134-Co. 2M-21 × Moco ..	1.10	2.7	106	0.57	8.5	„
I. S. C. 67 × Giza .. ..	1.20	2.6	102	0.56	8.0	„
Talod						
Co-ano-739-4-2 .. ..	1.13	3.4	135	0.69	7.5	51s
Co-ano-792-2-2 .. ..	1.16	3.2	126	0.64	7.7	> 50s
I. S. C. 67-5B .. ..	1.10	3.2	124	0.64	7.6	48s
Co-ano-750-4-2 .. ..	1.12	3.3	128	0.67	8.1	48s



## (c) Mysore

## (10) Mill tests on improved varieties:

One sample each of strains 5216, 5110 and Laxmi from Siruguppa were tested at the mill and the Laboratory for comparative performance. Their test results are given below:—

Variety	Mill test		Laboratory test	
	Count	Lea Strength (lb)	Count	Lea Strength (lb)
5216 .. .. .	30s*	51.8	30s†	49.5
5110 .. .. .	30s*	55.8	30s†	52.6
Laxmi .. .. .	30s*	54.8	30s†	46.0

\* t.m.=4.45 † t.m.=4.

## (d) Andhra Pradesh

## (11) Mill tests on improved varieties:

Two samples, one each of 741 and Pratap, from Narasaraopet were tested at the mill and the Laboratory for their performance. The test results were as follows:—

Variety	Mill test		Laboratory test	
	Count	Lea Strength (lb)	Count	Lea Strength (lb)
741 .. .. .	28s	59.3	30s	48.9
Pratap .. .. .	28s	60.9	30s	48.9

It is observed that 741 has given almost the same performance as Pratap.

## (12) 216F Samples:

Samples of 216F grown at two different places in Tenali and Nandyal in Andhra Pradesh were tested at the Laboratory and it was observed that the Tenali sample was having a staple length of 0.92 inch and adjudged as capable of being spun into 35s HSC while the Nandyal sample had a staple of 0.88 inch and was adjudged suitable to spin 38s.

## (e) Madras

## (13) Mill tests on improved varieties:

Two samples, one each of 9978-B-5 and K. 6, from Kovilpatti were tested at the mill and the Laboratory for their performance. The test results were as follows:—

Variety	Mill test		Laboratory test	
	Count	Lea Strength (lb)	Count	Lea Strength (lb)
9978-B-5 .. .. .	30s	47.7	30s	50.9
K. 6 .. .. .	30s	45.5	30s	51.4

## (f) Madhya Pradesh

## (14) Mill tests on improved varieties:

One sample of Badnawar-1 from Badnawar was tested at the mill and the Laboratory for its comparative performance. The test results were as under:—

Variety	Mill test		Laboratory test	
	Count	Lea Strength (lb)	Count	Lea Strength (lb)
Badnawar-1 .. .. .	30s	57.5	30s	59.9

## (15) Improved strains:

A number of improved strains raised at Gwalior and Badnawar were received for tests. Some of the strains seem to be promising. Strains C. 60-147 and C. 58.5 raised at Gwalior were about 0.95 inch in length and were adjudged suitable to spin to 44s. Similarly, strains B. 56-286, B. 59-1684 and B. 57-973 were about 1" in staple and were spinning to 49s, 43s and 47s (HSC) respectively.

## (g) Punjab

## (16) Improved strains from Abohar:

A number of samples of improved strains raised at Abohar were tested. It was observed that strains A-179, A-182, A-183 and A-164 were above 1 inch in length and were spinning to more than 40s. These seem to be promising.

## (h) Uttar Pradesh

## (17) Mill tests on improved varieties:

Samples of M 4/43, M 4/58, 216F, 320F, Raniben, B.A. 57/71, B.A. 57/9-8 from Raya were tested at the mill and Laboratory for their comparative performance. The test results are given below:—

Variety	Mill test		Laboratory test	
	Count	Lea Strength (lb)	Count	Lea Strength (lb)
M 4/43 .. .. .	30s	46.4	30s	58.2
M 4/58 .. .. .	30s	32.6	30s	51.1
216F .. .. .	30s	43.3	30s	47.4
320F .. .. .	30s	45.8	30s	50.4
Raniben .. .. .	20s	39.4	20s	58.5
B. A. 57/7-1 .. .. .	20s	40.1	..	..
B. A. 57/9-8 .. .. .	20s	59.3	20s	67.0

## (18) 320F and 216F:

These varieties had been tried at a number of research stations in Uttar Pradesh and from the test results of the samples received from Raya, Allahabad and Fatehpur, it was observed that 320F gave a slightly better spinning performance than 216F.

## (i) General

## (19) Samples of different pickings:

Samples of I, II and III pickings of 170-Co. 2 and Buri 147 were received for tests from Srirampur and Wandli (District Nagpur) respectively. It was observed that there was practically no difference in the fibre and spinning properties in the different picking samples of 170-Co. 2. But in the case of Buri 147, the III picking sample was somewhat shorter and poorer in spinning quality than the I and II pickings.

## (20) Samples of different generations:

A number of samples of different generations of Laxmi, Jayadhar, 170-Co.2, L. 147 and Kalyan had been received for tests. The results indicated that there was no appreciable difference in the spinning performance of the samples of different generations of these varieties.

## (21) Results for extra long staple (1-1/16" and above) cottons of 1962-63 season tested from different States:

The test results of full scale spinning carried out on extra long staple material developed in various States under different schemes of the Indian Central Cotton Committee are given in Table 8 (pages 16-18). This would be of help to the breeders to draw on the material for use in their breeding programme.

TABLE 8

Results of extra long staple (1-1/16" and above) cottons of 1962-63 season.

S. No.	Variety	Place of growth	Mean fibre length (inch)	Mean fibre length (mm)	Fibre weight (milli- tex)	Matu- rity coeffi- cient	Pressley str. index	H. S. C.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>I. Gujarat</b>								
1.	B.C. 68 x Moco	Thasra	1.18	30.0	117	0.63	8.4	About 50s
2.	I.S.C. 67 x Moco	"	1.14	29.0	101	0.57	8.0	48s
3.	134 Co.2-M-21 x S.I.	"	1.14	29.0	106	0.57	8.0	44s
4.	134 Co. 2-M-21 x Moco	"	1.20	30.5	112	0.61	8.6	About 50s
5.	I.S.C. 67 x S.I.	"	1.32	33.5	102	0.57	7.9	48s
6.	134 Co.2-M-21 x Giza	"	1.30	33.0	112	0.61	7.3	46s
7.	B.C. 68 x Giza	"	1.29	32.8	108	0.59	7.6	About 50s
8.	B.C. 68 x S.I.	"	1.30	33.0	110	0.60	8.3	50s
9.	I.S.C. 67 x Giza	"	1.20	30.5	112	0.60	7.6	43s
10.	I.S.C. 67	"	1.16	29.5	122	0.65	7.0	43s
11.	I.S.C. 67	"	1.15	29.2	124	0.65	6.9	35s
12.	Devitej	"	1.14	29.0	121	0.62	6.6	35s
13.	B.C. 68 x S.I.	Chanasma	1.15	29.2	105	0.58	8.3	39s
14.	B.C. 68 x Moco	"	1.17	29.7	122	0.65	8.8	About 50s
15.	134 Co.2-M-21 x S.I.	"	1.22	31.0	106	0.57	8.2	46s
16.	I.S.C. 67 x Moco	"	1.12	28.4	114	0.62	8.9	About 50s
17.	I.S.C. 67 x S.I.	"	1.20	30.5	101	0.56	8.2	45s
18.	134 Co.2-M-21 x Moco	"	1.10	27.9	106	0.57	8.5	About 50s
19.	I.S.C. 67	"	1.08	27.4	116	0.63	7.3	47s
20.	I.S.C. 67 x Giza	"	1.20	30.5	102	0.56	8.0	About 50s
21.	I.S.C. 67	"	1.17	29.7	118	0.64	7.4	45s
22.	Devitej	"	1.20	30.5	118	0.63	7.4	40s
23.	Deviraj	Samni	1.13	28.7	173	9.79	7.3	44s
24.	I.S.C. 67	"	1.24	31.5	135	0.71	7.0	41s
25.	I.S.C. 67	Halvad	1.16	29.5	132	0.71	7.0	39s
26.	Deviraj	"	1.06	26.9	165	0.79	7.2	36s
27.	I.S.C. 67	Vanthali	1.16	29.5	127	0.65	7.3	41s
28.	Devitej	"	1.26	32.0	122	0.64	7.2	43s
29.	I.S.C. 67	Bardoli	1.23	31.2	127	0.67	7.5	44s
30.	Deviraj	"	1.10	27.9	142	0.70	7.6	45s
31.	Devitej	"	1.24	31.5	130	0.67	7.5	37s
32.	I.S.C. 67	Kholwad	1.22	31.0	153	0.71	7.3	47s
33.	Deviraj	"	1.08	27.4	164	0.79	7.5	46s
34.	Devitej	"	1.26	32.0	156	0.76	6.8	43s
35.	I.S.C. 67	Kim	1.20	30.5	138	0.71	6.8	39s
36.	Deviraj	"	1.08	27.4	174	0.78	7.1	38s
37.	Devitej	"	1.23	31.2	163	0.76	6.8	41s
38.	Andrews	Vijapur	1.30	33.0	148	0.74	8.1	About 80s
39.	Devitej	"	1.11	28.2	120	0.62	7.4	37s
40.	Andrews	Manavadar	1.34	34.0	148	0.72	8.2	About 80s
41.	I.S.C. 67	Dehgam	1.12	28.4	115	0.61	7.6	36s
42.	Devitej	"	1.15	29.2	133	0.70	7.5	35s
43.	I.S.C. 67	Vandhya	1.14	29.0	142	0.70	7.4	39s
44.	Devitej	"	1.16	29.5	150	0.72	7.2	36s
45.	Devitej	Veda	1.06	26.9	113	0.61	7.4	35s
46.	Sea Island	Sagdividi	1.30	33.0	129	0.66	8.2	About 80s

TABLE 8—(contd.)

S. No.	Variety	Place of growth	Mean fibre length (inch)	Mean fibre length (mm)	Fibre weight (milli-tex)	Maturity coefficient	Pressley str. index	H. S. C.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
47.	I.S.C. 67-5B	"	1.12	28.4	138	0.70	7.0	37s
48.	I.S.C. 67-577	"	1.10	27.9	156	0.75	7.1	39s
49.	I.S.C. 67-579	"	1.10	27.9	184	0.81	6.5	36s
50.	I.S.C. 67	"	1.10	27.9	140	0.70	6.4	34s
51.	I.S.C. 67	"	1.16	29.5	169	0.76	7.3	83s
52.	Devitej	"	1.18	30.0	140	0.72	6.8	38s
53.	I.S.C. 67	Surat	1.26	32.0	145	0.71	7.1	40s
54.	Sea Island	"	1.30	33.0	102	1. m*	9.2	About 80s
55.	"	Boriavi	1.30	33.0	194	1. m*	8.9	About 70s
56.	I.S.C. 67-1-2	Surat	1.06	26.9	150	0.75	7.4	37s
57.	I.S.C. 77-1-733	"	1.06	26.9	134	0.69	7.7	27s
58.	N.C. 34	"	1.07	27.2	130	0.68	7.8	38s
59.	I.S.C. 67	"	1.12	28.4	132	0.68	7.5	34s
60.	I.S.C. 67-4	"	1.19	30.2	140	0.70	8.0	42s
61.	I.S.C. 67-4A	"	1.28	32.5	148	0.72	8.0	44s
62.	I.S.C. 67-5-2	"	1.23	31.2	125	0.65	8.0	37s
63.	I.S.C. 67-5-5	"	1.20	30.5	134	0.68	8.2	41s
64.	I.S.C. 67-B-10 (578)	"	1.22	31.0	144	0.71	7.6	34s
65.	I.S.C. 67-5-B	"	1.22	31.0	125	0.76	7.3	36s
66.	I.S.C. 67 (579)	"	1.22	31.0	128	0.66	7.6	38s
67.	I.S.C. 67 (582)	"	1.24	31.5	126	0.66	7.8	41s
68.	I.S.C. 67 (583)	"	1.20	30.5	130	0.67	7.4	28s
69.	Devitej	"	1.14	29.0	149	0.72	7.1	35s
70.	I.S.C. 67	Dabhoi	1.24	31.5	120	0.64	7.1	42s
71.	Deviraj	"	1.08	27.4	149	0.73	7.1	40s
72.	Devitej	"	1.28	32.5	142	0.73	6.9	44s
73.	I.S.C. 67-582-2-3	Talod	1.08	27.4	116	0.62	7.6	43s
74.	I.S.C. 67-583-2-3	"	1.09	27.7	117	0.64	8.0	About 40s
75.	I.S.C. 67-5B	"	1.10	27.9	124	0.64	7.6	48s
76.	I.S.C. 67-579	"	1.15	29.2	115	0.62	7.1	46s
77.	Co-Ano-739-4-2	"	1.13	28.7	135	0.69	7.5	51s
78.	Co-Ano-750-4-2	"	1.12	28.4	128	0.67	8.1	48s
79.	Co-Ano-792-2-2	"	1.16	29.5	126	0.64	7.7	About 50s
80.	Co-Ano-828-2-2	"	1.08	27.4	139	0.69	8.4	47s
81.	I.S.C. 67	"	1.13	28.7	115	0.62	7.6	43s
82.	Devitej	"	1.13	28.7	133	0.68	7.7	40s
83.	I.S.C. 67	Gokharwala	1.14	29.0	155	0.74	8.0	35s
84.	"	Mandvi	1.10	27.9	125	0.67	7.0	33s
85.	"	Malai	1.06	26.9	108	0.59	8.0	41s
<b>II. Maharashtra</b>								
86.	Deviraj	Ahmednagar	1.06	26.9	160	0.76	7.8	47s
87.	113/93	Pimpari	1.12	28.4	127	0.68	9.4	43s
88.	97-41	Parbhani	1.20	30.5	145	0.68	8.1	44s
89.	97-46	"	1.16	29.5	150	0.72	8.2	43s
90.	97-63	"	1.18	30.0	157	0.75	8.1	43s
91.	97-120	"	1.22	31.0	138	0.66	8.6	42s
92.	97-187	"	1.22	31.0	143	0.67	8.0	40s
93.	113-93	"	1.20	30.5	117	0.61	8.4	44s
94.	113-128	"	1.21	30.7	109	0.59	7.9	44s

\* low mature.

TABLE 8—(concl.)

S. No.	Variety	Place of growth	Mean fibre length (inch)	Mean fibre length (mm)	Fibre weight (milli- tex)	Matu- rity coeffi- cient	Pressley str. index	H. S.C.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
95.	113-181	Parbhani	1.20	30.5	110	0.59	7.9	46s
96.	Deviraj	Padegaon	1.13	28.7	144	0.69	6.6	37s
97.	Andrews	"	1.21	30.7	142	0.67	7.5	About 70s
98.	97-41	Dhulia	1.16	29.5	124	0.64	7.7	42s
99.	97-46	"	1.06	26.9	128	0.66	8.0	35s
100.	97-63	"	1.17	29.7	150	0.69	7.7	43s
101.	97-120	"	1.18	30.0	136	0.64	7.6	40s
102.	97-187	"	1.15	29.2	128	0.64	8.0	44s
103.	113-93	"	1.08	27.4	103	0.57	7.9	38s
104.	113-128	"	1.16	29.5	99	0.55	7.6	33s
105.	113-181	"	1.16	29.5	109	0.57	8.1	30s
106.	200-72	"	1.20	30.5	122	0.63	7.5	37s
107.	200-74	"	1.28	32.5	122	0.61	6.8	38s
108.	200-75	"	1.23	31.2	107	0.57	8.2	39s
109.	200-107	"	1.22	31.0	120	0.62	7.3	42s
110.	200-62	"	1.28	32.5	130	0.59	7.2	39s
111.	97-166	"	1.10	27.9	162	0.71	7.3	40s
112.	97-51	"	1.12	28.4	142	0.71	7.7	32s
113.	97-117	"	1.16	29.5	149	0.73	7.6	43s
114.	97-35	"	1.18	30.0	143	0.70	7.6	38s
115.	97-75	"	1.12	28.4	150	0.73	7.5	34s
116.	Andrews	"	1.33	33.8	144	0.73	7.9	About 50s
117.	"	"	1.25	31.8	145	0.70	7.7	About 70s
118.	Deviraj	"	1.08	27.4	152	0.72	7.6	About 50s
119.	Andrews	Badnapur	1.31	33.3	138	0.69	7.7	About 80s
<b>III. Andhra Pradesh</b>								
120.	Sea Island	Nandyal	1.24	31.5	154	0.74	8.0	50s
<b>IV. Punjab</b>								
121.	A 162	Abohar	1.06	26.9	109	0.59	8.8	27s
122.	A 172	"	1.06	26.9	152	0.75	8.4	37s
123.	A 165	"	1.07	27.2	126	0.68	8.8	38s
124.	A 182	"	1.09	27.7	120	0.65	8.9	44s
125.	A 183	"	1.13	28.7	111	0.62	8.5	44s
126.	A 164	"	1.08	27.4	124	0.66	9.0	43s
<b>V. Rajasthan</b>								
127.	A II	Sriganganagar	1.13	28.7	107	0.57	7.9	31s
128.	L.L. 80	"	1.12	28.4	141	0.70	8.7	42s
129.	P.S.T. 27	"	1.10	27.9	161	0.75	7.9	39s
<b>VI. Madras</b>								
130.	E.L. 123	Srivilliputhur	1.10	27.9	140	0.69	8.0	43s
131.	L.1143 EF	"	1.06	26.9	122	0.61	7.5	35s
132.	0892 B	"	1.23	31.2	140	0.69	8.4	50s
133.	E.L. 500	"	1.10	27.9	137	0.69	8.9	44s

## B. STANDARD INDIAN COTTONS

As in the past, extensive fibre and spinning tests were carried out on the Standard Indian Cottons for the 1962-63 season and a Technological Bulletin (Series A. No. 115) embodying the results obtained for these cottons has been prepared and is under print. Out of the 22 varieties tested during the 1962-63 season, four had recorded an improvement, eight had maintained their performance while eight had registered a decline in spinning value. Two cottons were tested for the first time this year. The comparative performance of the various cottons in each State was as shown below:—

*Spinning performance of Standard Cottons during 1962-63 as compared to that in 1961-62 season:*

State	Definitely better	Approximately same	Definitely poorer
Maharashtra.. ..	—	Gaorani-6, Gaorani-22	Virnar, Jarila, Gaorani-12.
Gujarat .. ..	—	Kalyan	Vijalpa, 1027 A. L. F. Digvijay.
Mysore .. ..	Jayadhar	Laxmi, Westerns Hagari I.	—
Andhra Pradesh ..	—	N. 14	—
Madras .. ..	M.C.U. 1 (winter) M.C.U. 3	M.C.U. 2 (Summer), K. 6	K.2
Punjab .. ..	L. S. S.	—	320F.

Some of the Standard Cottons of the 1963-64 season have also been received for tests. Tests on them are in progress.

## C. TRADE VARIETIES

Samples of fair average quality of the principal trade varieties of Indian Cottons of 1962-63 season were obtained with the assistance of the East India Cotton Association wherever possible and in other cases through the State Agricultural Departments. Representative kapas samples of the major trade varieties were also obtained through the co-operation of the State Agricultural Departments for the estimation of their ginning percentages. The fibre and spinning test results, ginning percentage, and other results obtained for each variety were, as in the past, published as Technological Circulars as early in the season as possible to be useful to the Cotton trade and the industry. The trade varieties on which such circulars were issued during the year are shown in pages 57-59. The technological circulars relating to the 1962-63 season, excepting a few less important ones, were later compiled and published as a Technological Bulletin (Series A, No. 114) entitled 'Technological reports on trade varieties of Indian Cottons—1963'.

Some of the trade varieties of the 1963-64 season have also been received and tested, while tests on others are in progress.

### III. RESEARCH INVESTIGATIONS

#### A. SUMMARY OF WORK IN PROGRESS

##### (a) INVESTIGATIONS ON GINNING

#### 1. Pre-cleaning and ginning tests on Indian cottons:

*(Item No. G. 1 in the Programme of Work).*

It was mentioned in the previous report that the pre-cleaning and ginning tests on Digvijay cotton were completed and the observations made on the results obtained from pre-cleaning and ginning and fibre tests had also been given therein. During the period under review, Graders' valuation on them was obtained and no marked difference was observed in the valuation of these samples. Spinning tests are in progress.

Two cottons, A-51-9 and Garo Hills, were obtained for conducting the pre-cleaning and ginning tests on them but it was not possible to carry out these tests during the period under review because of the dismantling of pre-cleaning and ginning machinery and shifting them to the new building. Most of the items of the above machinery have been shifted to the new building and are being reinstalled.

This work was done by Shri D. G. Shete.

#### 2. Economic and technical survey of the existing gins in India:

*(Item No. G. 3 in the Programme of Work).*

It was decided at the last meeting of the Indian Central Cotton Committee held in March 1964 that further work on this problem might be done by the Director of Economic Research and Statistics of the Committee. Accordingly, no further work was done in connection with this investigation.

#### 3. Fabrication of an Extractor:

*(Item No. G. 4 in the Programme of Work).*

It was mentioned in the previous report that the work of mounting of all the rollers on the angle iron frame and the driving arrangement to obtain the required speed and direction of rotation of a few of the rollers and its motorising were completed. During the period under review, the driving arrangement for the remaining rollers, taking into account the required speed and direction of rotation for each was completed. The steel wire screen suitable for eliminating fine trash from seed cotton was also fabricated. Besides, the arrangement for regulating the feed of raw cotton



into the machine was also fabricated. The mounting of steel wire brush for removal of hulls etc. and the alignment of rollers for their optimum positions to obtain better cleaning efficiency are being taken up.

This work was done by Shri D. G. Shete.

(b) INVESTIGATIONS ON FIBRE PROPERTIES

**4. Work of pulling of the fibre from seed in relation to fibre properties and percentage of seed-coat removal:**

*(Item No. F. 1 in the Programme of Work).*

The paper based on the results of the above investigation was published in the Textile Research Journal, May 1964 issue.

This work was done by Shri Jai Prakash.

**5. Study of variation between seeds of the same strain:**

*(Item No. F. 2 in the Programme of Work).*

As indicated in the previous report, the paper on this subject entitled, "The variation of the bundle strength at different regions of a cotton seed" was written up. This has been accepted for publication in the Indian Cotton Growing Review.

This work was done by Shri V.G. Munshi.

**6. Study of the properties of fibres collected from bolls of different ages:**

*(Item No. F. 3 in the Programme of Work).*

*(a) Structural properties:* Difficulties encountered in determining refractive index of young fibres at various stages of development were overcome and birefringence was determined on Vijalpa and 170-Co. 2 cotton fibres. With this, fibre development studies on the two cottons were completed.

A paper entitled, "Structural properties of cotton fibres: Part IV—Secondary cell wall deposition in relation to convolution angle, birefringence, structural reversal and tensile strength" incorporating the entire data so far obtained, was communicated to the Fifth Technological Conference held at South India Textile Research Association, Coimbatore in the first week of December, 1963.

The important conclusions were as follows:—

- (i) Degree of thickening showed linear relation with the age of development. The fibres from side region of Vijalpa showed higher cell wall deposition

as compared to fibres from chalazal region. This differentiation was lacking in 170-Co. 2.

- (ii) While convolution angle and birefringence varied appreciably with the increase in cell wall deposition, the bundle strength varied but little.
- (iii) Structural reversals were in large number in 170-Co. 2 appearing suddenly round about 36 days development, increasing at a high rate till 48 days and remaining more or less constant thereafter.
- (iv) In Vijalpa reversals were few which confirmed our earlier finding that number of reversals in a cotton is a genetic characteristic.
- (v) The period of secondary cell wall thickening is about 24 to 27 days for the two cottons which seems to be inadequate, especially for long staple 170-Co. 2, resulting in high immaturity.
- (vi) Efforts are called for to experiment and see whether it would be possible to enhance the rate of cell wall deposition and/or prolong the vital phase of secondary cell wall development by any treatment or agricultural practices with a view to producing more mature and strong Indo-American cottons.

A comprehensive project to study the effect of water stress and manuring on the fibre development of Indo-American cotton I.S.C. 67 and improved *herbaceum* strain 199 has been planned in collaboration with Shri P. S. Pandya, Cotton Specialist Gujarat State. The samples of the first season have been received for tests.

In accordance with the decision taken in February, 1961 to undertake the study on the development of long staple Indian Cottons at PIRRCOM Centres, preserved bolls of various ages of L. L. 54 variety were obtained from Sirsa.

This work is being done by Dr. S. M. Betrabet.

(b) *Chemical analysis of fibres*: In continuation of the results obtained on D.P. and wax content of fibres from different stages of Vijalpa, 170-Co. 2, Laxmi and Jayadhar cottons, it was decided to carry out chemical analysis in more detail. Accordingly, study was taken up on samples from bolls of different ages of Laxmi cotton for three seasons (1959-60, 1960-61 and 1961-62).

During the period under review study was made on ash percent, ash alkalinity, percentage of crystalline and amorphous cellulose and water soluble matter. Further work on cellulose content and other constituents is in progress.

Fibre maturity and fibre strength are being studied on the above samples.

This work is being done by Shri S. N. Pandey.

### 7. Study of properties of fibres from different regions of seed:

(Item No. F. 4 in the Programme of Work.)

It had been mentioned in the last Annual Report that the tests for D.P., bundle strength and maturity had been completed on 22 samples, while the X-ray angle measurements had been completed on 14 samples. During the period under review, the X-ray angle measurements were completed on the remaining 8 samples. The results of all tests (X-ray angle, bundle strength, maturity and D.P.) of the 22 samples taken for study were under analysis.

This work is being done by Dr. V. Sundaram, Shri Jai Prakash, Shri V. G. Munshi and Shri S. N. Pandey.

### 8. X-ray studies on the relationship between structural features and the physical properties of cotton:

(Item No. F. 5 in the Programme of Work.)

As considerable amount of time was spent in setting up the X-ray unit in proper working order due to want of some essential spare parts, very little progress could be made in this investigation. X-ray angle was determined for a few more samples relating to the investigation on the relationship between X-ray angle and rigidity. The values of rigidity and the mean fibre weight per unit length had been determined on these samples for an earlier investigation by Shri N. Balasubramanian. The results of tests for fibre rigidity ( $x_1$ ), X-ray angle ( $x_2$ ) and fibre weight per unit length ( $x_3$ ) in the case of 17 samples were analysed and the following correlations were observed:

$r_{12}$	.....	-0.501*
$r_{13}$	.....	+0.966**
$r_{23}$	.....	-0.425

It may be noted that  $r_{12}$  is significant at 5% level indicating some association between rigidity and X-ray angle.  $r_{13}$  is highly significant at 1% level confirming the previous finding of high association of fibre weight with rigidity. As may be expected,  $r_{23}$  is not significant. The partial correlation coefficient  $r_{12.3}$  was -0.243 whereas the value of the multiple-correlation  $R_{1.23}$  was 0.971.

This work was carried out by Dr. V. Sundaram.

### 9. Inheritance of X-ray angle:

(Item No. F. 6 in the Programme of Work.)

A large number of single plant selections of seven parent strains and eleven crosses were received from Dr. Santhanam, Head of PIRRCOM., Coimbatore in

July, 1963. On testing the samples of the parent strains, it was observed that there was very little variation in the bundle strength values of these strains; hence it was concluded that no useful purpose would be served by examining the crosses for X-ray angle, and bundle strength. A fresh lot of samples of 13 parent strains and another lot of 8 strains were received in September, 1963. On the basis of tests made on these, three strains (namely, Bobdel, Cabal T. 11 and Delfos 531C) were chosen as suitable parents. About 150 single plant selections from these three strains were received in February, 1964 and tested for bundle strength. On the basis of these tests, three plants from each variety have been selected by Dr. Santhanam for further study. The work is in progress and is being carried out by Dr. V. Sundaram and Shri Jai Prakash, in co-operation with Dr. Santhanam, Head of PIRRCOM, Coimbatore.

#### 10. Study of structural properties by optical methods:

(Item No. F. 7 in the Programme of Work).

(a) *Convolution angle*:—Relationship between convolution angle and bundle strength, species-wise was being investigated for the last few years. Incorporating these results a paper entitled, "Structural properties of cotton fibres: Part III—Interspecies relationship between convolution angle and strength" was published in the January 1964 issue of Textile Research Journal.

(b) *Birefringence, frequency of reversals and tensile behaviour*:—

- (i) A paper entitled, "Structural properties of cotton fibres: Part II—Birefringence and structural reversals in relation to mechanical properties" appeared in the September, 1963 issue of Textile Research Journal. It was also published as a Technological Bulletin, Series B, No. 86.
- (ii) Under certain experimental conditions sodium-metaperiodate preferentially attacks—OH groups in 2 and 3 positions of glucose molecules, converting them to—CHO groups. Similarly the —OH groups in the 6th position are preferentially attacked by dichromate oxalic acid solution. The effect of introducing —COOH and —CH<sub>2</sub>OH groups in place of —CHO, on structural properties of cotton by further treatments was being investigated.

Birefringence, density and tensile behaviour studies had been completed on the treated samples and reported earlier. During the period under review gross morphological studies were completed on all the oxycelluloses.

A paper entitled, "Birefringence, density and tensile characteristics of oxycelluloses" by S. M. Betrabet, E. H. Daruwalla, V. G. Munshi and C. J. Jacob has been communicated for publication.

- (iii) Encouraged with the interesting results obtained on the study of optical properties of oxycelluloses, it is now proposed to extend these studies to cotton fibres treated with morpholin, ethylenediamine, triethylamine, zinc chloride, piperazine etc. Preliminary experiments are in progress.

This work is being done by Dr. S. M. Betrabet in collaboration with Prof. E. H. Daruwalla of the University Department of Chemical Technology.

(c) *Structural properties of some cellulosic fibres:* Investigations on the effect of alkalis on the swelling behaviour of raw and delignified bast fibres is in progress. During the period under review, swelling of two bast fibres in NaOH, KOH and LiOH of various concentrations was determined. The bast fibres were also progressively delignified and its effect on swelling of the fibres in NaOH of different concentrations was studied. Birefringence was also determined on the samples subjected to different swelling treatments.

Data are being analysed and a review of literature on the swelling behaviour of cellulosic fibres is being written up.

This work was done by Dr. S. M. Betrabet with the assistance of Shri G. G. Phadnis.

#### **11. Effect of high energy radiation on cotton:**

*(Item No. F. 8 in the Programme of Work).*

The approval of the Government of India for the proposals put up in connection with a P.L. 480 project on the "Investigation of the preparation of radio-resistant and radio-sensitive celluloses to obtain basic information on the chemistry of cotton cellulose" was received in July 1963. The financial and other aspects of the project were discussed with the P.L. 480 experts Dr. Alvin D. Ayres, Mr. E. F. St. Clair, Dr. S. C. Gupta and Mr. Robert Evans of the U.S. Department of Agriculture, during their visit to the Laboratory in October, 1963 to finalise the project. The financial aspects have since been approved and the grant agreement was signed on behalf of the Government of India, on the 25th April, 1964.

Work on the project will be taken up after the necessary funds are released to the Indian Central Cotton Committee and after the receipt of Government sanction for appointment of the staff required for project work.

As regards proposals for second project entitled "The effect of high energy radiation on the induction and half life of excited, free and/or, ionised radicals in cotton cellulose", the Government of India have intimated that the project should

be revised in consultation with the authorities of the U.S. Department of Agriculture. Necessary action in this connection is being taken.

This work will be done by Dr. V. Sundaram and Shri Jai Prakash.

- 12. The comparison of Stelometer value with (a) Pressley strength-index (zero gauge length) and (b) intrinsic strength as measured on single fibres (1/8"-gauge length):**

*(Item No. F. 9 in the Programme of Work.)*

A paper on the above investigation was being written up.

This work was being done by Shri V. G. Munshi and Dr. V. Sundaram.

- 13. Comparison of different methods of measuring fibre maturity:**

*(Item No. F. 10 in the Programme of Work.)*

The detailed analysis of results on 80 samples was being carried out.

This work was being done by Dr. V. Sundaram with the assistance of Shri K. N. Seshan.

- 14. Stress-strain studies on cotton using the Instron Tester: bundle strength at various gauge lengths to determine the bundle strength gradient for different varieties of cotton:**

*(Item No. F. 11 in the Programme of Work.)*

Tests for bundle strength at different gauge lengths were completed on 8 samples belonging to *G. Barbadense* species. The analysis of results was in progress.

This work was carried out by Shri Jai Prakash.

- 15. Investigation to ascertain whether separate Micronaire scales are necessary for different botanical species:**

*(Item No. F. 13 in the Programme of Work.)*

The determination of mean fibre weight by counting method was completed on samples of 46 coarse cottons. Further work is in progress.

This work was done by Shri Jai Prakash and Dr. V. Sundaram.

**16. Effect of swelling agents on structural and mechanical properties of cotton fibres:**

*(Item No. F. 15 in the Programme of Work.)*

The measurements of refractive indices and birefringence were carried out on 10 samples, mercerised slack with 20% NaOH and mercerised at five stretches namely 92%, 96%, 100%, 104% and 108%. It was observed that compared to the unmercerised sample, the birefringence values decreased considerably on slack mercerisation. However, these values were found to increase steadily with each progressive stretch.

This work was being done by Shri Jai Prakash and Dr. V. Sundaram with the assistance of Shri P. G. Oka.

**17. Nickerson Hunter Colorimeter tests:**

*(Item No. F. 16 in the Programme of Work.)*

(a) *Effect of storage:* The reflectance percentage and degree of yellowness of the 16 samples stored in two lots, one in conditioned and another in unconditioned room, were determined after the monsoon. Tests for fibre length, fibre length irregularity were carried out. Results are being analysed.

(b) *Colour-Charts for Indian Grade Standards:* The Colorimeter was put in working order after replacing the broken flapper and the calibration of the instrument was checked by carrying out tests on samples which had been tested earlier with the original flapper. Efforts were made to obtain the necessary samples from the East India Cotton Association Ltd. However, as it was late in the season, the samples of 1962-63 season could not be obtained. As regards the current (1963-64) season it was pointed out by the East India Cotton Association Ltd. that as the compulsory survey scheme had been dropped, only very few samples could be sent for tests. This position was considered by the Indian Central Cotton Committee at its meeting held in February, 1964 and it was decided that as this work was very important, the samples should be made available early. As a result, about 77 samples have been received so far and these have been tested. It is hoped that the required samples would be forthcoming and the work concluded early. The work is in progress.

The above items of work were carried out by Dr. V. Sundaram.

**18. Standardisation of Digital Fibrograph:**

*(Item No. F. 17 in the Programme of Work.)*

Tests were made on samples of ten more cottons using both Manual and Digital Fibrographs. Further work is in progress.

This work was done by Shri Jai Prakash.

**19. Distribution curves of some of the properties of single fibres of cotton:**

*(Item No. F. 19 in the Programme of Work).*

In the first instance, the frequency distribution of the weight of single fibres has been taken up. The necessary data are being collected.

This work is being done by Shri G. S. Rajaraman.

**20. An evaluation of the performance of the Port-Ar-Instrument:**

*(Item not included in the Programme of Work.)*

A paper embodying the results of the above investigation was published in the Indian Cotton Growing Review, January, 1964 issue.

This work was done by Dr. V. Sundaram with the assistance of Shri K. N. Seshan.

**(c) INVESTIGATIONS ON FIBRE PROPERTIES AND YARN CHARACTERISTICS****21. Variation in the weight of single fibres in relation to yarn irregularity:**

*(Item No. Y. 2 in the Programme of Work.)*

The single fibre weighing balance was set in working order and tests for calibration and performance were in progress.

This work was being carried out by Dr. V. Sundaram.

**22. Studies on lustre behaviour of cotton fibres and yarns:**

*(Item No. Y. 6 in the Programme of Work.)*

The contrast ratio was determined for a few more foreign cottons in the raw state. The results of tests on cotton lint, both in the mercerised and unmercerised states, were under analysis.

The standardisation of the lustre meter for yarn was carried out. 12 samples of 30s yarn were doubled with a twist multiplier of 2.8. These were mercerised under tension stretched to original length. The contrast ratio of the mercerised yarns were determined. The study of the effect of various factors such as combing, use of different twist multiplier etc. is in progress.

This work was done by Shri Jai Prakash and Dr. V. Sundaram with the assistance of Shri P. G. Oka.



**23. Cotton roving strength in relation to fibre properties:**

*(Item No. Y. 7 in the Programme of Work.)*

During the period under review some further work was carried out regarding the effect of storage, hank number and relative humidity on the minimum twist of cohesion of the rovings.

This work was done by Shri Jai Prakash.

**24. Regression coefficients between fibre properties and spinning value on tract-wise basis:**

*(Item No. Y. 8 in the Programme of Work.)*

The data available have been sorted out for selected regions. Regression equations have been worked out for some tracts, where sufficient data were available. Further data are being collected for other regions.

This work is being done by Dr. V. Sundaram and Shri G. S. Rajaraman.

**25. Upgrading of cotton by double roving and high draft in relation to fibre properties:**

*(Item No. Y. 9 in the Programme of Work.)*

The improvement in C.S.P. of yarns spun using the Casablanca High Draft System over that of the yarns spun by the ordinary system was examined in relation to the fibre properties of the corresponding cotton lint samples, in the case of 46 samples spun to 34s count, 215 samples spun to 40s count, 156 samples spun to 44s count and 75 samples spun to 50s count. In all these cases, it was observed that the correlation between the percentage difference in C.S.P. and fibre length was highly significant. The relationships between percentage increase in C.S.P. and other fibre properties were not found to be consistent in all the cases.

This work was done by Dr. V. Sundaram.

**26. Determination of the extent of immaturity that could be tolerated in long staple cottons in reference to their final spinning performance and nep potentiality:**

*(Item No. Y. 10 in the Programme of Work.)*

No progress could be made in this investigation as the required samples have not been received inspite of repeated requests and reminders to the Cotton Specialists and Breeders in various States.

## (d) INVESTIGATIONS ON SPINNING AND YARN CHARACTERISTICS

**27. Standardisation of yarn evenness:**

*(Item No. S. 1 in the Programme of Work.)*

A paper entitled "A comparative study of the visual assessment of yarn irregularity with Uster Evenness Test results" was published in the Indian Cotton Growing Review in March, 1964.

This work was done by Shri N. Balasubramanian and Shri V. V. Gupte.

**28. Effect of distribution of draft in the speed frames and change of draft in the ring frame on evenness of the product:**

*(Item No. S. 3 in the Programme of Work.)*

A paper embodying the results of the above investigation has been published in the Indian Textile Journal in January, 1964.

The work was done by Shri N. Balasubramanian.

**29. Variance length curve studies:**

*(Item No. S. 5 in the Programme of Work.)*

The paper on this investigation was published in the Textile Research Journal, September 1963 issue and reprinted in the Indian Cotton Growing Review in May, 1964.

This work was done by Shri N. Balasubramanian.

**30. Experiments on the patented miniature spinning plant:**

*(Item No. S. 9 in the Programme of Work.)*

Fabrication of a miniature spinning frame is in progress.

This work is being done by Shri R. P. Neogi.

**31. Study of the variation in yarn strength at different positions on the bobbin:**

*(Item No. S. 10 in the Programme of Work.)*

A paper on the subject entitled the "Variation in counts and strength of yarn due to its position on the bobbin" by V. V. Gupte, V. Venkataraman, H. B. Joshi and R. L. N. Iyengar was published in the Indian Cotton Growing Review, July 1963 issue.

**32. Preliminary study of the characteristic curve connecting count and C.S.P:**

*(Item No. S. 11 in the Programme of Work.)*

Four cotton samples, one each of Digvijay (Broach), Laxmi (Gadag), Parbhani American-1. (Adilabad) and M.A. 5 (Arsikere) were spun into different counts. The yarn samples are under test.

This work is being done by Shri R. P. Neogi.

**33. Comparison of strength and extension values of single thread by different methods of tests;**

*(Item No. S. 12 in the Programme of Work.)*

The analysis of results was in progress.

This work was being done by Shri Harirao Navkal, Dr. V. Sundaram and Shri Jai Prakash.

**34. Investigation on the effects of different processing treatments on the spinning value of M.A. 5:**

*(Item No. S. 13 in the Programme of Work.)*

A paper on the subject entitled "Effect of different processing treatments on the spinning quality of M.A. 5" by Hari Rao Navkal, V. V. Gupte and R. L. N. Iyengar was published in the Indian Cotton Growing Review, September, 1963 issue.

**35. Skein strength of the yarn in the metric system:**

*(Item No. S. 14 in the Programme of Work.)*

The results of the above investigation, reported in the last Annual Report, were published in a paper entitled "Skein breaking load of cotton yarns numbered in French Counts", in Indian Standards Institutions' Bulletin, February, 1964.

This work was done by Dr. V. Sundaram.

**36. Relationship between single thread strength measured at 500 mm. test length and at 12" test length on a constant rate of traverse machine:**

*(Item No. S. 15 in the Programme of Work.)*

Regression equations have been worked out to predict the strength of the yarns at 500 mm. test length from the values obtained using 12" test length. Further analysis of results is in progress.

This work is being done by Dr. V. Sundaram.

**37. Variation in yarn strength with relative humidity:**

*(Item No. S. 16 in the Programme of Work.)*

It had been mentioned in the last Annual Report that 36 samples of yarn were tested for metric skein strength after necessary pre-conditioning in atmospheres of 35%, 45%, 55% and 65% relative humidity. During the period under review, the metric skein strength of all the 36 samples were determined at relative humidities of 75% and 85%. Tests for single strand strength of these yarns at the various humidity levels are in progress.

This work is being carried out by Dr. V. Sundaram.

(e) CHEMICAL INVESTIGATION

**38. Evaluation of D.P. values of Indian cottons by different methods:**

*(Item No. C. 1 in the Programme of Work.)*

Work on this problem was continued during this period. D.P. tests were made on six cotton samples by cuprammonium solvent method, using X-type viscometer tubes and C.E.D. solvent using Cannon-Fenske viscometer tubes. D.P. results obtained by the two methods were analysed and a paper entitled "Cellulose viscosity in cuprammonium and cupriethylenediamine solvents" was sent for publication.

The following important conclusions have been derived:

- (i) The two solvents viz., cuprammonium and C.E.D. are sensitive to oxygen and should, therefore, be stored under oxygen-free nitrogen atmosphere.
- (ii) The method of preparation for C.E.D. is simpler and does not require refrigeration, in general, while in the case of cuprammonium, its preparation is complicated and more time consuming.
- (iii) C.E.D. is more stable than cuprammonium under the same conditions and can be used for viscometric work without refrigeration.
- (iv) Value of cellulose viscosity (absolute) in C.E.D. and cuprammonium is not the same, but it is higher in C.E.D. solvent than in cuprammonium.
- (v) Linear-relationship has been found for specific viscosity in C.E.D. and cuprammonium solvents.
- (vi) Intrinsic viscosity values for cellulose samples are not the same in the two solvents. A linear relationship has been obtained between these values.

- (vii) The values of degree of polymerisation (D.P.) obtained by the two methods are in good agreement.

This work was done by Shri S. N. Pandey.

**39. Estimation of pectin and wax-content and their relation to fibre strength and moisture absorption:**

*(Item No. C. 3 in the Programme of Work.)*

Investigation on this problem was continued during this period and moisture-absorption was determined at different levels of humidities, viz. 85%, 75%, 65%, 55%, 45% and 35% on 14 raw as well as dewaxed cotton samples.

This work is being done by Shri S. N. Pandey.

**40. Effect of chemical treatments on the physical properties of fibres:**

*(Item No. C. 4 in the Programme of Work.)*

Chemical treatment with anhydrous ethylamine, as reported earlier, was repeated on the cotton lint and yarn (20/1 count) of Gaorani-1422 cotton. Before the treatment, samples were dewaxed, kierboiled and scoured. Both the samples were treated with anhydrous ethylamine at ice-bath temperature for 4 hours in two sets, one under the nitrogen atmosphere and another in the presence of air.

Lint sample of cotton Gaorani-1422, after chemical purifications was also treated with different concentrations of zinc chloride and lithium chloride solutions for 4 hours at 20°C.

Crystallinity and amorphous ratio of treated and control samples were studied by Iodine absorption and acid hydrolysis methods. Other chemical properties such as D.P., copper number etc. and physical properties such as strength, elongation etc. are being investigated.

This work is being done by Shri S. N. Pandey.

**41. Study of the ash and mineral contents of Indian cottons:**

*(Item No. C. 5 in the Programme of Work.)*

A paper entitled "Study on cotton ash and some of the ash constituents" has been accepted for publication in the Indian Cotton Growing Review.

This work was done by Shri S. N. Pandey.

**42. (i) Determination of the oil content of different varieties of cotton seeds:**

*(Item No. C. 6 in the Programme of Work.)*

296 cotton seed samples were tested for oil content during this year and the reports were sent to the respective breeding stations.

(ii) **Estimation of oil-content of cotton seed by different methods:**

A paper entitled "Rapid centrifuge method for the determination of oil in cotton-seeds" was communicated for publication.

(f) **MISCELLANEOUS INVESTIGATIONS****43. Reduction of neps in neppy Indian cottons:**

*(Item No. M. 1 in the Programme of Work.)*

Single plant produce (1962-63) of about 100 plants each of 134-Co.2-M, I.S.C. 67 and M.C.U.2 cottons, together with control samples representing the general crop of the year were tested for neps and other important fibre properties. Seeds of the strains selected on the basis of neppiness were sent for propagation during 1963-64 season.

This work was done by Dr. S. M. Betrabet.

**44. Study of the effects of different agronomic treatments on fibre properties:**

*(Item No. M. 2 in the Programme of Work.)*

(i) *Study of different frequencies of irrigation and manurial trials.*

The statistical analysis of the data obtained for the samples of three seasons was completed. It was found that the quantity of irrigation affected the lint-weight and the seed-weight significantly, for L.L-54 cotton. The interaction between season and quantity of irrigation was significant for the length-irregularity-percentage, the micronaire fineness and the maturity coefficient. The results are being further analysed.

(ii) *Effect of differential irrigation (Different frequencies of irrigation and intensities of irrigation).*

The draft paper entitled "The effect of nitrogen and irrigation treatments on physical properties and yield of 320-F cotton" was revised. As there was considerable differential response of the treatments in the different seasons, the effect of treatments was analysed separately for each season. It was observed:—

1. The effect of irrigation treatment was found to be significant on the mean-fibre-length (for 1958-59 season), the bundle strength (for 1957-58 and 1958-59 seasons) and the maturity coefficient (for 1957-58 and 1959-60 seasons). It was further found that medium irrigations were beneficial to these properties.
2. The response of nitrogen was significant for the lint-weight (for 1959-60 season), the mean fibre length (for 1959-60 season), and the length irregularity percentage (for 1957-58 and 1958-59 seasons). For the first two fibre properties, 60 lbs of nitrogen was advantageous, while for reducing the length-irregularity percentage, 120 lbs. of nitrogen appeared to be more suited.

3. Data on the effect of nitrogen and irrigation treatments on yield per acre showed that the medium irrigations in combination with higher rates of nitrogen could profitably be applied in respect of this property.

A detailed communication based on this study is being drafted.

*(iii) Effect of alpha-naphthalene-acetic acid:*

As mentioned in the previous Annual Report, the experiment was continued for the fourth season. During this period, the other properties such as micronaire fineness, maturity coefficient and the bundle strength (zero-gauge length) were determined on 56 samples of Desi and 320F cottons. The length-irregularity-percentage was also calculated for these samples. The statistical analysis showed that no property was significantly affected by hormone treatments in any season except 1956-57. For this season, the mean-fibre length was found to have significantly increased over the control at three levels of hormone application.

*(iv) Agronomic experiment at Sirsa:*

As stated in the previous Annual Report, the samples from 1961-62 crop of NPK trial were not received. However, 192 samples from two agronomic experiments (i) NPK trial (1962-63 season) and (ii) Entomology trial (1963-64 season), were received. These samples will be tested for fibre properties.

*(v) Samples from I. A. R. I. investigations on phosphorous fertilization of cotton by Radio-Tracer Technique.*

In the previous report, it was mentioned that mean fibre length and micronaire fineness were determined for 72 samples, belonging to 1961-62 season. During the period under review, the bundle strength at zero-gauge length was determined on these samples.

*(vi) Study of the effect of different concentrations of alpha-naphthalene-acetic acid and different time of application.*

Ninety six samples of 1963-64 season, were received from the co-ordinated agronomic scheme on cotton, Srivilliputhur (Madras). The important treatments were two concentrations of alpha naphthalene acetic acid, four times of application and six doses of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O.

Ginning percentage was determined on all the 96 samples. Mean-fibre-length and uniformity ratio were measured for 30 samples. Further work is in progress.

The above items of work are being done by Shri V. G. Munshi.

**45. Effect of change in the conditions of growth on the physical characters and spinning performances of cottons:**

*(Item No. M. 3 in the Programme of Work.)*

It had been mentioned in the last Annual Report that in order to study the place effect on the fibre properties and spinning performance of 170-Co. 2 cotton, tests were made on samples of 1961-62 season, received from five places, namely Arbhavi in Mysore State, Kopergaon, Khasapur and Niphad in Maharashtra State, and Junagadh in Gujarat State. However, the soil analysis data had not been received from four centres inspite of repeated reminders. Further, samples were received from three centres only during 1962-63 season while no sample belonging to 1963-64 season was received. The absence of samples and the agro-climatic and soil data handicaps the progress of the work. In view of the importance of the investigation further efforts will be made to elicit co-operation from the officers concerned.

This work is being done by Dr. V. Sundaram.

**46. Investigation on the microbial decomposition of cellulose with special reference to the effect of Indian bacterial organisms on cotton and cotton fabrics to provide basic information for the improvement of cotton products:**

*(Item No. M. 5 in the Programme of Work.)*

A good number of cotton and fabric samples, suspected of mildew damage, were collected from various godowns and mills in Bombay. Determination of total count of bacteria, actinomycetes, yeasts and fungi was carried out on all the cotton samples, employing various suitable media. Simultaneously, alkali solubility and copper number were determined for all these samples. Based on these data, 14 samples were selected for screening of cellulolytic microorganisms by resorting to enrichment culture methodology.

So far, five cotton samples have been screened and 11 fungal and 11 bacterial isolates encountered in the enrichments have been identified up to genus. Different physico-chemical techniques have been standardised to evaluate the cellulolytic activity of these microorganisms and such studies on the 11 bacterial isolates are under way.

As compared to the knowledge on the deterioration of cotton by fungi, little is known about the cellulolytic actinomycetes. Hence, large number of actinomycetes which were encountered while determining the total count were tested for their capacity to decompose cellulose. Taxonomic study of active isolates is in progress.

A number of commercial mildew agents available locally have been collected and a comparative systematic study, which will be of practical importance to the mills, will shortly be undertaken.



This work is being done by Dr. S. M. Betrabet with the assistance of Kumari I. G. Bhatt and Kumari U. P. Dasani.

**47. Comparative performance of three interspecific varieties of cotton:**

*(Not included in the Programme of Work.)*

The paper on the above investigation was published in the Indian Cotton Growing Review, November 1963, issue.

The work was done by Dr. V. Sundaram.

**48. Technological tests on samples effected by pests or diseases:**

*(Not included in the Programme of Work.)*

With a view to assess the extent of deterioration of quality of cottons as a result of the attack of pests or diseases, a number of samples from various localities are being collected. It is proposed to undertake tests on the affected crop, crop treated with various insecticides and also healthy crop from the neighbourhood.

This work will be done by Dr. V. Sundaram.

**B. PUBLICATIONS**

A list of the publications issued by this Laboratory during the year is given in Appendix II. Nine of these which were issued as Technological Bulletins and Leaflets are summarised below:—

**1. Technological Bulletin, Series A, No. 112.**

*Variation in counts and strength of yarn due to its position on the bobbin.*

Two hundred and thirty-one different samples of cotton were spun into seven different counts 6s, 8s, 10s, 12s, 20s, 30s and 40s, each count having 33 samples. Full doffs of 10 bobbins were prepared in each case. The entire yarn on the bobbin was exhausted for lea tests. The count and lea strength of every lea from the top to bottom was noted with its position on the bobbin. In this manner, over fourteen thousand readings for count and lea strength were collected for this investigation.

The vast data were statistically analysed and the following conclusions were drawn:

(i) The counts of yarn become finer from the top of the bobbin to its bottom in the case of all counts spun for this investigation.

(ii) The lea strength, however, decreased from the top of the bobbin to its bottom in the case of coarse counts, remained more or less constant throughout the bobbin in the case of 20s and 30s, while it increased in the case of 40s counts.

## 2. Technological Bulletin Series A, No. 113.

### *Effect of different processing treatments on the spinning quality of M.A. 5.*

In previous investigations conducted at this Laboratory, it had been observed that the mean fibre-length of many cottons tended to diminish by the time the roving was formed. This decrease was found to be very marked for those long-stapled varieties which spun much less than what could be expected out of them from a consideration of their chief fibre-properties. The alteration in length was probably due to their inability to withstand the drastic action of the blow-room and other machinery on account of their fineness and/or their low intrinsic strength as well as low maturity. Hence, an experiment was designed to investigate whether the spinning value of such cottons could not be stepped up by giving a milder treatment in the blow-room etc. than what was ordinarily adopted and also by spinning the resultant material by high-drafting methods even by employing different twist multipliers. M.A. 5 cotton was chosen in this investigation and an attempt was made to step up its yarn strength by giving a milder treatment in the blow-room and by spinning the resultant material by high drafting methods employing different twist multipliers.

Certain optimum combinations have been found which can increase the yarn-strength by upto 8%. A reduction in Crighton fan-speed, however, is found to be unnecessary in the case of those treatment combinations which yield strong yarns. There is reason to believe that a lowering of doffer speed is conducive to a higher yarn strength.

## 3. Technological Bulletin Series B, No. 86.

### *Structural properties of cotton fibres: Part II—Birefringence and structural reversals in relation to mechanical properties.*

Refractive indices  $n_{//}$  and  $n_{\perp}$ , strength at nominal zero gauge and 1/8" gauge, toughness and stiffness were determined on 20 Indian cottons representing all the species grown in India. The refractive index was determined by Becke Line method.

Average ribbon width of unconvoluted fibre was determined from Meredith's formula and convolution angles for 20 cottons were calculated therefrom. On subtracting the new values for convolution angles from the respective spiral angle values, the difference was found to be approximately constant at  $24.25^{\circ} \pm 0.37^{\circ}$ , strengthening the argument of Meredith that the spiral angle of fibrils in the originally unconvoluted fibres may be about the same irrespective of the variety of cotton. The fibre bundle strength was found to be highly correlated with the fibrillar orientation.

Birefringence and spiral angle were found to be significantly correlated with toughness and stiffness. The average number of reversals in a cotton seems to be a genetic character. Desi cottons have been found to have very few reversals in contrast to *G. hirsutum* and *G. barbadense* cottons. The overall correlation between the average distance between reversals and the cotangent of spiral angle calculated for a cell breadth of  $24\mu$  was 0.60. This correlation vastly improved to 0.88 on excluding the *G. arboreum indicum* cottons. This peculiar behaviour of *indicum* cottons is explained on the basis of their perimeter and number of reversals. The high correlation between the two entities showed that their relationship is akin to the one found in wood tracheides and bamboo fibres as observed by Meredith.

**4. Technological Bulletin, Series B, No. 87.**

*Metric skein breaking strength of yarns numbered in French counts.*

With the adoption of the metric system in India, it has become necessary to metricise the testing procedures used for evaluating yarn linear density and skein breaking strength. The advantages of using the Tex system for this purpose have been pointed out. However, as the Government of India have issued orders for the adoption of the French Count by the Cotton Textile Industry for designating yarn number, a new measure of yarn quality, namely, F.S.P. or the product of French Count and the metric skein breaking strength in Kilograms, has been proposed in this note and has been shown by analysis of the data on 90 samples of yarn, ranging from  $10^S$  to  $80^S$  English Cotton Counts, that F.S.P. is nearly equal to half the count strength product (C.S.P.), which is the current measure of yarn quality. A regression equation for calculating F.S.P. from C.S.P. has also been derived.

**5. Technological Bulletin, Series B, No. 88.**

*A comparative study of the visual assessment of yarn irregularity with the Uster Evenness test results.*

The results of visual assessment of yarn irregularity are compared with measurements obtained with the Uster Evenness Tester. A large number of samples of 20s, 30s and 40s carded yarns were evaluated for evenness by the Technological Laboratory method, which consists in visually examining the yarn and allotting it a number, known as the Evenness class. The irregularity of each of the yarns was then determined by the Evenness Tester. It is observed that although the mean value of Uster irregularity increases with the evenness class, there is a considerable overlap of irregularity values between adjacent evenness classes which shows the limitations present in visual assessment of yarn irregularity, especially when no reference standards are used and when the test is stretched over a long period of time. On the basis of the results, the yarns were graded into four quality classes and standard values of Uster irregularity for each class were drawn up.

## 6. Technological Bulletin, Series B, No. 89.

### *Contribution to the study of the B-L Curve of cotton yarns.*

For the worsted system of processing, Grosberg has developed an equation which makes possible the derivation of the variance-length curve of a yarn from the total variance of each of the slivers made during the manufacture of the yarn. The present study is an attempt to evaluate the suitability of this equation for cotton processing. For this purpose, two cottons were spun to 40s and one to 30s using the orthodox system of processing consisting of 3 speed frame passages. The irregularity of the material at different stages of processing was determined with the Uster evenness tester, and the B-L curve of the yarn was deduced using Grosberg's equation. The actual B-L curve of the yarn was also determined with the evenness tester by the "inert test" method. On plotting the results it is found that there is considerable discrepancy between theory and experiment—the predicted curve is seen to be too high in every case. The reasons for this discrepancy are discussed. A preliminary study on two yarn samples showed that there is good agreement between the B-L curves obtained by the Uster evenness tester and the cut-and-weigh method. The log B(L)—log L plot is found to be fairly linear, except for short lengths, for cotton yarns.

## 7. Technological Leaflet No. 74.

### *Comparative performance of three interspecific varieties of cotton.*

The black-arm and jassid resistant *inter se* derivative strain, I.S.C. 67, is being tried for the replacement of the existing strains, 170-Co. 2 and 134-Co. 2-M, which are being grown extensively in Gujarat State. To study the relative performance of I.S.C. 67, 170-Co. 2 and 134-Co. 2-M the test results on samples (i) of these cottons grown in eight localities in Gujarat and three in Maharashtra during the season 1959-60 and (ii) of 170-Co. 2 and I.S.C. 67 grown in five localities during three seasons, have been analysed. It was observed that I.S.C. 67 and 134-Co. 2-M have nearly the same fibre properties, but I.S.C. 67 is superior on account of its higher yield and ginning percentage, and lower processing loss. Hence, I.S.C. 67 can profitably replace 134-Co. 2-M.

The superiority of I.S.C. 67 over 170-Co. 2 in respect of mean fibre length and fibre fineness is not reflected in its spinning performance, probably due to its higher percentage of short fibres and immaturity as shown by its higher processing loss. Further 170-Co. 2 has a higher ginning percentage. In addition to this, the samples grown in different localities exhibited a greater variation in fibre properties and spinning performance in the case of I.S.C. 67 than in the case of 170-Co. 2. It is suggested that further trials will be necessary to improve these characteristics of I.S.C. 67 before it is released for large scale cultivation.

**8. Technological Leaflet No. 75.***Influence of draft distribution on irregularity.*

The effect of draft distribution between the slubber and intermediate frames on the irregularity of the intermediate roving was studied at two different levels of total drafts. At the lower total draft, the draft distribution did not have a significant effect on regularity and at the higher total draft the effect was just significant. The results indicate that, provided the individual drafts were kept within reasonable limits, the draft distribution could be varied over a fairly wide range without causing any adverse effect on the uniformity of the final product.

**9. Technological Leaflet No. 76.***An evaluation of the performance of Port-Ar instrument with respect to the Micronaire instrument for the measurement of fibre fineness.*

The performance of the *Port-Ar* instrument was compared with that of the Micronaire instrument by testing 21 cottons covering wide range of micronaire fineness. It was observed from this study under the identical conditions of testing using bow-opened samples that (1) the values obtained by the *Port-Ar* and Micronaire are subject to errors of the same order, (2) a high correlation of  $+0.98$  exists between the values determined by these instruments and (3) the *Port-Ar* values are on an average slightly higher than the Micronaire values. The effect of sample opening on the *Port-Ar* values was also investigated, and it was found that, as expected, the hand opened samples recorded a higher value than the corresponding bow opened samples.

#### IV. MISCELLANEOUS

##### (i) Visitors.

Among the distinguished persons who visited this Laboratory during the year under review, mention may be made of the following:—

1. Mr. T. L. W. Bailey, F.A.S. Cotton Division, U.S. Department of Agriculture, Washington D.C.
2. Mr. Robert B. Evans, Agricultural Officer, U.S. Department of Agriculture, American Consulate-General, India, Bombay.
3. Dr. Alvin D. Ayers, Agricultural Research Service, U.S. Department of Agriculture, American Embassy, New Delhi.
4. Mr. E. F. St. Clair, Agricultural Research Service, U.S. Department of Agriculture, Washington D.C.
5. Dr. S. C. Gupta, Agricultural Research Service, U.S. Department of Agriculture, American Embassy, New Delhi.
6. Chief Akin Deko, U.N. F.A.O. Regional Representative for Africa, Accra.
7. Shri A. V. Venkateswaran, Joint Secretary to Government of India, Ministry of Industry, New Delhi.
8. Mr. Ali El Khalifa, F.A.O. Trainee, Republic of Sudan, Ministry of Commerce, Khartoum.
9. Mr. Siddig Karrar, F.A.O. Trainee, Republic of Sudan, Ministry of Commerce and Industry, Sudan.
10. Mr. A. H. Sparige, F.A.O. Trainee, Republic of Somalia, Ministry of Agriculture and Animal Husbandry.

As usual, a large number of students from various Technological Institutions also visited this Laboratory.

##### (ii) Membership of Committees etc.

Dr. R. L. N. Iyengar, Director, has been appointed as (1) Chairman of Textile Standards Sectional Committee TDC I, (2) Convenor of Sub-committee for ISO work, TDC 1 : 8 and (3) Representative of India-Member-Body on ISO Working Group ISO/TC38/SC6/WGI-Cotton Fibre Tests, of the Indian Standards Institution.

Dr. V. Sundaram, Senior Scientific Officer, was nominated as a member of the Sub-committee for Definitions of Textile Terms relating to Natural Fibres TDC 1 : 19 and as alternate member to Dr. R. L. N. Iyengar in the Sub-Committee TDC 1 : 8 of the Indian Standards Institution.

**(iii) University Recognition and Awards**

Dr. R. L. N. Iyengar, Director, continued to be the recognised University teacher for guiding students registered at this Laboratory for the M.Sc. and Ph.D. degrees, in Textile Physics by research.

Dr. V. Sundaram, Senior Scientific Officer, and Shri Harirao Navkal, Retired Senior Research Officer continued to be the recognised University teachers for guiding students registered at this Laboratory for the M.Sc. degree in Textile Physics by research.

**(iv) Appointments**

The following appointments were made during the year:—

Name	Designation	Date of Appointment
Kum. S. B. Karnik	Technical Assistant*	10- 6-1963
„ U. P. Dasani	Microbiologist*	1- 7-1963
Shri K. R. Chandran	Lower Division Clerk*	5- 8-1963
„ B. R. Rao	Research Assistant (Workshop)	14-11-1963
„ Y. A. Shetty	Senior Research Assistant (Spinning)	18-11-1963
„ B. Manamohanan	Research Assistant	18-12-1963
„ C. N. Kartha	Librarian	21-12-1963
Kum. I. K. P. Iyer	Research Assistant	23- 1-1964
Smt. S. D. Pai	-do-	17 -2-1964
Shri P. A. Menoky	Upper Division Clerk	24- 2-1964
„ C. M. N. Nair	Lower Division Clerk	2- 3-1964
„ P. V. Thomas	Stencographer Grade I	9- 3-1964
„ J. P. Mishra	Lower Division Clerk	1- 4-1964
„ F. C. Fernandes	Cashier	10- 4-1964
Kum. G. D'sa	Lower Division Clerk*	27- 4-1964
„ T. T. Annamma	Research Assistant	29- 4-1964
Shri P. B. Gutjar	Draughtsman	4- 5-1964

\* Under P.L. 480 Project.

Shri R. D. Patwardhan, Upper Division Clerk was appointed to the upgraded post of Assistant with effect from the 1st April, 1964.

Sarvashri V. Venugopalan, N. Thejappa, K. M. George, Junior Assistants (Testing) were appointed to the upgraded posts of Research Assistants with effect from the 1st September, 1963.

Shri K. M. Vijayaraghavan, Jr. Assistant (Testing) was appointed to the upgraded post of Research Assistant with effect from the 1st October, 1963.

Sarvashri K. V. Babu and R. G. Parekh, Junior Assistants (Testing) were appointed to the upgraded posts of Research Assistants with effect from the 1st December, 1963.

One post each of Watchman and Hamal-cum-sweeper was created from 1st April, 1964 in view of the construction of an additional building of the Laboratory.

One post each of Upper Division Clerk and Lower Division Clerk was created in view of the transfer of administrative and technical control of the Technological Assistants stationed at various centres to the Director, Technological Laboratory.

Research Assistants Shri P. D. Vakil and Shri C. A. S. Aiyar were promoted to the posts of Senior Research Assistants with effect from the 24th December, 1963 and the 15th April, 1964, respectively.

#### (v) Retirement and Resignations

Among the Junior Staff, resignations were received from the following members which were accepted with effect from the dates indicated against their names:—

Name	Designation of post held	Resignation accepted from
1. Shri A. H. Sawant	Lower Division Clerk.*	16- 7-1963
2. „ S. A. Shankaranarayanan	Senior Research Assistant (Spinning)	1-10-1963
3. „ H. M. Basu	Research Asstt. (Spinning)	14-12-1963
4. „ C. M. Krishnan	Stenographer Grade I	1- 2-1964
5. „ K. R. Chandran	Lower Division Clerk*	15- 2-1964@
6. „ V. D. Ponkshe	Stenographer Grade II	15- 2-1964
7. „ H. Gopalakrishnan	Lower Division Clerk	1- 3-1964
8. „ B. Manamohanam	Research Asstt.	1- 5-1964
9. „ M. S. Sawant	-do-	23- 5-1964

@ Services terminated.

\* Staff under P.L. 480 Project.



Shri C. V. Raman, Research Assistant, was transferred to the post of Research Assistant (Technological) in the scheme for production of extra long staple cotton at Srivilliputhur from the 23rd February, 1964.

Shri H. R. Nayak, Senior Research Assistant, having attained the age of 60 years retired from the services of the Committee with effect from the 24th December, 1963.

Shri K. S. Marar, Senior Research Assistant, was granted leave preparatory to retirement for 61 days from the 15th April, 1964 till he attains the age of 60 years on the 15th June, 1964.

Shri L. R. Surti, Cashier, was transferred to the Secretary's office as Accountant with effect from the 10th April, 1964.

**(vi) Leave**

Dr. R. L. N. Iyengar, Director, proceeded on earned leave for 41 days from 11th May, 1964 to 20th June, 1964.

Dr. V. Sundaram, Senior Scientific Officer, proceeded on earned leave for 26 days from 13th May, 1963 to 7th June, 1963.

Shri Jai Prakash, Senior Scientific Officer, proceeded on earned leave for 31 days from 6th August, 1963 to 30th August, 1963 and from 23rd September, 1963 to 28th September, 1963.

Dr. S. M. Betrabet, Senior Scientific Officer, proceeded on earned leave for 40 days from 21st April, 1964 to 30th May, 1964.

Shri J. F. Quodras, Administrative Officer, proceeded on earned leave for 40 days from 18th May, 1964 to 26th June, 1964.

Shri V. G. Munshi, Junior Scientific Officer, proceeded on earned leave for 23 days from 9th December, 1963 to 31st December, 1963.

Shri G. S. Rajaraman, Junior Scientific Officer, proceeded on earned leave for 34 days from 23rd March, 1964 to 25th April, 1964.

**(vii) Training**

Shri Jai Prakash, Senior Scientific Officer, who was selected for a Fellowship under the Colombo Plan for advanced training in U.K. left India on the 28th September, 1963 afternoon.

The training of Dr. S. M. Betrabet, Senior Scientific Officer in the U.K. under the Colombo Plan, in Textile Microscopy and Microbiology has been postponed to 1964-65.

Shri V. G. Munshi, Junior Scientific Officer, who was deputed for training in Electronics Instrumentation at the Central Electronics Engineering Research Institute, Pilani (Rajasthan) reported for duty at this Laboratory on the 19th October, 1963, after completing the six months' course.

**(viii) Short Course in Cotton Technology**

The following were selected for training in the elements of spinning and methods of testing fibres, yarn and cloth and application of statistical methods for a period of six months commencing from the 8th July, 1963:—

Shri K. A. Narayana Ayyar	M/s Standard Mills, Bombay.
„ Rasiklal Ravilal Shah	M/s Gill & Co., (Pvt.) Ltd., Bombay.
„ Manu Parialkar	M/s Khatau Makanji Spg. & Wvg. Co.. Ltd., Bombay.
„ Veeranna Chigateri	M/s Sree Sankara Textile Mills Ltd., Devangere.
„ Nandlal Bhimrajka	M/s Rajasthan Spg. & Wvg. Mills Ltd., Bhilwara, (Rajasthan).
„ P. P. Bharucha	M/s Empire Dyeing & Mfg. Co., Bombay.

The above six months' training course has been modified to make it more suitable for persons employed in the cotton trade or in co-operative marketing societies with effect from the year, 1964.

**(ix) Conference and Symposium**

A paper on 'Structural properties of cotton fibres—Part IV—Secondary cell wall deposition in relation to convolution angle, birefringence structural reversals and tensile strength' by Dr. S. M. Betrabet, G. G. Phadnis and Dr. R. L. N. Iyengar was submitted to the 5th Joint Technological Conference held at Coimbatore from 5th to 7th December, 1963. Dr. Betrabet presented the paper at the Conference.

A paper 'Role of Technological Laboratory of the Indian Central Cotton Committee in testing and evaluation of cotton and other textile materials in the context of the development of the country' by Dr. R. L. N. Iyengar and Dr. V. Sundaram was submitted to the symposium on "Testing and Evaluation of Materials" sponsored by the Government Testing House, Calcutta from 21st to 23rd March, 1964. However, as the dates synchronised with those of the meeting of the Indian Central Cotton Committee, no one could attend the symposium.

**(x) P. L. 480 Projects**

The first project, "Investigation of the microbial decomposition of cellulose with special reference to the effect of Indian bacterial organisms on cotton and cotton fabrics, to provide basic information for the improvement of cotton products"

came into effect from the 3rd January, 1963 and is progressing satisfactorily. The 3rd fiscal report for the period ending the 30th April, 1964 and the Annual Progress Report for the period ending the 31st March, 1964 were submitted to the United States Department of Agriculture, Agriculture Research Service, in accordance with the terms of the agreement.

The second project "Investigation of the preparation of radioresistant and radio-sensitive celluloses to obtain basic information on the chemistry of cotton cellulose" has been accepted by the Government of India. The grant agreement was signed on the 25th April, 1964.

The third project "Effects of high energy radiation on the induction and half-life of excited, free and/or ionised radicals in cotton cellulose" is still under consideration of the Government of India.

#### (xi) Laboratory Equipment

Additions to the Laboratory equipment during the period under review are given below :—

- 1) 'ADCO' Vertical Autoclave electrically operated
- 2) 'Express' Arnolds English made portable High Pressure sterilizer
- 3) New Blow room machinery for expansion and modernisation comprising of the following :—

S. R. R.L. Opener, Shirley Opener, Air stream cleaner, Single scutcher and Lap machine, Waste collector unit, and Northmoor Rotary Filter Units along with hopper machines, pipe lines and essential accessories.

#### (xii) Instruments fabricated

The following instruments were fabricated locally, tested and supplied during the period.

(1) Laboratory Model Gins .....	7
(2) Draw-box .....	1
(3) Halo Length discs .....	74

#### (xiii) Library

The number of books in the Library at the beginning of the year was 1797. During this year 62 books were added bringing the total to 1859. The number of bound volumes at the end of the year was 1709. This Laboratory was getting 80 important scientific journals dealing with the textile and allied subjects. Of these 60 were subscribed, while the other 20 were on exchange or free basis.

**(xiv) Staff Research Council**

Four meetings of the Staff Research Council were held during the period. The programme of work of the Laboratory, the progress made on the various investigations in hand and the Annual Report of the Director were discussed.

**(xv) Establishment**

The scales of pay of the Senior Scientific Officers have been further revised and upgraded to Rs. 700-50-1250 with effect from the 20th April, 1964.

The administrative and technical control of the Technological Assistants located in various centres has been vested in the Director of the Technological Laboratory with effect from the 1st April, 1964.

**(xvi) Expansion and Modernisation Programme**

The new block of the Technological Laboratory constructed at a cost of about Rs. 3½ lakhs, was opened by Shri A. D. Pandit, President, Indian Central Cotton Committee, on Wednesday, the 18th March, 1964. The Government of India have been requested to expedite their sanction for the necessary foreign exchange to provide controlled atmosphere for the testing section. Most of the new machinery for the blow room has arrived and arrangements are being made to install the same.

**ACKNOWLEDGEMENT**

I take this opportunity to express my gratitude and deep indebtedness to the office-bearers of the Indian Central Cotton Committee for their keen interest in the work of the Laboratory and for the valuable suggestions thereon. My grateful thanks are due to the East India Cotton Association Ltd., Bombay, and their Sworn Surveyors for kindly grading a large number of experimental, trade, standard and technological samples of cotton and also for their kind co-operation in supplying the samples of different grades and their data. My thanks are also due to the authorities of the mills who conducted the mill tests.

I also wish to place on record my sincere thanks to the technical and administrative staff of the Laboratory for their willing and loyal co-operation, without which the work described in the present report could not have been accomplished.

R. L. N. IYENGAR.

## APPENDIX I

### TECHNICAL SUMMARY

This report gives an account of the work carried out at the Laboratory during the year 1963-64. Good progress has been recorded in the various activities, as will be seen from the report, a summary of which is given below:—

#### A. TESTS MADE AT THE LABORATORY

The total number of samples received for all types of tests during the year was 5,761 as against 5,103 during the previous year. As already observed in the last report, this figure is round about the normal number that can be expected to be handled annually. The number of samples tested during the year was 5,261 against 5,037 last year.

#### B. TESTS FOR THE STATE AGRICULTURAL DEPARTMENTS

The total number of samples received for various types of tests from the Agricultural Departments of various States was 3,005 as against 3,069 last year. The reports on the test results evaluating the quality of new strains proved to be of great utility to the cotton breeders in selection work. Some of them belonged to the improved varieties under various stages of multiplication. A few items of special interest are summarised below:—

1. Samples of 394-3, 597-B, 797 and Kalyan grown in different places of Gujarat were received and tested. The average performance indicated that 597-B was better than Kalyan in spinning performance while 797 from some of the places only had recorded good performance.

2. The samples of I.S.C. 67, Devitej and Deviraj grown in experimental trials at several stations in Gujarat were received for tests. It was observed that both I.S.C. 67 and Devitej were longer in staple than Deviraj but all the three were almost of the same spinning value.

3. A number of samples received from the cotton breeders, Parbhani were tested. Eight strains viz. 97-41, 97-46, 97-63, 97-120, 97-187, 113-93, 113-128 and 113-181 were found to have staple length more than 1.15" and were spinnable into 40<sup>s</sup> and above.

4. Mill tests were arranged to be carried out on 30 samples of improved varieties (including the controls) received from various States and reports thereon were sent to the concerned officers.

5. Results of tests on samples of extra long staple varieties 1.1/16" and above belonging to the 1962-63 season received for tests are given in this report for the benefit of the cotton breeders.

### C. TESTS FOR THE COTTON TRADE AND THE TEXTILE INDUSTRY

Technological bulletins on trade varieties of fair average quality and on standard cottons raised in the experimental stations were published for general information. Technological Circulars on the trade varieties were issued as soon as tests were completed. These publications proved very useful to the cotton trade and industry.

The Testing House of the Laboratory received 1,524 samples for various types of tests during the year against 1,725 last year. Tests on some of these were of a special nature, details of which are referred to in the main report.

### D. RESEARCH INVESTIGATIONS

Substantial progress was recorded during the year in most of the items of research work. Progress on each item is very briefly dealt with below:—

1. Two cottons A-51-9 and Garo Hills were obtained for conducting pre-cleaning and ginning tests on them. These will be tested as soon as the ginning machinery is installed in its new premises.

2. It was decided at the last meeting of the Indian Central Cotton Committee held in March, 1964 that further work on the economic and technical survey of the existing gins in India might be done by the Director of Economic Research and Statistics of the Committee.

3. Fabrication of the extractor was continued and good progress has been made.

4. A paper based on the results of the investigation carried out on the work of pulling of the fibre from seed in relation to fibre properties and percentage of seed-coat removal, was published in the Textile Research Journal, May 1964 issue.

5. A paper entitled "The variation of the bundle strength at different regions of a cotton seed" has been accepted for the publication in the Indian Cotton Growing Review.

6. A paper entitled "Structural properties of cotton fibres: Part IV—Secondary cell wall deposition in relation to convolution angle, birefringence, structural reversals and tensile strength" was presented at the Fifth Technological Conference held at South India Textile Research Association, Coimbatore.

7. A comprehensive project to study the effect of water stress and manuring on the fibre development of Indo-American cotton I.S.C. 67 and improved *herbaceum* strain 199 has been planned in collaboration with Shri P. S. Pandya, Cotton Specialist, Gujarat State. The samples of the first season were received for tests.

8. During the period under review study was made on samples from bolls of different ages of Laxmi cotton for three seasons (1959-60, 1960-61 and 1961-62) for

ash per cent, ash alkalinity, percentage of crystalline and amorphous cellulose and water soluble matter. Further work on cellulose content and other constituents is in progress. Fibre maturity and fibre strength are also being studied on the above samples.

9. In connection with the study of properties of fibres from different regions of seed, the results of all tests (X-ray angle, bundle strength, maturity and D. P.) of the 22 samples taken for study were being analysed.

10. X-ray angle was determined for a few more samples relating to the investigation on the relationship between X-ray angle and rigidity. The results of tests for fibre rigidity, X-ray angle and fibre weight per unit length in the case of all 17 samples tested so far were analysed.

11. In connection with the inheritance of X-ray angle, a large number of parent strains received from Dr. Santhanam, Head of PIRRCOM., Coimbatore were tested for bundle strength and three strains (namely, Bobdel, Cabal T. 11 and Delfos 531C) were chosen as suitable parents. About 150 single plant selections from these three strains were received and tested for bundle strength. On the basis of these tests, three plants from each variety have been selected for effecting crosses for further study.

12. In connection with the study of structural properties by optical methods a paper entitled "Structural properties of cotton fibres: Part III-Interspecies relationship between convolution angle and strength" was published in the January 1964 issue of Textile Research Journal. Another paper entitled "Structural properties of cotton fibres: Part II-Birefringence and structural reversals in relation to mechanical properties" which was published in the September, 1963 issue of Textile Research Journal was re-issued as a Technological Bulletin Series B, No. 86. One more paper entitled "Birefringence, density and tensile characteristics of oxycelluloses" was also communicated for publication.

Investigations on the effect of alkalis on the swelling behaviour of raw and delignified bast fibres was in progress.

13. The approval of Government of India for the proposals put up in connection with a P. L. 480 project on the "Investigation of the preparation of radio-resistant and radio-sensitive celluloses to obtain basic information on the chemistry of cotton cellulose" has been received. Work on the project will be taken up after the necessary funds are released to the Indian Central Cotton Committee and after the receipt of Government sanction for appointment of the staff required for project work. A second project entitled "The effect of high energy radiation on the induction and half life of excited, free and/or, ionised radicals in cotton cellulose" is being revised in consultation with the authorities of the U.S. Department of Agriculture.

14. The detailed analysis of results on 80 samples was being carried out in connection with the study of the comparison of different methods of measuring fibre maturity.

15. The determination of mean fibre weight by counting method was completed on samples of 46 coarse cottons in connection with the investigation to ascertain whether separate Micronaire scales are necessary for different botanical species.

16. From the measurements of refractive indices and birefringence carried out on 10 samples, mercerised slack with 20 % NaOH and mercerised at five stretches namely 92 %, 96 %, 100 %, 104 % and 108 %, it was observed that compared to the unmercerised sample, the birefringence values decreased considerably on slack mercerisation and increased steadily with each progressive stretch.

17. In connection with the studies of the effect of storage, the reflectance percentage and degree of yellowness of the 16 samples stored in two lots, one in conditioned and another in unconditioned room, were determined after the monsoon and tests for fibre length and fibre length irregularity were also carried out.

18. For the preparation of the Colour-Charts for Indian Grade Standards, efforts were made to obtain the necessary samples from the East Indian Cotton Association Limited. About 77 samples have been received so far and have been tested. It is hoped that the required remaining samples would be received shortly.

19. A paper embodying the results of the investigation on the evaluation of the performance of the Port-Ar instrument was published in the Indian Cotton Growing Review, January 1964 issue.

20. The contrast ratio (lustre) was determined for a few more foreign cottons in the raw state and the results of tests on cotton lint, both in the mercerised and unmercerised states were under analysis. The standardisation of the lustre meter for yarn was carried out.

21. In connection with the study of the cotton roving strength in relation of fibre properties, further work was carried out regarding the effect of storage, hank number and relative humidity on the minimum twist of cohesion of the rovings.

22. For studying the relationship of fibre properties and the spinning value on tract-wise basis, the available data have been sorted out for selected regions. Regression equations have been worked out for some tracts, where sufficient data were available. Further data are being collected for other regions.

23. In connection with the upgrading of cotton by double roving and high draft in relation to fibre properties, it was observed that in the case of 46 samples spun to 34s count, 215 samples spun to 40s count, 156 samples spun to 44s count and 75 samples spun to 50s count, the correlation between the percentage difference in C.S.P. and fibre length was highly significant. The relationships between percentage



increase in C.S.P. and other fibre properties were not found to be consistent in all the cases.

24. No progress could be made in the investigation for the determination of the extent of immaturity that could be tolerated in long staple cottons with reference to their final spinning performance and nep potentiality as the required samples have not been received inspite of repeated requests and reminders to the Cotton Specialists and Breeders in various States.

25. A paper entitled "A comparative study of the visual assessment of yarn irregularity with Uster Evenness Test results" was published in the Indian Cotton Growing Review in March, 1964.

26. A paper embodying the results of the investigation on the effect of distribution of draft in the speed frames and change of draft in the ring frame on evenness of the product was published in the Indian Textile Journal, January 1964.

27. A paper on the variance length curve studies was published in the Textile Research Journal, September 1963 issue and reprinted in the Indian Cotton Growing Review in May, 1964.

28. Experiments on the patented miniature spinning plant for the fabrication of a miniature spinning frame were in progress.

29. A paper entitled the "Variation in counts and strength of yarn due to its position on the bobbin" was published in the Indian Cotton Growing Review, July 1963 issue.

30. In connection with the preliminary study of the characteristic curve connecting count and C. S.P., four cotton samples, one each of Digvijay (Broach), Laxmi (Gadag), Parbhani American-1. (Adilabad) and M.A.5 (Arsikere) were spun into different counts. The yarn samples were under tests.

31. A paper entitled "Effect of different processing treatments on the spinning quality of M.A.5" was published in the Indian Cotton Growing Review, September 1963 issue.

32. The results of the investigation on skein strength of the yarn in the metric system were published in a paper entitled "Skein breaking load of cotton yarns numbered in French Counts" in Indian Standards Institution Bulletin, February, 1964.

33. In order to study the relationship between single thread strength measured at 500 mm. test length and at 12" test length on a constant rate of traverse machine, regression equations were worked out to predict the strength of the yarns at 500 mms. test length from the values obtained using 12" test length.

34. To study the variation in yarn strength with relative humidity, the metric skein strength of 36 samples of yarn were determined at relative humidities of 75% and 85% also in addition to 35%, 45%, 55% and 65% R. H. already carried out. Tests for single strand strength of these yarns at the various humidity levels were in progress.

35. The work on evaluation of D. P. values of Indian cottons by different methods was continued during this period and D. P. tests were made on six cotton samples by cuprammonium solvent method, using X-type viscometer tubes and C.D. solvent using Cannon-Fenske viscometer tubes. A paper entitled "Cellulose viscosity in cuprammonium and cupriethylene-diamine solvents" was sent for publication.

36. The investigation on the effect of chemical treatments on the physical properties of fibres was continued.

37. A paper entitled "Study on cotton ash and some of the ash constituents" has been accepted for publication in the Indian Cotton Growing Review.

38. 296 cotton seed samples were tested for oil content during this year and the reports were sent to the respective breeding stations. A paper entitled "Rapid centrifuge method for the determination of oil in cotton-seeds" was communicated for publication.

39. In connection with the investigations on reduction of neps in neppy Indian cottons, single plant produce (1962-63) of 134-Co.2-M, I.S.C. 67 and M.C.U. 2 cottons, together with control samples representing the general crop of the year were tested for neps and other important fibre properties and seeds of the strains selected on the basis of low neppiness were sent for propagation during 1963-64 season.

40. The study of the effects of different agronomic treatments such as different frequencies of irrigation, intensities of irrigation, manurial treatments, applications of alpha-naphthalene-acetic-acid and suitable times of application was continued.

41. Determinations of total count of bacteria, actinomycetes, yeasts and fungi and of alkali solubility and copper number were carried out on all the cotton and fabric samples, suspected of mildew damage, collected from various godowns and mills in Bombay. Based on these data, 14 samples were selected for screening of cellulolytic microorganisms by resorting to enrichment culture methodology. Taxonomic study of active isolates is in progress.

42. A paper on the comparative performance of three interspecific varieties of cotton was published in the Indian Cotton Growing Review November, 1963 issue.

43. With a view to assess the extent of deterioration of quality of cottons as a result of the attack of pests or diseases, a number of samples from various localities were being collected. It is proposed to undertake tests on the affected crop, crop treated with various insecticides and also healthy crop from the neighbourhood.

## APPENDIX II

### LIST OF PUBLICATIONS

#### (A) Technological Bulletins:

- 1 (1) Series A. No. 112, 'Variation in counts and strength of yarn due to its position on the bobbin' by V. V. Gupte, V. Venkataraman, H. B. Joshi and R. L. N. Iyengar. (Reprinted from I.C.G.R.\* Vol. XVII, No. 4, July, 1963).
- 2 (2) Series A. No. 113, 'Effect of different processing treatments on the spinning quality of M.A. 5' by Harirao Navkal, V. V. Gupte and R. L. N. Iyengar. (Reprinted from I.C.G.R., Vol. XVII, No. 5, September, 1963).
- (3) Series A. No. 114, 'Technological Reports on Trade Varieties of Indian Cottons 1963', by R. L. N. Iyengar.
- (4) Series A. No. 115, 'Technological Reports on Standard Indian Cottons 1963' by R. L. N. Iyengar.
- 3 (5) Series B. No. 86, 'Structural properties of cotton fibres, Part II—Birefringence and structural reversals in relation to mechanical properties' by S. M. Betrabet, K. P. R. Pillai and R. L. N. Iyengar. (Reprinted from Proceedings of the 4th Technological Conference held in December, 1962, jointly sponsored by ATIRA, BTRA and SITRA).
- 4 (6) Series B. No. 87, 'Skein breaking load of cotton yarn numbered in French counts' by R. L. N. Iyengar and V. Sundaram (I.S.I. Bulletin February, 1964).
- 5 (7) Series B. No. 88 'A comparative study of the visual assessment of yarn irregularity with the Uster evenness test results' by N. Balasubramanian, V. V. Gupte and R. L. N. Iyengar. (Reprinted from I.C.G.R., Vol. XVIII, No. 2, March, 1964).
- 6 (8) Series B. No. 89, 'Contribution to the study of B.—L. curve of cotton yarns' by N. Balasubramanian. (Reprinted from I.C.G.R., Vol., XVII, No. 3, May, 1964).

#### (B) Technological Leaflets:

- 7 (1) Leaflet No. 74—'Comparative performance of three interspecific varieties of cotton' by V. Sundaram and R. L. N. Iyengar. (Reprinted from I.C.G.R., Vol. XVII, No. 6, November, 1963).

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\* I.C.G.R. refers to 'Indian Cotton Growing Review' a bimonthly publication of the Indian Central Cotton Committee.

- 8 (2) Leaflet No. 75—'Influence of draft distribution on irregularity' by N. Balasubramanian. (Reprinted from Indian Textile Journal, Bombay, January, 1964).
- 9 (3) Leaflet No. 76—'An evaluation of performance of *Port-Ar* instrument with respect to the Micronaire instrument for the measurement of fibre fineness' by V. Sundaram and K. N. Seshan. (Reprinted from I.C.G.R., Vol. XVIII, No. 1, January 1964).

**(C) Articles and Papers:**

**(a) Published:**

- (1) 'Structural properties of cotton fibres: Part III, Interspecies relationship between convolution angle and strength' by S. M. Betrabet and R. L. N. Iyengar. (Textile Research Journal, U.S.A. January, 1964).
- (2) 'A simple explanation for the formation of reversals in a cotton fibre' by R. L. N. Iyengar (Textile Research Journal, U.S.A., April 1964).
- (3) 'Work done in pulling fibres from the cotton seed under impact conditions in relation to fibre properties and ginning behaviour' by Jai Prakash and R. L. N. Iyengar (Textile Research Journal, U.S.A., May 1964).

**(b) Sent for Publication:**

- (1) 'Role of Technological-Laboratory of Indian Central Cotton Committee in testing and evaluation of cotton and other textile materials in the context of the development of the country', by R. L. N. Iyengar and V. Sundaram.
- (2) 'Cellulose viscosity in cuprammonium and cupriethylene-diamine solvents', by S. N. Pandey.
- (3) 'Rapid centrifuge method for determination of oil in cotton seeds' by S. N. Pandey and Miss I. G. Bhatt.
- (4) 'Study of wax content of cotton fibres from different regions of the seed' by S. N. Pandey.
- (5) 'Structural properties of cotton fibres, Part IV—Secondary cell wall deposition in relation to convolution angle, birefringence, structural reversals and tensile strength' by S. M. Betrabet, G. G. Phadnis and R. L. N. Iyengar.
- (6) 'Study of cotton ash and some of the ash constituents' by S. N. Pandey.
- (7) 'Examination and standardisation of the test methods for the evaluation of fibre properties of cotton fibres for an effective quality control programme' by Jai Prakash and R. L. N. Iyengar.

- (8) 'Methods of measuring the staple length of cotton' by R. L. N. Iyengar.
- (9) 'The variation of bundle strength at different regions of cotton seeds' by V. G. Munshi and R. L. N. Iyengar.
- (10) 'Birefringence, density and tensile characteristics of oxycelluloses' by S. M. Betrabet, E. H. Daruwalla, V. G. Munshi and C. J. Jacob.
- (11) 'Relationship between yarn irregularity, draft and fibre properties' by N. Balasubramanian and R. L. N. Iyengar.
- (12) 'Evaluation of length parameters obtained with Digital Fibrograph with special reference to length non-uniformity' by Jai Prakash.

**(D) Publicity Note:**

- (1) 'Technological Laboratory—Forty years of progress' by R. L. N. Iyengar.

**(E) Technological Circulars:**

<i>Technological Circular No.</i>	<i>Variety</i>	<i>Fibre and Spinning test Report No.</i>	<i>Month of publication</i>
<b>1962-63 Season</b>			
1319	Bengal Deshi (Rajasthan)	7247	June, 1963
1320	Jarila (Moglai)	7253	"
1321	Wagad (Saurashtra)	7257	"
1322	Kalyan (Viramgam)	7258	"
1323	Vijalpa (Navsari)	7259	"
1324	P. A. 320 F	7260	"
1325	Laxmi (Gadag)	7261	"
1326	A. K. 235	7262	"
1327	Virnar (West Khandesh)	7263	"
1328	Nandyal-14	7268	"
1329	Comillas—Assam	7271	"
1330	Kalyan (Saurashtra)	7272	"
1331	A. K. 277	7273	"
1332	Digvijay (Kapadvanj)	7274	"
1333	Maljari	7304	July, 1963
1334	Westerns (Adoni)	7305	"
1335	A. R. B. P. -52	7307	"
1336	Digvijay (Petlad)	7308	"

<i>Techno- logical Circular No.</i>	<i>Variety</i>	<i>Fibre and Spinning test Report No.</i>	<i>Month of publication</i>
<b>1962-63 Season—(contd.)</b>			
1337	L. 147 (Achalpur)	7319	July 1963
1338	L. 147 (Pathorat)	7320	"
1339	L. L. 54	7359	August, 1963
1340	Indore-1	7360	"
1341	Virnar (Berar)	7385	September, 1963
1342	Gaorani-22	7386	"
1343	Laxmi (Adoni)	7387	"
1344	P.A. L.S.S.	7388	"
1345	Devitej	7389	"
1346	M. A. 5	7390	"
1347	Parbhani American -1	7391	"
1348	Coconadas-2	7472	December, 1963
1349	M.C.U. 1	7473	"
1350	Karunganni	7474	"
1351	Tinnevelly	7475	"
1352	M.C.U. 2	7476	"
1353	Jayadhar (Hubli)	7477	"
1354	Westerns (Bellary)	7478	"
1355	Narmada (East Nimar)	7479	"
1356	M.C.U. 3	7480	"
1357	Karunganni - 5	7481	"
1358	M.C.U.-1 (Madurai)	7482	"
1359	Karunganni - 2 (Sattur)	7498	"
<b>1963-64 Season</b>			
1360	Deviraj (Nagar)	7515	January, 1964
1361	P. A. 320F	7532	"
1362	Bengal Deshi (Rajasthan)	7553	"
1363	Bengal Deshi (Punjab)	7534	"
1364	Jarila (Moglai)	7537	"
1365	Gaorani 6 (Bhainsa)	7538	"
1366	Virnar (Berar)	7552	"
1367	Virnar (East Khandesh)	7620	March, 1964
1368	Virnar (Aurangabad)	7621	"

<i>Techno- logical Circular No.</i>	<i>Variety</i>	<i>Fibre and Spinning test Report No.</i>	<i>Month of publication</i>
<b>1963-64 Season—(concl.d.)</b>			
1369	A. K. 277	7622	March, 1964
1370	A. K. 235	7623	"
1371	Gaorani-22	7654	"
1372	Buri 147 (Achalpur)	7655	"
1373	Virnar (W. Khandesh)	7656	"
1374	Narmada	7661	"
1375	H. 14	7663	"
1376	Buri 147 (Pathorat)	7679	"
1377	Deviraj (Manavadar)	7690	"
1378	Digvijay (Dabhoi)	7704	"
1379	" (Palej)	7720	May, 1964
1380	Devitej	7721	"
1381	Vijalpa (Surat)	7724	"
1382	Jayadhar (Hubli)	7725	"
1383	A. R. B. P. 52	7748	"
1384	Laxmi (Gadag)	7749	"
1385	Kalyan (Bavla)	7750	"
1386	" (Saurashtra)	7751	"
1387	Jayadhar (Bagalkot)	7752	"
1388	Maljari	7764	"

### APPENDIX III

#### SCIENTIFIC AND TECHNICAL STAFF IN THE TECHNOLOGICAL LABORATORY

(as on the 31st May, 1964)

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<b>Director:</b>	Dr. R. L. N. Iyengar, D.Sc., F.T.I.
<b>Senior Scientific Officers:</b>	Dr. V. Sundaram, M.Sc., Ph.D., A.R.I.C. Shri Jai Prakash, M.Sc. Dr. S. M. Betrabet, M.Sc., Ph.D. Shri R. P. Neogi, B.Sc., B.Sc. (Tech.) (Manch), A.M.C.T. (Eng.)
<b>Junior Scientific Officers:</b>	Shri V. G. Munshi, M.Sc. ,, S. N. Pandey, M.Sc. ,, G. S. Rajaraman, M.A. (One Post Vacant)
<b>Senior Research Assistants:</b>	Shri K. G. Deo ,, K. S. Marar, B.Sc. ,, P. S. Sambamurthy ,, P. V. Nachane, B.Sc. ,, S. Samson, B.Sc., LL.B. ,, S. B. Mogre, M.Sc. ,, D. G. Shete, L.M.E. ,, H. V. Tamhankar, L.M.E., L.E.E. ,, Y. A. Shetty, B.Sc. (Text.) ,, P. D. Vakil* ,, C. A. S. Aiyar, B.Sc.*
<b>Research Assistants:</b>	Shri K. Venkateswaran, B.A. ,, S. Ramanathan ,, S. S. Malik, M.A. (Maths.), M.A. (Stat.) ,, K. S. Bhyrappa, L.T.T. ,, Y. N. Tendulkar ,, R. Braganza, B.Sc. ,, P. G. Oka, B.Sc. Smt. S. B. Pai, B.Sc. (Hons.) Shri G. G. Phadnis, B.Sc. Smt. K. L. Datar, B.Sc.

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\* Officiating



**Research Assistants:** (contd.) Shri S. R. Ganatra, B.Sc.  
,, A. W. Shringarpure, B.Sc.  
,, S. G. Nayar, B.Sc., LL.B.  
,, S. Srinivasan, B.Sc.  
,, A. Rajagopalan, B.Sc.  
,, A. V. Ukidve, B.Sc.  
,, K. S. ShamaRao, B.Sc.  
,, N. Venkataramu, B.Sc.  
,, B. M. Petkar, B.Sc.  
,, K. R. Kamath, B.Sc.  
Kum. K. G. Tavkar, B.Sc. (Hons.)  
Shri A. K. Anthony, B.Sc.  
,, K. Chandran, B.A.  
Kum. S. Janaki, B.Sc.  
Shri P. K. Jairam, B.Sc.  
,, S. N. Nagvekar, B.Sc.  
,, V. Venugopalan, B.Sc.  
,, N. Thejappa, B.Sc.  
,, K. M. George, B.Sc.  
,, K. M. Vijayaraghavan, B.Sc.  
,, B. R. Rao, L.M.E.  
,, K. V. Babu, B.Sc.  
,, R. G. Parekh, B.Sc.  
Kum. I. K. P. Iyer, B.Sc.  
Smt. S. D. Pai, B.Sc.  
Kum. T. T. Annamma, B.Sc.  
(Three Posts Vacant)

**Draughtsman:** Shri P. B. Gurjar.

**P. L. 480 Project Staff:** Bio-Chemist—Kum. I. G. Bhatt, M.Sc.  
Microbiologist—Kum. U. P. Dasani, M.Sc.  
Technical Assistant—Kum. S. B. Karnik, B.Sc.

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