TECHNOLOGICAL LABORATORY

INDIAN CENTRAL COTTON COMMITTEE

ANNUAL REPORT

OF THE

DIRECTOR

TECHNOLOGICAL LABORATORY

FOR THE

YEAR ENDING 31st MAY, 1960.

PRICE Rs. 5·00

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THIRTY-SIXTH ANNUAL REPORT OF THE DIRECTOR, TECHNOLOGICAL LABORATORY, MATUNGA,

For The Year Ending 31st May, 1960.

This is the Thirty-sixth Annual Report of the Technological Laboratory, and deals with the work done during the year 1959-60. It will be observed from the data presented, that peak figures recorded last year have been maintained, accompanied by an appreciable improvement in certain categories.

It will be noted from the figures given in Table 1, that the number of samples received for all tests during the year under review was 5,357, nearly the same as 5,476 received last year. The total number of samples received from the State Departments of Agriculture for full-scale and micro-spinning tests rose from 3230 to 3645 recording an increase of 13 per cent. The number of samples received for micro-spinning tests alone increased from 1607 to 2226 registering an increase of as much as 39 per cent.

The work done on these samples is summarised in Tables 2, 3 and 4, from which it will be seen that during the year under review, 2,636 samples were spun and 803 reports of all kinds were issued. 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.

It will be noticed from the figures given in Table 37 that 1,517 samples were received for tests in the Testing House of the Laboratory as against 1,781 of last year, recording a decrease of 15 per cent.

The number of samples tested for fibre properties (Table 38) has increased from 2,256 to 2,593 during the year under report, thus recording an increase of 15 per cent over that of last year.

The research activities continued to be concentrated on the structural, developmental and agronomic aspects of the cotton fibre. Further, the application of simplified methods of tests enabled the determination of larger number of properties on each sample, thus rendering the Laboratory reports more useful to the Cotton Breeder. The research activities were also maintained at a high level and several investigations were completed and papers based on them were either published or sent for publication during the year.

A modified and concise form of presentation of Fibre and Spinning Test Reports which are being sent to the Breeders was prepared by the writer for the consideration of the Committee. After consulting the Cotton Breeders, the Bombay Millowners' Association and the East India Cotton Association, this form has been approved by the Committee with a few modifications. It will be used in future.

A new strength index for yarns in the metric system was established by the Laboratory after exhaustive investigations. The lead taken by the Laboratory on this subject was well appreciated by the industry as expressed at the Second All India Spinners, Breeders & Ginners Conference and also at the Indian Standards Convention held at Hyderabad in December, 1959.

Eight to ten check samples are being sent annually to each of the Senior Assistants (Technological) working in the Breeding Stations for carrying out all fibre tests for the various properties and forwarding the results to the Laboratory. These are being checked with the results obtained in the Laboratory for the same samples and the Assistants are advised annually to rectify any errors that might have cropped up either in the instruments or methods of tests.

The progress made in the construction of the new building for the Laboratory and alterations to the existing building has been very slow indeed in spite of the best efforts made by the President of the Committee in this regard. This is very much regretted as it has come in the way of the much needed expansion of the Laboratory and modernising its equipment and machinery.

The Visiting Committee appointed by the Indian Central Cotton Committee to assess the work of the Laboratory for the three-year period, 1955-58, visited the Laboratory for two days and submitted their Report, which was considered by the Committee at their last meeting in February, 1960. The recommendations made therein are being implemented.

Table 1 gives the number of samples received at the Laboratory for various tests under different heads during the period under review together with the corresponding figures for the previous four years and averages for the three five-year periods for purposes of comparison.

TABLE 1

Number of samples received.

Type of sample	Average			1-6-55 to 31-5-56	1-6-56 to 31-5-57	1-6-57 to 31-5-58	1-6-58 to 31-5-59	1-6-59 to 31-5-60
	1943-1948	1948-1953	1953-1958					
1. Agri. Dept.'s strains :								
Full spg. tests	372	807	728	706	768	905	832	737
Micro-spg. tests ...	...	...	1,081	1,166	1,092	1,626	1,607	2,226*
2. Standard cottons ...	20	17	20	24	22	23	25	12
3. Technological samples ...	267	63	135	45	291	251	234	23
4. Trade Varieties cottons ...	38	37	41	50	45	35	46	53
5. Spg. tests (Paid)	73	76	92	108	66	78	63	61
6. Fibre tests (Paid)... ...	261	169	269	223	219	330	176	313†
7. Fibre tests (Agr.)... ...	...	128	325	298	391	594	766	670
8. Yarn tests	97	190	233	383	242	243	405	174
9. Cloth tests	95	105	391	573	422	373	354	188
10. Samples for valuation ...	147	83	41	42	9	81	41	...
11. Moisture tests	2	5	140	31	186	473	825	881
12. Miscellaneous	8	9	32	50	55	32	102	19
Total ...	1,380	1,689	3,528	3,699	3,808	5,044	5,476	5,357

* Includes 210 samples received for Commercial Grading (90+120).

† Includes 64 samples from East India Cotton Association.

It will be seen from the figures given in the above Table that the total number of samples received during the period under review was practically the same as that received during the previous year. Although there was a decrease in the number of samples received for yarn tests, cloth tests and miscellaneous tests in the Testing House, the number of samples received from the Agricultural Departments rose from 3,230 to 3,645 recording an increase of 13 per cent. The increase in the number of samples for micro-spinning tests is particularly noteworthy.

Table 2 gives the number of test reports classified under various categories issued during this period together with the corresponding figures for the previous four years and also for the three five-year period, 1943-48, 1948-53 and 1953-58.

TABLE 2

Number of Reports issued.

Type of Report	Average			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960
	1943-1948	1948-1953	1953-1958					
Spinning Test	149	220	328	365	397	339	368	418
Fibre Test	54	73	104	88	115	135	102	178
Yarn Test	47	109	92	120	95	94	145	84
Cloth Test	50	56	189	207	269	152	150	83
Moisture Test	...	3	11	4	17	28	24	34
Miscellaneous	2	2	9	12	14	7	15	6
Total ...	302	463	733	796	907	755	804	803

As will be seen from the above Table, the total number of Reports issued during the period under review remained practically the same as last year. Here again, it may be noted that the total number of fibre and spinning test reports issued during the period increased from 470 to 596 registering an increase of as much as 27 per cent.

The work done during the year under review will be described under the following heads :—

I. Spinning Section (Spinning Test)
II. Testing House
III. Fibre Testing Section (Fibre Tests)
IV. Research Work
V. Ginning Section
VI. Publications
VII. Summary
VIII. Miscellaneous

I. SPINNING SECTION

Tables 3 and 4 give the distribution of samples and counts spun at the Laboratory during this period together with the corresponding figures for the previous four years and the averages for the three five-year periods. Consequent on the reorganisation of the States, the data for the different periods are not comparable in some of the States.

TABLE 3

Number of samples spun.

State	Average			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960
	1943-1948	1948-1953	1953-1958					
Maharashtra	...	...	...	...	...	...	...	514
Gujarat	208	429	1,038	923	1,087	1,696	1,398	736
Mysore	...	...	80	...	231	180	491	354
Madras	24	94	120	111	94	119	67	61
Uttar Pradesh	28	29	84	87	112	113	153	197
Madhya Pradesh	30	113	232	352	133	213	144	131
Punjab	35	61	110	176	150	70	54	58
Rajasthan	...	2	35	44	20	...	41	25
Andhra	...	...	70	71	96	97	122	111
Kerala	...	...	...	...	...	...	24	71
Miscellaneous	5	18	53	78	49	78	42	3
Total ...	330	746	1,822	1,842	1,972	2,566	2,536	2,261
Standard cottons	22	18	21	24	22	20	27	16
Trade and Tech. tests ...	233	233	213	203	263	224	183	359
Grand Total ...	585	997	2,056	2,069	2,257	2,810	2,746	2,636*

* 1,567 are Micro-spinning samples.

TABLE 4

Number of yarns spun.

State	Average			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960
	1943-1948	1948-1953	1953-1958					
Maharashtra	...	...	...	...	...	...	...	898
Gujarat	329	728	1,508	1,258	1,806	2,448	2,093	1,271
Mysore	...	...	153	...	446	318	875	729
Madras	67	198	236	240	241	217	135	121
Uttar Pradesh	83	71	169	196	212	224	278	395
Punjab	103	112	221	414	298	134	74	180
Madhya Pradesh	28	154	338	452	251	374	310	305
Rajasthan	...	...	12	...	60	...	89	27
Andhra	...	...	48	...	122	119	146	143
Kerala	...	...	...	...	...	...	64	79
Miscellaneous	393	443	499	1,103	65	120	80	6
Total ...	1,003	1,706	3,184	3,663	3,501	3,954	4,144	4,154
Standard tests	152	115	139	165	142	130	141	96
Trade and Tech. tests ...	657	753	564	593	766	500	492	704
Grand Total ...	1,812	2,574	3,887	4,421	4,409	4,584	4,777	4,954*

* 1,567 are Micro-spinning.

Tables 3 and 4 show that the number of samples spun remained about the same while the number of counts spun registered a small increase of 4 per cent. This is because an additional count is spun in the high draft system on all varieties having mean fibre-length of 1″ and above.

It may be stated here that although these tests were of a routine nature, a few deserve particular mention as they relate to special experiments ; these are described below.

A. AGRICULTURAL SAMPLES

I. MAHARASHTRA STATE

1. *Five* desi *varieties in three centres in Vidarbha area.*—The four varieties, AK 235, AK277, 13A and AK 14 were raised along with the control, Virnar, in the three centres, Nagpur, Yeotmal and Akola in the 1958-59 season. It was observed, on statistical analysis of their results, that these varieties were significantly longer in staple at Nagpur than at Yeotmal and Akola while they were significantly finer in staple at Yeotmal than at Nagpur and Akola. As in the case of last year, 13A gave a lower spinning value than AK 277 in this season also.

2. *Tests on irrigated* 170-*Co*2 *raised in* 12 *different centres in the Deccan Canals area.*—Twelve samples of 170-Co2 raised in different districts, Poona, Nasik, West Khandesh, Sholapur, East Khandesh, Ahmednagar, South Satara and North Satara were received for tests under instructions from the Cotton Development officer, Ahmednagar in the 1958-59 season. The mean fibre length varied from 1.06″ to 0.98″ with a mean value of 1.02″. The variation in mean fibre-weight per inch was from 0.127 to 0.151 (10^{-6} oz.) with an average of 0.138. The average blow-room waste loss lay in the neighbourhood of 7 per cent. The yarns were generally rather neppy and the average spinning value ranged from 43s for the Dhulia sample to 33s for the Sreerampur and Sangli samples with a mean value near about 39s standard counts.

3. *Tests on last pickings of* 170-*Co*2 *from bales in Ahmednagar and Poona districts.*—It was decided at the meeting of the Local Cotton Sub-Committee of Poona District held on 2nd April, 1959, that the last pickings of 170—Co2 (Deviraj) drawn from their bales obtained from their market centres should also be tested as in the case of the normal picked (1st and 2nd picking) samples. Accordingly, samples of this cotton from last picking drawn from full-pressed bales from Ahmednagar and Baramati centres were received for tests. Comparative results of tests for the last picked and normal picked samples are given in Table 5.

TABLE 5

Results for last picked and normal picked 170-Co2, 1958-59 season.

	Ahmednagar			Baramati (Poona Dist.)		
		Normal picking			Normal picking	
	Last picking	Ginned in Bharat fty.	Ginned in Newasber fty.	Last picking	Press Mark 525	Press Mark 526
Mean fibre-length (in) ...	0·94	1·02	1·01	0.97	1·06	1·02
Mean fibre-weight per inch (10^{-6} oz.)	0·128	0·143	0·146	0·120	0·139	0·131
Highest Standard counts ...	32s	36s	41s	31s	40s	40s

It may be seen that the last picked sample was some 7 per cent shorter and somewhat finer in staple than the normal samples in both cases. The last picked samples were also definitely inferior to the normal picked samples not only in spinning value but in all other respects also.

4. *Comparative tests on 170-Co2 and Laxmi in Baramati area.*—As it was reported that cultivators were switching over to Laxmi cotton in place of 170-Co2 cotton in these areas, comparative tests on samples of 1959-60 season were carried out on them. It was found that though both varieties had about the same fibre-properties, 170-Co2 gave a definitely better spinning value than Laxmi, the former being suitable for 46s while the latter could be spun upto only 38s standard counts.

5. *Comparative tests on 170-Co2 and I.S.C. 67 in Baramati area.*—At the instance of the Botanist I/C. Scheme for improvement of Indo-American cottons, Surat, comparative tests on 170-Co2 and I.S.C. 67 raised in 1959-60 season in Baramati area were made in the Laboratory. It was found that I.S.C. 67 gave a better spinning performance than 170-Co2, the former being suitable for 44s and the latter for 40s standard counts.

6. *Mill tests on improved varieties (Maharashtra).*

(i) *Y-1 and Virnar.*—It may be recalled that Mill and Laboratory Tests were carried out on these two varieties raised in Jalgaon and Dhulia in the two seasons, 1956-57 and 1957-58 which were reported in the last Report. They were carried out in the 1958-59 season also. Comparative results of tests obtained in all three seasons for the two centres are given in Table 6 below:—

TABLE 6

Lea strength (lb.) for 20s yarns.

Variety	1956-57				1957-58				1958-59			
	Jalgaon		Dhulia		Jalgaon		Dhulia		Jalgaon		Dhulia	
	Mill Test	Lab. Test	Mill Test	Lab. Test	Mill Test	Lab. Test	Mill Test	Lab. Test	Mill Test	Lab. Test	Mill Test	Lab. Test
Y–1 ...	85·5	86·1	80·4	87·1	81·0	91·9	78·5	91·3	76·5	82·3	87·1	87
Virnar ...	77·4	84·7	56·9	78·0	71·1	79·4	68·6	87·7	76·2	80·5	81·0	75

It may be observed that Y-1, in most cases, definitely gave stronger yarns than Virnar both by the Mill Test and by the Laboratory Test. The exception was only in the case of the 1958-59 samples at Jalgaon when the difference in the test between the two varieties was small, though in favour of Y-1.

(ii) *Buri strains at Achalpur.*—Mill and Laboratory Tests were carried out on the samples of Buri 0394, B.147 and 0296-7 raised at Achalpur in the 1958-59 season. It may be recalled that such tests on their samples raised at Akola were carried out previously for the two seasons, 1956-57 and 1957-58 and discussed in the previous Report. Comparative results of tests obtained in the Mill and in the Laboratory in all three seasons are given in Table 7.

TABLE 7

Lea strength (lbs.) for 30s yarns.

	AKOLA				ACHALPUR	
	1956-57		1957-58		1958-59	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test	Mill Test	Laboratory Test
Buri 0394	44·2	50·1	51·8	54·7	31·3*	53·8
,, 0296-7	46·8	53·0	51·5	52·0	29·8*	57·0
,, 147	53·0	54·7	50·2	59·2	60·4	65·1

* The Spinning Master in the Mill has reported "Excessive Breakages" when spinning these two varieties.

It may be noticed that Buri 147 yielded stronger yarns than Buri 0394 and Buri 0296-7 both at the Mill and the Laboratory except in the case of the Mill Test in the 1957-58 season.

(iii) *1585 against Gaorani 6 at Nanded.*—Mill and Laboratory Tests were carried out on samples of these two varieties, 1585 and Gaorani 6, raised at Nanded in the 1958-59 season. It may be recalled that similar tests were carried out in 1957-58 also which were given in the last Report. Comparative results of tests obtained in the Mill and in the Laboratory for both seasons are given in Table 8.

TABLE 8

Lea strength (lb.) for 30s yarns.

	1957-58		1958-59	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test
1585	42·7	50·1	46·7	46·8
Gaorani 6	36·0	44·7	48·8	48·7

Though 1585 yielded definitely stronger yarns than Gaorani 6 both at the Mill and at the Laboratory in the 1957-58 season, it did not come upto the level of Gaorani 6 in yarn-strength in 1958-59 season both by the Mill Test and by the Laboratory Test.

7. *Establishment of permanent cotton plots.*—Under instructions from the Superintending Agricultural Officer, Nagpur, nine samples of **kapas** each weighing one pound of the early, middle and last pickings of each of the three varieties Buri 147, Buri 0394 and Desi No. 91 from the 1958-59 season were received from the Agricultural Officer, Seed Multiplication Farm, Jamb, Wardha, for tests. Ginning, fibre and micro-spinning tests were carried out on them and the results obtained are given in Table 9.

TABLE 9

Results of tests on Jamb samples.

	Buri 147			Buri 0394			Deshi 91		
	PICKING			PICKING			PICKING		
	Early	Middle	Last	Early	Middle	Last	Early	Middle	Last
Ginning percentage... ...	35·5	35·8	37·0	34·9	35·06	...	33·4	32·0	33·6
Mean fibre-length (inch) ...	1·00	1·00	0·98	0·94	0·96	...	0·87	0·86	0·84
Mean fibre-weight per inch (10^{-6} oz.)	1·149	0·151	0·131	0·162	0·153	...	0·164	0·136	0·127
Maturity Co-efficient ...	0·80	0·83	0·77	0·85	0·81	...	0·85	0·78	0·75
Pressley Strength index lb/mg.	8·16	7·89	7·92	7·83	7·66	...	8·92	8·56	8·06
Micro-spinning lea strength (lb)–40s for Buri and 20s for Deshi	36·0	35·5	37·7	31·1	31·5	...	75·8	84·2	81·8

The last picked sample of Buri 0394 could not be ginned as it contained immature and insect-affected locks and yellow-stained kapas. Its results are, therefore, not available. It may be observed that the later picked samples especially of Desi 91, were generally finer, less mature and had lower strength index value.

8. *Agronomic Experiments (Maharashtra).*

(i) *Different methods of sowing at Amravati.*—The four varieties, Desi 91, Buri 0394, B.147 and Rajapalayam were sown by two methods, viz., dibbling (D_1) and drilling (D_2) in the 1958-59 season as in the case of the three previous seasons at Amravati. Rajapalayam was included for the first time in this season. The samples obtained for these tests were subjected to micro-spinning tests. The yarn-strength results obtained in all four seasons are summarised in Table 10.

TABLE 10

Lea Strength results (Micro-spinning)

Variety Counts	Dibbling (D1)				Drilling (D2)			
	1955-56	1956-57	1957-58	1958-59	1955-56	1956-57	1957-58	1958-59
Desi 91 20s ...	90·3	78·7	80·0	74·4	92·6	73·6	85·4	77·0
Buri 0394 40s ...	42·1	41·4	42·7	39·1	40·6	39·9	41·1	37·1
Buri 147 40s ...	46·5	41·5	45·4	36·6	44·3	43·1	44·0	40·6
Rajapalyam 40s ...	...	...	...	35·1	...	...	...	32·6

It may be seen that sowing by dibbling gave some-what stronger yarns than sowing by drilling for Buri 0394 in all four seasons. This was also true for Rajapalayam in the 1958-59 season. For Desi 91, on the other hand, sowing by drilling yielded some-what stronger yarns than sowing by dibbling except in 1956-57 season.

(ii) *Effect of irrigations on four varieties at Amraoti.*—The above experiment on four varieties with different methods of sowing conducted in 1958-59 season also included tests for three different irrigations, I_0 (no post-monsoon irrigation), I_1 (one post-monsoon irrigation) and I_2 (two post-monsoon irrigations). The results obtained are summarised in Table 11.

TABLE 11
Lea Strength results (Micro-spinning)

	Counts	I_0 (no post-monsoon irrigation)	I_1 (one post-monsoon irrigation)	I_2 (two post monsoon irrigations)
Desi 91	20s	76·7	76·6	73·8
Buri 0394	40s	37.4	40.0	37.0
Buri 147	40s	39·8	37·4	38·7
Rajapalayam	40s	34·4	33·5	33·7

The different irrigations did not have any significant effect on yarn-strength.

(iii) *Effect of nitrogenous and phosphatic fertilisers on three varieties at Amraoti.*—The three varieties, Desi 91, Buri 0394 and B. 147 were tried with three levels of nitrogen, N_0 (O lbs. N per acre), N_1 (30 lbs. N per acre) and N_2 (60 lbs. N per acre) and three levels of P_2O_5, P_0 (0 lbs. per acre), P_1 (30 lbs. P_2O_5 per acre) and P_2 (60 lbs. P_2O_5 per acre) in the 1958-59 season at Amraoti. Nitrogen was applied in the form of ammonium sulphate and phosphate in the form of super-phosphate. The total rainfall from April 1958 to January 1959 was 811.6 mms. The samples were subjected to micro-spinning tests and the yarn-strength results are summarised in Table 12.

TABLE 12
Lea strength results (Micro-spinning)

Variety	Counts spun	Effect of N			Effect of P		
		N_0	N_1	N_2	P_0	P_1	P_2
Desi 91 ...	20s	75·6	82·6	77·9	75·6	79·6	80·9
Buri 0394 ...	40s	38·5	39·4	39·0	37·5	41·5	37·9
B. 147 ...	40s	40·7	40·2	41·1	40·3	41·7	40·1

The differences in yarn-strength between different treatments were small in each variety. However, application of 30 lbs. N and 30 lbs. P would be beneficial for yarn-strength in the case of Desi 91. Application of 30 lbs. P would also be beneficial for Buri 0394.

(iv) *Effect of different levels of nitrogen applied at different times at Amraoti.*—The two varieties, Desi 91 and B. 147 were subjected to tests for this experiment in the 1958-59 season. The three levels of nitrogen tried were No. N_1

and N_2 as given above. The times of application of nitrogenous fertiliser were T_1 (at the time of sowing), T_2 (little before flowering) and T_3 (half at the time of sowing and half little before flowering). The total rainfall was the same (811.6 mm) as given above. The samples were subjected to micro-spinning tests and the yarn-strength results are summarised in Table 13.

TABLE 13

Lea strength results (Micro-spinning)

	Counts	Levels of nitrogen			Times of application		
		N_0	N_1	N_2	T_1	T_2	T_3
Desi 91 ..	20s	73·8	78·9	78·0	76·5	80·9	77·9
B. 147 ...	40s	40·3	41·1	41·0	39·3	41·5	42·3

As in the case of the above experiment, application of N_1 would be beneficial and economical especially for Desi 91. Regarding the time of application, applying manure little before flowering seemed to be advantageous for Desi 91 in respect of yarn-strength.

II. GUJARAT STATE

9. *Five varieties in five centres in Gujarat.*—The five varieties, Vijay, Digvijay, 394-3, 280-1 and Kalyan were raised in the five centres, Viramgam, Dholka and Dhanduka in Ahmedabad district, Kalol in Panchmahals and Harij in Mehsana district in the 1958-59 season. Statistical analysis of the results indicated that these samples raised at Kalol in Panchmahals were significantly finer in staple than those grown in Ahmedabad and Mehsana districts. Vijay and Digvijay, as should be expected, stood in a superior class in respect of spinning value. 394-3 and 280-1 did not differ significantly from Kalyan either in fibre properties or in spinning value.

10. *Vijay and Digvijay against 2087 in five centres.*—The three varieties, Vijay, Digvijay and 2087 raised in five centres, Vemar, Wada Farm and Bhileshwar in Broach district, Hadmatia in Kaira and Dehgam in Ahmedabad district, in the 1958-59 season were tested in the Laboratory. When analysed statistically, the results indicated that though 2087 was significanty longer in staple than Vijay and Digvijay, it gave appreciably lower spinning value than Vijay and Digvijay. Among the localities, these varieties, when raised at Vemar, Bhileshwar and Hadmatia, yielded significantly higher mean fibre-length than when raised at Dehgam and Wada Farm. But, these when raised at Dehgam and Bhileshwar gave definitely better spinning value than when raised in the other three localities.

11. *Deviraj (170-Co2) in rain-fed and irrigated conditions in Saurashtra area.*—It has been reported by the Cotton Superintendent, Superior Long Staple Cotton Multiplication Scheme, Junagadh, that the acreage under rain-fed conditions of Deviraj was increasing as the farmers preferred to grow under rainfed conditions

without irrigation. In order to study which would be beneficial to cultivators, samples of Deviraj under rainfed and irrigated conditions were received for tests from six different centres in Saurashtra area in the 1958-59 season. Full fibre and spinning tests were carried out on them and the test results are summarised in Table 14.

TABLE 14

Results for Deviraj under rainfed and irrigated conditions 1958-59 season.

	Mean fibre-length (inch)		Mean fibre weight per inch (10^{-6} oz)		Maturity Co-efficient		Blow room loss		Highest Standard counts	
	Rain-fed	Irri-gated	Rain-fed	Irri-gated	Rain-fed	Irri-gated	Rain fed	Irri-gated	Rain-fed	Irri-gated
Junagadh Farm ...	0·98	1·00	0·154	0·156	0·80	0·80	6·3	6·2	46s	38s
Upleta	1·01	1·02	0·141	0·154	0·79	0·80	5·3	5·5	44s	42s
Manavadar... ...	0·99	0·94	0·139	0·133	0·79	0·79	8·5	11·0	35s	30s
Agatrai	0·97	0·96	0·123	0·145	0·78	0·79	5·8	5·1	39s	38s
Kutiyana	1·06	0·94	0·137	0·135	0·79	0·80	5·7	6·5	44s	40s
Dhrangadhra ...	1·00	0·99	0·136	0·141	0·78	0·80	12·0	9·4	34s	31s

It is quite interesting to observe that the rain-fed samples gave better spinning values than the corresponding irrigated samples, though not significantly, in two cases. At Kutiyana and Manavadar, the rain-fed sample was also significantly longer in staple than the corresponding irrigated sample.

12. *Mill tests on improved varieties (Gujarat)*

(i) *I.S.C. 67 at Talod and Kosad.*—Samples of I.S.C. 67, a black-arm resistant strain, raised in goradu soil at Talod and in besar soil at Kosad in the 1958-59 season were subjected to Mill and Laboratory tests. Samples of this cotton from Talod and Gotalawadi were subjected to these tests in the 1957-58 season. Comparative results of tests obtained in the Mill and in the Laboratory for both seasons are summarised in Table 15.

TABLE 15

Lea strength (lb.) for 40s yarns.

	1957-58		1958-59	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test
Talod	43·6	49·6	42·8	45·6
Gotalawadi	41·5	49·6	...	...
Kosad	...	...	43·3	47·6

As this variety has given a test of about 43 lbs. in the mill for 40s yarns, it may be suitable for spinning upto 40s standard counts under mill conditions.

(ii) *Deviraj (170-Co2) at Junagadh.*—Mill and Laboratory tests were carried out on this variety in the 1958-59 season as in the case of the previous season. The results obtained in the two seasons are given below :—

TABLE 16

Lea strength (lb.) for 40s yarns.

	1957-58		1958-59	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test
Deviraj (170-Co2) ...	41·1	40·4	45·4	45·4

This variety has recorded good improvement in 1958-59 as compared with the previous season. As it has given a test of over 45 lbs. for 40s yarn in the mill in the 1958-59 season, this variety is also suitable for spinning definitely upto 40s yarns under mill conditions.

13. *Agronomic experiment (Gujarat).*

(i) *Spacing experiments at Bavla.*—The six varieties, 280-1, 348-5, 394-3, 786-B, 797 and Kalyan, were tried with two different spacings, 2′ x 9″ and 2′ x 2′ at Bavla in the 1958-59 season. Full spinning tests were carried out on them and the results obtained are summarised in Table 17.

TABLE 17

Results with two spacings at Bavla, 1958-59 season.

Variety	Yield (kapas) per acre (lb.)		Ginning Percentage		Mean fibre length (inch)		Mean fibre weight per inch (10^{-6} oz)		Highest Standard Counts	
	2′×9″	2′×2′	2′×9″	2′×2′	2′×9″	2′×2′	2′×9″	2′×2′	2′×9″	2′×2′
280–1 ...	665	608	45·3	41·3	0·94	0·96	0·159	0·143	26	26
348–5 ...	594	586	43·8	40·8	0·96	0·93	0·134	0·133	27	27
394–3 ..	597	534	43·6	38·8	0·90	0·92	0·151	0·129	26	30
786–B ..	527	636	45·3	41·7	0·94	0·94	0·158	0·153	26	31
797 ..	562	610	45·0	40·5	0·94	0·94	0·145	0·150	27	28
Kalyan ...	560	441	44·8	39·7	0·88	0·90	0·168	0·140	24	27

The main point to note is that it was found that the ginning percentage was higher by 3 to 5% for 2′ x 9″ spacing then for 2′ x 2′ spacing. The yield also was higher for the former than for the latter samples except in the cases of 786B and 797. These are the results of only one season and therefore they require confirmation.

(ii) *Irrigation trials on 170-Co2 at Halvad (Surendranagar).*—The object of these tests was to find out the minimum number of irrigations with maximum interval period for economical cultivation of 170-Co2 under Brahmani Canal Zone at Halvad. It was tried with no irrigations, 3, 5 and 7 irrigations at 28, 21 and 14 days' intervals respectively. The total rainfall received was 13.85″ (1.55″, 2.23″, 2″, 6.67″, 0.65″ and 0.75″ respectively in June, July, etc., upto November, 1958). Full spinning tests were carried out on all four samples of 1958-59 season and the results of tests are given in Table 18.

TABLE 18

Results of 170-Co2 with different irrigations, 1958-59.

Variety	No. of irri-gations	Intervals	Yield of kapas per acre (lb.)	Ginning %	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6} oz.)	Highest standard counts
170–Co2 ...	0	...	571	39	0·98	0·149	38
,, ...	3	28 days	768	38	0·98	0·149	43
,, ...	5	21 days	734	35	1·02	0·162	38
,, ...	7	14 days	771	39	0·95	0·153	39

It was found that the sample which received three irrigations at 28 days intervals gave definitely better spinning value than the other three samples. As these results are only for one season, this conclusion also requires confirmation.

(iii) *Sowing date vs spacing trial on 170-Co2 at Halvad.*— The object of these tests carried out in 1958-59 season was to evaluate the best time of sowing for 170-Co2 in combination with adequate spacing under canal irrigation at Halvad. The samples sown on 15th May, received 8 irrigations, those sown on 1st June, 6 irrigations, those sown on 15th June 5 irrigations, those sown on 1st July received 4 irrigations while the samples sown on 15th July received only 3 irrigations at intervals as and when necessary with 21 days during winter. Total rainfall from 29th June, 1958 to end of November, 1958 was 13.85″. There were four pickings for the samples sown on 15th May and 1st June while there were only 3 pickings for the others. The yield of kapas was highest when sown on 1st June for the two spacings, 3′ x 3′ and 3′ x 4′ while it was highest when sown on 15th May for 3 ′ x 5′ spacing.

It was observed from their results that mean fibre-weight per unit length had recorded a progressive decrease as the date of sowing advanced from 15th May to 1st July. The different spacings had not affected any of the fibre-properties or yarn strength significantly. Fibre tests carried out on similar samples of 1957-58 season were discussed in the previous Report.

(iv) *Fertilisers-cum-spacing trial on 170-Co2 at Halvad.*—The object of this trial carried out in the 1958-59 season was to obtain the optimum dose of manure with adequate spacing for the cultivation of 170-Co2 under the agro-

climatic conditions of Brahmani Dam Zone at Halvad. The samples were sown on 28th June, 1958. They received four irrigations at 20 days intervals. Nitrogen per acre was applied as ammonium sulphate and phosphorus as super-phosphate. There were four pickings on 27th January, 17th February, 26th February and 13th March, 1959. There were four manurial treatments N_0P_0, $N_{30}P_{30}$, $N_{60}P_{30}$ and $N_{60}P_{60}$ with four spacings 3′ x 9″, 3′ x 18″, 3′ x 27″ and 3′ x 36″.

It was found that no significant change was brought about by the different spacings and different manurial treatments in mean fibre-length or in yarn-strength. Different manurial treatments did not produce any significant effect in mean fibre-weight also. But, the two wider spacings, 3′ x 27″ and 3′ x 36″, tended to produce somewhat finer fibres than the two narrower spacings. Fibre tests carried out on similar samples of 1957-58 season were discussed in the previous Annual Report.

(v) *Sann hemp, hot weather green manuring trial on 170-Co2 at Halvad.* The object of this experiment was to find out the effect of hot weather sann green manuring on cotton with and without the fertiliser doses to both. Sann was sown on 16th February, 1958 while cotton was sown on 20th June, 1958. Sann was given four irrigations at intervals of 15 days while cotton also received four irrigations at intervals of 20 days. The six different treatments are indicated in Table 19. Fibre and micro-spinning tests were carried out on the six samples and the results are given in Table 19.

TABLE 19

Results for green manuring trials on 170-Co2, 1958-59 season.

Cotton	Treatment	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6} oz)	Maturity Coefficient.	Lea strength (lb) for 40s.
170–Co2	Control	1·00	0·151	0·80	35·6
,, ...	Cotton + 16 N	1·00	0·160	0·81	39·5
,, ...	Sann + cotton	1·04	0·162	0·85	38·0
,, ...	Sann + cotton + 16 N	1·00	0·163	0·85	37·3
,, ...	Sann 16 P_2O_5 + cotton	1·00	0·143	0·80	38·3
,, ...	Sann 16 P_2O_5 + cotton + 16 N	1·00	0·147	0·81	37·5

It may be observed that the fibre-properties were more or less comparable with the control in all cases. But, all five treated samples yielded stronger yarns than the control. The differences in yarn-strength between the five treated samples are small and within sampling error. Fibre tests carried out on similar samples of 1957-58 season were discussed in the last Report.

(vi) *Mixed cropping trial on 170-Co2 at Halvad.*—The object of this study was to see the effect of growing 170-Co2 with Jowar, and 170-Co2 with groundnut in comparison with growing it alone. Jowar was grown two rows in between two rows of cotton. Cotton and groundnut were raised in alternate rows

3′ apart. All three samples received five irrigations on 17th August, 1958, 8th October, 1958, 6th November, 1958, 1st December, 1958 and 1st January, 1959. They were sown on 5th July, 1958 and picked on 9th February, 1959, 25th February, 1959 and 12th March, 1959. Maximum yield (922 lbs. seed-cotton per acre) was obtained when grown with Jowar. The yield when grown alone was 880 lbs. while it was 538 lbs. when raised with groundnut. Their fibre and micro-spinning test results are given in Table 20.

TABLE 20

Mixed cropping results for 170-Co2, 1958-59.

Cotton	Crop	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6} oz)	Maturity coefficient.	Lea strength (lb.) for 40s
170–Co2	Cotton alone	1·02	0·168	0·84	34·7
,, ...	Cotton + groundnut	1·06	0·146	0·80	35·9
,, ...	Cotton + jowar	1·04	0·174	0·84	38·2

This cotton when grown with groundnut yielded somewhat longer and finer fibres, but gave the strongest yarns when raised with Jowar.

(vii) *Arboreum hybrids with broad leaves and narrow leaves, and white and yellow flowers at Amreli.*—Tests carried out last year on 18 cultures both with yellow flowers and with white flowers raised at Amreli in the 1958-59 season were discussed in the last Annual Report. It was found that the white flowered samples, on the whole, yielded significantly stronger yarns than the corresponding yellow flowered samples. Samples of three cultures with broad leaves and with narrow leaves raised at Amreli in the 1958-59 season were tested by micro-spinning and their yarn-strength results are given in Table 21 below.

TABLE 21

Results for samples with narrow and broad leaves, 1958-59 season.

Culture	Lea strength (lb) for 30s yarns	
	Narrow leaves	Broad leaves
(C. J. 73 × D.C. 92) F5–102–N	40·5	30·0
,, –142–N	45·2	34·1
(C. J. 73 × D.C. 93) –178–N	34·5	32·0

It is noteworthy that the narrow-leaves samples had given stronger yarns than the corresponding broad leaves samples in all three cases.

(viii) *Spacing and manurial trial on Sanjay (C.J. 73) at Amreli.*—Sanjay cotton was tried with 3 spacings, 18″, 27″, 36″ between rows and 2 spacings, 6″ and 9″ between plants at Amreli in 1958-59 season. They were also tried with three manures, N_0P_0, $N_{20}P_{10}$ and $N_{40}P_{20}$. The 18 samples thus obtained were subjected to fibre and micro-spinning tests.

The effects of these different spacings and different manurial treatments on fibre-properties and yarn-strength were non-significant.

(ix) *Rotation Experiments at Broach.*—It may be recalled that test results for Digvijay cotton raised at Broach in the 1957-58 season after Jowar, after lang and after mixed Jowar and lang were discussed in the previous Report. Similar samples were received for tests in the 1958-59 season also and they were subjected to fibre tests and micro-spinning tests. The results obtained for both seasons are summarised in Table 22.

TABLE 22

Results for rotation experiments at Broach.

Rotation	1957-58		1958-59	
	Mean fibre length (inch)	Lea Strength (lb) for 40s.	Mean fibre length (in)	Lea Strength (lb) for 30s
Digvijay after Jowar	0·87	35·3	1·02	64·7
,, ,, lang	0·94	38·6	1·02	63·3
,, ,, mixed Jowar and lang ...	0·94	38·0	1·01	65·5

It may be observed that Digvijay after Jowar gave shorter staple and somewhat weaker yarns in the 1957-58 season while no such difference was noted in the 1958-59 season.

(x) *Spacing experiments at Kadiadra.*—Two spacings, $5' \times 2'$ and $2\frac{1}{2}' \times 2'$ were tried with eight varieties at Kadiadra in the 1958-59 season. Similar tests were also carried out in the previous two seasons 1956-57 and 1957-58, at Kadiadra which were discussed in the 1958-59 Report. Samples of each were subjected to fibre length and micro-spinning tests. These two spacings, on the whole, did not produce any significant effect either in mean fibre-length or in yarn-strength though significant differences were observed in a few varieties.

(xi) *Effect of irrigation at Talod.*—Samples of eight varieties were raised with irrigation and under rainfed conditions in the 1958-59 season at Talod. The irrigated samples received one irrigation. They were subjected to fibre and micro-spinning tests. It was found that these samples are likely to be finer and less mature when raised under irrigation. They are also likely to yield somewhat stronger yarns under irrigated conditions.

III. MYSORE STATE

14. *15-39X, 16X and 16Y against Jayadhar in ten centres.*—The four varieties, 15-39X, 16X, 16Y and Jayadhar were raised in the 1958-59 season in ten different centres in Mysore State. Samples obtained from them were subjected to fibre and spinning tests. It was found on statistical analysis of their results that these four varieties did not differ significantly from each other in mean fibre length. 15-39X, 16X and 16Y were all significantly finer than Jayadhar and 15-39X and 16X yielded significantly better spinning value than Jayadhar. These varieties when raised under district trials in Dharwar and in Bagalkot were found to be significantly shorter but finer in staple than when raised in the other centres. These varieties at Hungund and Kundgol were significantly coarser in staple than those from the other centres. These varieties raised at Bailhongal gave significantly better spinning value than when raised in all the other centres.

15. *B.C. 1 against Jayadhar and Kumpta.*—The three varieties, B.C. 1 Jayadhar and Kumpta, were raised in five different centres in the 1958-59 season. Fibre and spinning tests were carried out on them. When the results were analysed statistically, they indicated that B.C.1 and Jayadhar were significantly longer and finer in staple and gave significantly better spinning performance than Kumpta. B.C. 1 was also significantly finer in staple than Jayadhar. Among the centres, these varieties did not indicate any significant difference in mean fibre-length or spinning value when raised in these five centres. But, they are likely to be appreciably finer in staple when raised at Bagalkot as compared with the other centres as found in the previous experiment (Item No. 14).

16. *Sea-Island 'Andrews' from Mysore State.*—Twenty-one samples of Sea-Island 'Andrews' cotton from different centres were received for full scale spinning tests in the 1958-59 season. The results obtained are summarised in Table 23. It may be observed that the mean fibre length varied from 1.32″ for the Mangalore samples to 1.11″ for a Kollegal sample giving an average of 1.24″. The mean fibre weight per inch gave an average of 0.122 (10^{-6}oz.). Cottons with a maturity coefficient value between 0.7 and 0.9 are medium mature while those having values below 0.7 are of low maturity. The variation in highest standard counts was from 85s to 59s with a mean value of 74s.

17. *Mill tests on improved varieties (Mysore State).*

(i) Mill tests were carried out at a Mill in Bombay, on two samples of Sea-Island 'Andrews' cotton, one from Mangalore and the other at Kudige Government Farm in the 1958-59 season. The results of tests obtained at the Mill and at the Laboratory are summarised in Table 24.

The mill had stated in its remarks that the Mangalore sample had given the standard test for 60s and 80s while the Kudige sample had less than standard test. The yarns from the former sample were slightly neppy while those from the latter were uneven in appearance. The mill was of the opinion that though these samples compared quite well with their Mixing for 100s/120s as far as staple length was con-

TABLE 23

Results of tests on Sea-Island Andrews (Mysore State)

Centre	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6} oz)	Maturity Co-efficient	Pressley strength index lb/mg.	Highest standard counts
Jenkevekkar, Mangalore	1·32	0·111	0·70	6·90	81s
Paddy Breeding Station, (Kankanady Farm), Mangalore ...	1·26	0·106	0·68	6·66	83s
Bajpe Farm, Mangalore	1·26	0·113	0·70	7·12	80s
Perumedu (Gauda), Mangalore ...	1·26	0·116	0·74	6·81	84s
Perumedu (D'Souza), Mangalore ...	1·32	0·114	0·71	7·13	85s
Panemangalore, Belthangady ...	1·28	0·112	0·77	6·74	83s
Narayana Bhatt — Puttur	1·26	0·117	0·73	6·99	84s
Perla, Kasargode	1·28	0·110	0·67	6·76	75s
Bilur, Ponnampet	1·26	0·123	0·76	6·95	72s
Kushalnagar, Kudige	1·28	0·137	0·79	6·70	70s
Kudige Farm, Kudige	1·27	0·136	0·77	6·58	69s
Banwara, Somwarpet	1·25	0·123	0·76	6·58	70s
Ayanur, Shimoga	1·23	0·110	0·70	6·74	76s
Sirsi, N.. Kanara (Agri. Res. Station)	1·28	0·126	0·74	6·88	72s
Ankola, N. Kanara	1·18	0·099	0·66	6·58	73s
Madhuguni (Kumpta), N. Kanara ...	1·21	0·104	0·67	6·88	77s
Lokkanahalli, Kollegal	1·11	0·146	0·69	7·89	59s
Bylore, Kollegal	1·25	0·142	0·76	7·62	62s
Dr. Iyengar, Koppa	1·18	0·128	0·72	7·77	67s
Subba Rao, Koppa	1·25	0·137	0·76	7·76	69s
Puttappa, Saklaspur	1·14	0·142	0·69	7·66	67s

TABLE 24

Results of Mill and Laboratory Tests on Sea-Island (Mysore State)

	B. S. Hedge (Mangalore)				Kudige Govt. Farm (Kudige)			
	Mill Test		Laboratory Test		Mill Test		Laboratory Test	
	60s warp	80s weft	60s-4R	80s	60s warp	80s weft	60s-4R	80s
Comber waste % ...	12·8	12·8	12·4	12·4	12·2	12·2	12·4	12·4
T. P. I.	35·91	41·07	28·92	33·44	35·91	41·07	28·92	33·44
Counts actual ...	59·1	79·6	61·1	80·0	59·6	79·4	59·3	81·7
Strength (lb) ...	37·2	25·3	34·6	24·5	33·3	22·3	33·9	21·1
Count strength product	2199	2014	2114	1960	1985	1771	2010	1724
Corrected strength (lb) ...	36·6	25·2	35·2	24·5	33·1	22·1	33·5	21·6

cerned, they were lower in value in uniformity ratio and strength index. They gave lower spinning values due to these factors. They considered these to be barely suitable for 60s warp and 80s weft.

(ii) *B.C. 1 against Jayadhar at Bagalkot.*—Mill and Laboratory tests were carried out on these two varieties raised at Bagalkot in the 1958-59 season.

Similar tests carried out on the samples of 1957-58 season were reported in the last Report. Comparative results of tests obtained at the Mill and at the Laboratory are given in Table 25.

TABLE 25

Lea strength (lb) for 30s yarns

	1957-58		1958-59	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test
B. C. 1 ...	60·0	56·7	52·4	50·0
Jayadhar	56·4	50·7	51·8	48·4

It may be seen that though B.C. 1 gave definitely stronger yarns than Jayadhar in the 1957-58 season, no such difference was observed in the 1958-59 season both by the Mill test and by the Laboratory test.

(iii) *IHX-11 against Laxmi.*—Mill and Laboratory tests were carried out on these two varieties raised at Gadag in 1958-59. Comparative results of tests obtained for them are given in Table 26.

Table 26

Lea strength (lb) for 30s yarns.

	Mill Test	Laboratory Test
IHX - 11	35·8	59·2
Laxmi	34·0	58·6

IHX-11 gave only slightly stronger yarns than Laxmi, the difference being small and non-significant both by the Mill test and by the Laboratory test. It may be noted that the Laboratory results were appreciably better than those given by the Mill.

18. *Agronomic Experiments (Mysore State).*

(i) *NPK Experiment on Giza 12 at Mandya.*—32 samples of Giza 12 cotton raised in Mandya in the 1958-59 season with treatment combinations of 4 P treatments, P_0, P_1, P_2, P_3, 4 K treatments, K_0, K_1, K_2 and K_3 and 2 N treatments, N_0, N_1 were received for tests. N_0 and N_1 are control and 50 lbs. N per acre applied as ammonium sulphate, P_0, P_1, P_2, P_3 are control, 50 lbs. P_2O_5, 100 lbs. P_2O_5 and 150 lbs. P_2O_5 per acre as superphosphate while K_0, K_1, K_2, K_3 are control, 50 lbs. K_2O, 100 lbs. K_2O and 150 lbs. K_2O per acre applied as potassium sulphate. The samples were spun by micro-spinning technique into 60s yarns. Similar tests were also made last year on the 1957-58 samples and dicusssed in the last Report.

It may be stated on the basis of statistical analysis of their results that these different treatments had not, on the whole, produced any significant difference in yarn-strength as compared with the control sample which was grown without any manure.

A similar experiment without N manure but applying P_0, P_1, P_2, P_3 and K_0, K_1, K_2, K_3 only was also carried out on Giza 12 in the 1958-59 season at Mandya and 16 samples obtained therefrom were subjected to micro-spinning tests by spinning into 60s yarns. In this case also, the differences in yarn-strength were found to be non-significant.

(ii) *NPK Experiment on M.A. 5 cotton at Mandya.*—Eight samples of M.A.5 with the eight treatments, N, K, P, N+P, N+K, P+K, N+P+K and control of the 1959 season were subjected to micro-spinning tests. Application of N was at 30 lbs. per acre as ammonium sulphate, K_2O at 100 lbs. per acre as potassium sulphate and P_2O_5 at 100 lbs. per acre as superphosphate. These samples were sown on 17th February, 1959 and picked from 1st July, 1959 to 1st September, 1959. They received 8 irrigations at 10-12 days intervals while the total rainfall from April to September, 1959 was 20.54″. It was found that none of the manurially treated samples came upto the level of the control in yarn strength. The N treatment and the P treatment had depressed the yarn-strength to a greater extent than the other treatments. Fibre tests carried out on them indicated that the K treatment and the N+P+K treatment yielded coarser fibres while the K, N+K and P+K treatments yielded somewhat weaker fibres than the control.

(iii) *Sowing date experiment on M.A. 5 and Selection 69 at Hiriyur under irrigation.*—These two varieties were sown on 24th May, 1959, 2nd June, 1959, 2nd July, 1959 and 16th July, 1959 at Hiriyur. The crops received 12 irrigations at 10 days intervals. The first rainfall was on 21st May, 1959 and 25th May, 1959 which extended upto 8th December, 1959. There were six pickings for M.A. 5 from 20th October, 1959 to 10th January, 1960 for all four sowing date samples while there were only four pickings from 18th November, 1959 to 10th January, 1960 for Selection 69 in all four cases. Fibre maturity and micro-spinning tests were carried out on the eight samples. It was found that the first (24th May, 1959) and the last (16th July, 1959) sowing date samples are likely to yield somewhat stronger yarns than the two middle sowing dates for both the varieties.

(iv) *Sowing date experiments at Bagalkot.*—The six varieties, 16X 98-41, Hagari, B.C.1, Jayadhar and Kumpta were raised at Bagalkot in the 1958-59 season, each with four different sowing dates, 8th August, 1958, 16th August, 1958, 3rd September, 1958 and 17th September, 1958. The samples received from each were subjected to micro-spinning tests. It may be recalled that similar tests on four varieties in the 1957-58 season were discussed in the last Report.

The dates of sowing, on the whole, did not produce any significant effect on yarn-strength in both the seasons.

(v) *Soaking seeds experiment on B.C. 1 and Jayadhar at Bagalkot.*—These two varieties were tried by sowing their seeds dry, after soaking seeds in water for 14 hours and after soaking for 24 hours in the 1958-59 season at Bagalkot. Micro-spinning tests carried out on their samples indicated that the dry sample of B.C.1 yielded stronger yarns than the two soaked samples while in the case of Jayadhar, the sample with seeds soaked for 14 hours gave stronger yarns than the other two samples.

IV. Kerala State

19. *Sea-Island 'Andrews' from Kerala State.*—Eighteen samples of Sea-Island 'Andrews' cotton from different centres in Kerala State were subjected to full spinning tests in the 1958-59 season. The results obtained are summarised in Table 27.

The mean fibre-length for these samples varied from 1.37″ to 1.14″ with an average of 1.28″. The mean fibre-weight per inch gave an average of 0.125 (10^{-6} oz.). All the samples seemed to be fully mature except the Wynad and Chalakudy samples. The Pressley Strength index value gave an average of 6.94. The variation in highest standard counts was from 92s to 72s with a mean value of 82s. Thus, it may be seen that this cotton raised in Kerala gave a spinning value which is 8 counts higher than that given by it in Mysore State.

TABLE 27

Results of tests on Sea-Island 'Andrews' (Kerala State)

Short title	Centre	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6} oz)	Maturity per-centages	Pressley strength index lb/mg.	Highest Standard counts
J. H. W.	Pariyaram	1·30	0·117	74-12-14	6·63	83s
T. P. R.	Irinjalakuda	1·30	0·131	78-7-15	7·29	87s
K. G. A.	Pariyaram (Chalakudy)	1·28	0·125	60-11-29	7·16	84s
A. M.	Kanjirapatty	1·37	0·138	68-10-22	6·73	86s
T. K. J.	Wadakkanchery	1·31	0·128	73-9-18	6·40	77s
T. V. K.	Vellanikkara	1·24	0·121	74-9-17	7·28	81s
K. K. I.	Kannamkulam	1·28	0·128	79-8-13	6·36	87s
C. V. K.	Kuttalloor	1·37	0·134	66-9-25	7·32	83s
P. T. R.	Perumudiyur	1·29	0·128	72-6-22	7·58	92s
V. B.	Kakkidi	1·29	0·129	64-12-24	7·08	86s
M. K. A.	Ottapalam	1·22	0·116	68-9-23	6·86	76s
K. I. G.	Thachempara	1·32	0·123	69-9-22	6·91	75s
R. R. M.	Nilambur	1·36	0·119	72-9-19	6·68	84s
K. T. V.	Pookottumana	1·30	0·125	73-8-19	7·21	78s
C. K. K.	Chungathara	1·26	0·124	68-8-24	7·22	87s
K. R.	Attapadi	1·14	0·129	74-8-18	6·78	73s
Shri J.	Wynad	1·27	0·121	55-16-29	6·78	72s
Agri. College Farm.	Vellayini	1·22	0·121	74-10-16	6·60	86s

20. *Mill tests on Sea-Island Andrews (Kerala);*.—Mill tests were carried out as in the case of the last season on two samples of Sea-Island Andrews from Kerala, one raised at Wadakkanchery and the other at Pookottumana in the 1958-59 season. The results of tests obtained at the mill and at the Laboratory are summarised in Table 28.

TABLE 28

Results of Mill and Laboratory Tests on Sea-Island 'Andrews' (Kerala)

	Vadakkancherry				Pookottumana			
	Mill Test		Laboratory Test		Mill Test		Laboratory Test	
	60s warp	80s weft	60s-4R	80s	60s warp	8ps weft	60s-4R	80s
Comber waste % ...	12·5	12·5	13·5	13·5	13·8	13·8	12·5	12·5
Turns per inch ...	35·91	41·07	28·92	33·44	35·91	41·07	28·92	33·44
Counts actual ...	58·8	79·4	60·5	80·2	59·1	78·9	59·6	79·9
Lea strength (lb) ...	35·8	22·1	33·2	23·4	36·3	21·2	34·2	24·5
Count-strength product ...	2105	1755	2009	1877	2145	1673	2038	1958
Corrected strength (lb) ...	35·1	21·9	33·5	23·5	35·8	20·9	34·0	24·5

The mill had stated in its Remarks that the Wadakkancherry sample gave better tensile for 60s than the standard while it was less than the standard for 80s. The shadow graphs of both yarns showed that the yarns were neppy. The test for 60s for the Pookottumana sample was just on the border of the standard. The mill was of the opinion that though these samples compared quite well with their Mixing for 100s/120s as far as staple length was concerned, they were lower in value in uniformity ratio and strength index. They gave lower spinning values due to these factors. They considered these to be barely suitable for 60s warp and 80s weft.

V. Madhya Pradesh

21. *Thinning trial at Badnawar on C.T.I. 4.21.*—The object of this experiment was to find out the effect of closer spacing on yield. A sample sown with three seeds per hole and thinned to one good seedling and another sown with three seeds per hole but not thinned, of C.T.I.-4-21 raised at Badnawar were received for full spinning tests. The yield per acre of kapas for the former was 514 lbs. while that for the latter was 690 lbs. The thinned sample was 18 per cent finer in staple than the non-thinned sample. Both gave practically the same (41s) spinning performance.

22. *Mill tests on improved varieties (M.P.)*

(i) *C.T.I. 4-25-4 against C.T. 1.4-21.*—Mill and Laboratory tests were carried out on the samples of these two varieties of the 1958-59 season raised at Badnawar and the results obtained are given in Table 29.

TABLE 29

Lea strength (lbs.) for 30s yarns

	Mill Test	Laboratory Test
C. T. I. 4-21	48·8	55·9
C. T. I. 4-25-4	55·6	64·9

It may be observed that C.T.1.4-25-4 yielded definitely stronger yarns than C.T.1.4-21 both by the Mill test and by the Laboratory test.

(ii) *A51-9 against Buri 0394.*— Mill and Laboratory tests on these two varieties raised at Khargone in the 1958-59 season were carried out during the year. It may be recalled that similar tests had previously been made in the 1956-57 season which were discussed in the 1958 Report. Comparative results of tests obtained at the Mill and the Laboratory in both seasons are given in Table 30.

TABLE 30

Lea strength (lb.) for 30s yarns

	1956-57		1958-59	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test
A 51-9	53·2	52·7	61·5	53·6
Buri 0394	45·2	44·9	54·2	47·1

A 51-9 gave definitely stronger yarns than Buri 0394 both by the Mill Test and by the Laboratory Test in both the seasons.

VI. Uttar Pradesh

23. *Six varieties from four centres in Uttar Pradesh.*—The six varieties UP. No. 1, 35/6 x G4M-11 x 35/6, x Jarilla, 51/50, C520 x C402 and 35/1 were raised in four centres, Bulandshahr, Nagina, Muzaffarnagar and Meerut in the 1958-59 season. They were subjected to fibre and full spinning tests. Statistical analysis applied to the results indicated that 51/50 gave the finest fibres and significantly better spinning value than the other five varieties including U.P. No. 1. Among the centres, these samples raised at Meerut had the longest and the finest staple and gave significantly better spinning performance than when raised in the other three centres. When raised at Bulandshahr they had the shortest staple and yielded significantly lower spinning value than the other three centres.

24. *Mill tests on improved varieties (U.P.).*

(i) *U.P. No. 1 against 35/1.*—Mill and Laboratory tests were carried out on these two varieties raised at Raya in the 1958-59 season. Comparative results of tests obtained at the Mill and at the Laboratory are given in Table 31.

TABLE 31

Lea strength (lb) for 18s yarns

	Mill Test	Laboratory Test
U. P. No. 1	93·1	89·7
35/1 (Commercial)	84·4	74·6

U.P. No. 1 gave definitely stronger yarns than the control 35/1 both by the Mill test and by the Laboratory test.

(ii) *Two American hybrids against 216F.*—Two hybrid varieties, Iran 1 x P. Am. 1 and 100F x Parb. Am. x 100F/6 were subjected to Mill and Laboratory tests against the control 216F. Comparative results of tests are given in Table 32.

TABLE 32

Lea strength (lb) for 18s yarns

	Mill Test	Laboratory Test
Iran 1 × P. Am. 1	97·3	104·4
100F × Parb. Am × 100F/6	98·5	101·8
216F (Commercial)	95·8	103·2

The two hybrids have given somewhat stronger yarns than the control 216F according to the Mill test while no such difference was observed by the Laboratory test.

VII. Punjab State

25. *Mill tests on improved varieties (Punjab):*

(i) *L.L. 54 against 320F.*— It may be recalled that Mill and Laboratory tests were carried out on these two varieties raised at Abohar in the 1957-58 season which were discussed in the last Report. Similar tests were carried out in the 1958-59 season also. Comparative mill and Laboratory results obtained in both the seasons are given in Table 33.

TABLE 33

Lea strength (lb)

	1957-58 40s yarns		1958-59 30s yarns	
	Mill Test	Laboratory Test	Mill Test	Laboratory Test
L. L. 54	46·0	47·4	59·8	59·5
P. A. 320F	21·2	20·3	57·9	51·4

L.L. 54 gave appreciably stronger yarns than P.A. 320F both by the Mill test and by the Laboratory test in the 1957-58 season. But, in the 1958-59 season though L.L. 54 yielded definitely stronger yarns than P.A. 320F in the Laboratory, the difference was small in favour of L.L. 54 according to the Mill test.

(ii) *H. 14.*—Mill and Laboratory tests were carried on H. 14 cotton raised at Hansi in the 1958-59 season. The mill gave a test of 52.4 lbs. while the Laboratory obtained a test of 49.9 lbs. for 30s yarns for this variety, indicating thereby that it may be suitable for spinning upto 30s yarns in the mill.

VIII. West Bengal State

26. *Four samples of D5 (Parbhani-American).*—Four samples of Parbhani-American, oblong white, oblong green, round green and round white were raised in the State Agricultural Farm, Tollygunge, in the 1958-59 season. The grouping of all the four types — two oblong and two round ones — has been provisionally made within the variety D5 (West Bengal-American) with its original source in Parbhani-American. They were evolved in secondary selection in D5. The size and shape of the boll with soft white lint and characteristic white and green fuzz were indicative of Dharwar-American and Madras-American blood mixed in them. They were sown on 6th July, 1958 and harvested from December, 1958 to February, 1959. They were subjected to fibre and micro-spinning tests and the results are given in Table 34.

TABLE 34

Test Results for West Bengal American

Variety	Designation	Size and shape of boll	Ginning %	Mean fibre length (inch)	Mean weight per inch (10^{-6}oz)	Maturity Co-efficient	Pressly strength index lb/mg	Lea strength for 40s (lb)
D5 (Parbhani-American)	Oblong white	Oblong with white soft lint and fuzz	28·5	0·98	0·123	0·76	6·52	39·7
,,	,, green	Oblong with white soft lint and green fuzz	27·9	0·96	0·126	0·74	6·10	37·7
,,	Round white	Round with white soft lint and fuzz	31·2	0·96	0·120	0·76	6·85	34·5
,,	,, green	Round with white soft lint and green fuzz	30·2	0·94	0·131	0·77	7·34	33·1

The two Round samples yielded some $2\frac{1}{2}$ per cent higher ginning percentage and had higher Pressley Strength index values than the two Oblong samples. But, the two Round samples gave weaker yarns than the Oblong samples. The sample with white fuzz gave slightly higher ginning percentage and somewhat stronger yarns than the sample with green fuzz in both the oblong and round types.

IX. Assam State

27. *Sea-Island 'Andrews'.*—A sample of Sea-Island 'Andrews' cotton raised in the District Seed Farm, Kakikuchi, Kamrup district in Assam in the 1958-59 season was received for tests. It had a mean fibre-length of 1.18" so that it did not come upto the level of its samples grown in Kerala and Mysore States. The mean fibre-weight per unit length was about the same as the Kerala and Mysore samples. It was well mature as it contained 65% mature fibres. The Pressley Strength index value (6.67) was on the low side. It gave a yarn-strength test of only 25 lbs. for 60s carded yarns while the Laboratory standard for 60s is 28 lbs.

X. General

28. *Tests on improved varieties from distributed seed at various stages of of multiplication.*—Fourteen improved varieties belonging to different stages, each received from different centres, were tested in the 1958-59 season. They were Virnar and Daulat from Maharashtra State, Digvijay, Vijalpa, Kalyan, Pratap and Deviraj from Gujarat State, Laxmi, Jayadhar and Deviraj from Mysore State, M.C.U. 2, P.216F and K.2 from Madras State and C. Indore-1, from Rajasthan State. The highest standard counts obtained for the different stages of these varieties in this season are tabulated in Table 35. It may be seen from this Table that there was no general decline in quality as the stage of multiplication advanced, thus confirming the previous finding. There are, however, a few exceptions, viz., Pratap at Botad, Daulat at Hingoli, Digvijay at Haldar and Jayadhar at Bailhongal and Bijapur supplied by the Cotton Officers.

29. *Results for Extra-long staple (1.1/16" and above) cottons of 1958-59 tested from different States.*—The test results of full-scale spinning carried out on the extra-long staple material developed in various States under different schemes of the Indian Central Cotton Committee are being published in the Annual Reports of the Laboratory in view of the necessity of developing such strains in the country. This would help the Breeders to draw upon the material for use in their breeding programme. Accordingly, the available results for such cottons tested in the 1958-59 season at the Laboratory are given in Table 36.

TABLE 35

Highest standard counts, 1958-59 season.

Improved varieties in various stages of multiplication.

Sr. No.	Improved variety	Place grown	Source of sample	Stage					
				1	2	3	4	5	6
	Maharashtra State :								
1	Virnar	Jalgaon	The Cotton Breeder, Jalgaon	25	24	24	...	...	...
	,,	Dhulia	-do-	...	23	26	22	...	...
	,,	Yawal	-do-	...	...	27	25	...	...
	,,	Amalner	-do-	...	...	25	27	...	...
2	Daulat	Parbhani	Cotton Supervisor, Parbhani	...	...	32	31	31	29
	,,	Hingoli	Agricultural Assistant Hingoli	33	34	26	29	...	...

TABLE 35—(*Contd.*)

Sr. No.	Improved Variety	Place grown	Source of sample	Stage					
				1	2	3	4	5	6
	Gujarat State:								
3	Digvijay	Haldar	Agricultural Officer, Dabhoi	...	49	49	42	...	...
	,,	Derol	-do-	44	47	49	44	...	...
	,,	Dakor	-do-	...	44	43	45	...	...
	,,	Sadhli	-do-	...	46	...	...	...	...
	,,	Jambusar	-do-	...	...	43	...	...	...
	,,	Varnama	-do-	46	...	...	...	...	...
	,,	Talod	-do-	45	...	...	...	...	...
	,,	Idar	-do-	...	...	...	44	...	...
	,,	Dhansura	-do-	...	...	...	46	...	...
	,,	Samlaya	-do-	...	45	...	...	...	...
	,,	Dabhoi	-do-	45	...	...	44	...	...
4	Vijalpa	Surat Farm	Cotton Specialist, Gujarat State, Surat.	35	...	...	...	...	...
	,,	Athwa	-do-	35	35	36	...	...	...
	,,	Navsari	-do-	34	32	33	...	...	...
	,,	Maroli	-do-	...	31	...	...	...	...
	,,	Mangrol	-do-	...	...	33	...	...	...
	,,	Abrama	-do-	...	...	36	...	...	...
5	Kalyan	Viramgam	Cotton Superintendent, N. G., Viramgam.	26	...	24	...	...	...
	,,	,,	Cotton Breeder, Viramgam	22	21	22	...	...	...
	,,	Bavla	-do-	21	21	21	...	...	...
	,,	,,	Cotton Officer, Bavla	27	29	30	...	...	...
	,,	Kadi	Cotton Breeder, Viramgam	20	22	20	...	...	...
	,,	,,	Cotton Supervisor, Kadi	32	31	32	...	...	...
	,,	Limbdi	Cotton Superintendent, Surendranagar.	...	28	...	...	...	...
6	Pratap	Botad	Cotton Superintendent, Botad	...	22	22	12	...	...
7	Deviraj	Halvad	Cotton Superintendent, Surendranagar.	35	35	...	...	...	...
	Mysore State:								
8	Laxmi	Gadag	Cotton Supervisor, Gadag	...	...	37	36	38	37
	,,	,,	Agricultural Officer, L.C.I. Scheme, Gadag.	...	37	36	39	42	...
	,,	Annigiri	-do-	...	...	...	40	41	40
	,,	Ron	-do-	...	...	...	38	39	38
	,,	Hungund	Cotton Officer, Hungund	...	...	44	40	44	...
	,,	Haveri	Cotton Officer, Haveri	...	...	37	41	40	37
	,,	Muddebihal	Cotton Officer, Muddebihal	...	...	39	...	...	38
9	Jayadhar	Dharwar	Cotton Breeder, Dharwar	...	...	34	35	35	35
	,,	Kagawad	Agricultural Assistant (Cotton), Kagawad.	...	...	34	29	34	32
	,,	Bailhongal	Cotton Officer, Bailhongal	...	...	35	36	32	28
	,,	,,	Cotton Breeder, Dharvar	...	...	...	35	34	32
	,,	Hubli	Cotton Supervisor, Hubli	...	...	31	33	32	31
	,,	,,	Cotton Breeder, Dharwar	...	...	...	35	37	36
	,,	Bagalkot	Cotton Supervisor, Bagalkot	...	...	30	30	31	32
	,,	Bijapur	Cotton Officer, Bijapur	...	...	33	32	25	26
	,,	,,	Cotton Breeder, Dharwar	...	...	...	35	36	34
10	Deviraj	Mudhol	Agricultural Assistant, (Cotton) Mudhol.	...	38	...	...	33	...
	Madras State:								
11	M.C.U. 2	Srivilliputtur	Special Agricultural Demonstrator, Srivilliputtur (South).	...	...	41	42	...	...
12	P 216F	Manaparai	Special Agricultural Demonstrator, Manaparai.	...	42	42	38	38	...
13	K 2	Kovilpatti	Special Agricultural Demonstrator, Kovilpatti.	...	...	28	25	26	...
	Rajasthan :								
14	C. Indore 1.	Kapasin	Cotton Supervisor, Kapasin (Chittorgarh Dist.)	...	26	26	...	...	...

TABLE 36

Results for extra-long staple cottons (1 1/16″ and above) tested for full spinning in 1958-59.

Serial No.	Name of variety	Place	Mean fibre length (in.)	Mean fibre weight per inch (10^{-6}oz)	Maturity coefficient *	Pressley strength Index lb/mg.	Highest standard counts
	I. Gujarat State :						
1	I.S.C. 67–3	Surat	1·11	0·097	0·64	6·70	40s
2	I.S.C. 67–4	,,	1·10	0·091	0·63	7·28	44s
3	I.S.C. 70–1–5	,,	1·08	0·090	0·60	7·30	50s
4	I.S.C. 37–1	,,	1·12	0·097	0·65	6·83	42s
5	68–G–4–4	,,	1·10	0·099	0·65	5·88	40s
6	134–Co2 M21–B–3 ...	,,	1·07	0·104	0·68	6·84	46s
7	134–Co2 M21–B–5 ...	,,	1·12	0·096	0·63	6·82	48s
8	134–Co2 M	,,	1·10	0·098	0·64	6·72	42s
9	I.S.C. 67 × Sea Island ...	,,	1·18	0·090	0·61	7·36	52s
10	I.S.C. 67 × Moco ...	,,	1·18	0·094	0·62	7·78	53s
11	I.S.C. 67 × Andrews ...	,,	1·18	0·085	0·56	7·49	52s
12	68 × Sea Island	,,	1·16	0·088	0·59	7·10	52s
13	68 × Maco	,,	1·14	0·097	0·64	7·20	56s
14	68 × Andrews	,,	1·20	0·088	0·58	6·84	48s
15	134–Co2M21 × Moco ...	,,	1·22	0·088	0·59	7·58	60s
16	134–Co2M21	,,	1·13	0·095	0·63	7·36	50s
17	170–Co2	Kadiadra	1·08	0·153	70–12–18	6·74	38s
18	134–Co2M Surat	,,	1·14	0·128	58–13–29	6·92	41s
19	134–Co2M Kadiadra ...	,,	1·14	0·118	55–14–31	7·86	40s
20	134–Co2M21	,,	1·16	0·118	47–12–41	7·53	42s
21	I.S.C. 67	,,	1·18	0·117	50–16–34	6·90	44s
22	I.S.C. 67	Broach	1·18	0·101	0·65	6·36	44s
23	I.S.C. 67	Kosad	1·22	0·105	0·68	7·22	...
24	I.S.C. 67	Talod	1·14	0·108	0·70	6·90	...
25	I.S.C. 67	Kholwad	1·14	0·099	0·66	6·11	40s
26	MDB 14–37–27	Junagadh	1·07	0·153	0·80	5·05	40s
27	SA 2–17–21	,,	1·09	0·150	0·81	6·34	42s
28	SA 24–26–23	,,	1·13	0·133	0·76	6·06	41s
29	134–Co2 M	Vijapur	1·09	0·113	0·70	6·42	42s
	II. Maharashtra State :						
30	Sh–12–9	Achalpur	1·14	0·130	0·77	...	43s
31	1371	,,	1·18	0·120	0·74	...	45s
32	245	,,	1·08	0·162	0·83	...	48s
33	A47	,,	1·09	0·156	0·80	...	43s
34	B147	Nagpur	1·08	0·151	0·79	...	43s
	III. Madhya Pradesh :						
35	C.T.I. 4–21–14	Badnavar	1·14	0·131	0·76	...	52s
36	C.T.I. 4·25·2	,,	1·08	0·140	0·78	...	50s
37	C.T.I. 4–25–4	,,	1·14	0·149	0·80	...	52s
38	C.T.I. 4–58	,,	1·07	0·138	0·76	...	48s
39	C.T.I. 1–6–3	,,	1·09	0·144	0·78	...	43s
40	C.T.I. 4–23–5–3	,,	1·07	0·126	0·74	...	50s
41	C.T.I. 4–20–1–2	,,	1·16	0·131	0·73	...	58s
42	C.T.I. 4–21–14–5	,,	1·10	0·127	0·75	...	49s
43	C.T.I. 4–25–2–8	,,	1·14	0·139	0·76	...	49s
44	C.T.I. 4–25–6–2	,,	1·08	0·148	0·79	...	53s
	IV. Mysore State :						
45	Sea Island Andrews ...	Different centres.	1·32″–1·11″	0·099–0·146	0·79–0·66	7·89–6·58	85s to 59s
	V. Kerala State :						
46	Sea Island Andrews ...	-do-	1·37″–1·14″	0·116–0·138	79–60	7·58–6·36	92s to 72s

*Higher than 0·9 are highly mature, 0·7 to 0·9 medium mature & below 0·7 low mature.

B. STANDARD INDIAN COTTONS

As in the past, extensive fibre and spinning tests were carried out on the Standard Indian cottons of the 1958-59 season which covered as much as 57 per cent of the total area under cotton cultivation in India. It was estimated that growers of these improved varieties in place of the previous local varieties were benefitted by an additional gross income of as much as 21.2 crores of rupees in the 1957-58 season alone. A technological bulletin (No. 101) embodying the results obtained for these varieties was published during the period under review.

In the 1958-59 season, out of 22 varieties tested, four of them had recorded an improvement, three of them had registered a decline in spinning value while the other 15 had maintained their performances. Buri 0394 from Maharashtra, Vijay from Gujarat and the two Karunganni varieties from Madras State had recorded an improvement in spinning value over the last season. The three varieties, Jayadhar and Laxmi from Mysore State and P.A. L.S.S. from the Punjab had registered a decline in spinning value as compared with last year.

Some of the standard cottons of the 1959-60 season have been received for tests during the period and tests on them are in progress.

C. TRADE VARIETIES

Samples of fair average quality of the principal trade varieties of Indian cottons of 1958-59 season were obtained with the assistance of the East India Cotton Association and the Madras Agricultural Department. Representative kapas samples of these varieties were also obtained from market committees and other sources in order to determine the ginning percentages which were incorporated in these reports. The fibre and spinning test results, ginning percentage and other results obtained for each variety were, in the first instance, published in 2-3 page technological circulars as early in the season as possible to provide useful information to the cotton trade and the industry. These were later compiled and published as a Technological Bulletin (No. 102) entitled "Technological Reports on Trade Varieties of Indian cottons, 1959" during the period under review. In the 1958-59 season, Deviraj (170-Co2), from Manavadar and Veraval, were added to the list as this cotton is now cultivated on a large scale. Westerns (Anantapur) was removed as its samples were not received for tests for the last four years and Farm Westerns (Bellary) is already in the list. Samples of Jarila (Berar), C.P. No. 1, L.S.S., Tinnevelly and A.R. Jinja were not received for tests in this season, as these were not available in the Bombay market.

It was decided by the Indian Central Cotton Committee in July 1959 that the results of tests for Tanganyika cottons of the two varieties, Mwanzas and Central Line, should be included in this bulletin. Accordingly, their results have been included in this bulletin. In this connection, the results for both Mwanzas (Landside) and Mwanzas (Lake side) have been included besides Central Line since the East India Cotton Association was of the opinion that both are representative of Mwanza type largely imported into India.

In this bulletin, results of tests for maturity coefficient obtained on micronnaire by using a spacer have been added for the first time. Cottons which have a value higher than 0.9 are highly mature, those having values between 0.7 and 0.9 are medium mature while those having values below 0.7 are of low maturity. As a result of investigations carried out at the Laboratory, the technique of testing by the Pressley tester was modified, thereby eliminating some of the errors likely to occur in these tests. The modified technique was employed for testing most of the cottons of the current season.

A summary table has been added in this Bulletin for the first time giving the results for all trade varieties of the current season, 1958-59. This will facilitate reference to all the results at a glance as they are all in the same Table.

The question of the revision of the list of trade varieties had been engaging the attention of the Indian Central Cotton Committee for sometime past and this list was finally approved by the Committee in January 1960 containing 62 varieties. The East India Cotton Association was requested to supply samples of the 1959-60 crop in accordance with this revised list. They have been able to supply samples of only 15 of these varieties so far and they have intimated their inability to supply 15 of these samples as they stated that the cotton crop had not grown in sufficient quantities in this season and most of the cottons arriving in Bombay are diverted to mills direct from the railway yards. They further state that samples representing fair average quality of the season in respect of some varieties are not available in the Bombay market and some do not at all come to the Bombay market. Those that were received have been tested and technological circulars are being issued on them.

II. 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 below shows the number of samples received during the period under review. It will be seen from these figures that the total number of samples received during the year was 1,517 as against 1,781 of the last

TABLE 37

Number of samples received in the Testing House.

Nature of test.	Average No. of samples received.			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960
	1943-1948	1948-1953	1953-1958					
Spinning tests ...	75	68	89	105	75	76	68	64
Fibre tests	144	110	161	137	124	240	98	254
Yarn tests	97	188	233	383	242	243	405	174
Cloth tests	95	115	390	573	422	373	354	188
Moisture tests ...	2	5	168	31	186	615	806	821
Miscellaneous tests ...	7	6	29	50	55	16	50	16
Total ...	420	492	1,070	1,279	1,104	1,563	1,781	1,517

year recording a fall of about 15% over the last year. The fall is particularly noticeable in the number of samples for yarn and cloth tests; however there is an appreciable increase in them for fibre tests.

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 organisations are listed below:—

1. Merchants
2. Mills
3. Manufacturing concerns
4. Central Government Departments
5. Bombay State Road Trade Corporation
6. Bombay Municipal Corporation
7. Surveyors etc. etc.

Generally most of the samples received for testing were of routine nature but a few worthy of special mention are given below :—

(1) Samples of dyed poplin cloth with ribbon effect along the warp, were received for investigation of the causes for such defect. The tests indicated that the ribbon effect was not due to any defect in the construction of the material, but may be due to either faulty scouring or due to defects in dyeing with vat dye that has been used.

(2) A sample of twill cloth was received for testing tensile strength with and without selvedge ; no difference in strength between them was observed and a report was issued accordingly.

(3) Nine samples of cloth stated to be treated to resist mildew attack, were received for testing the efficiency of the treatment. The samples were tested for Resistance to Mildew and a report giving the rank in descending order of merit for this property was issued.

(4) A sample of canvas with yellow and black stains was received to investigate the causes of such stains. The stains were found to be caused by mildew growth.

(5) Three samples of Jacquard Tapestry with weft bars were received for determining the causes of such defects. Any defect in construction could not have occurred. It appeared that pirns from cheeses dyed in different shades might have been used in the manufacture of the fabric, which may be responsible for the defect.

(6) A sample of raised cloth with stains was submitted for testing to ascertain if the stains affected the strength of the cloth. A comparative test of stained and unstained portions for tensile strength indicated no loss in strength was suffered due to the stains.

The total number of samples tested since the inceptions of the Testing House is 16,313, the average per annum being 680.

III. FIBRE TESTS

Samples on which fibre tests were done by the Fibre Testing Section fall under the following categories :—

(i) Samples received from the Government Agricultural Farms,

(ii) Standard Indian cottons, on which more elaborate tests than all other types of samples are done.

(iii) Commercial samples received from mills, trade organisations, East India Cotton Association, etc.

(iv) Samples connected with ginning, technological and other investigations, undertaken at the Laboratory, and

(v) Miscellaneous.

The number of samples tested for fibre properties under different categories in the current year together with the corresponding figures for the previous four years and average for the period 1946-48 and two 5-year periods 1948-53 and 1953-58 for purposes of comparison are given in Table 38, which shows that during the period under review, fibre tests were made on 2,593 samples recording an increase of 15 per cent as compared with last year.

TABLE 38

Number of samples tested in the Fibre Testing Section.

	Average			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960
	1946-1948	1948-1953	1953-1958					
Standard	20	17	22	21	21	30	22	18
Agricultural (spun) ...	446	475	701	958	794	759	820	929
Agri. (for fibre tests only)	116	190	447	374	610	736	1,055	1,170
Commercial ...	182	197	315	253	271	409	224	400*
Ginning	137	64	51	17	88	49	27	47
Technological ...	98	58	72	30	2	64	44	26
Miscellaneous ...	13	27	24	...	...	...	64	3
Total ...	1,012	1,028	1,632	1,653	1,786	2,047	2,256	2,593

* 69 samples received from the East India Cotton Association.

Most of the tests carried out on small size samples were of a routine nature, but a few of them deserving mention are given blow.

1. *Tests on dfferent pickings of four varieties at Nandyal.*—The 1st, 2nd and 3rd picking samples of the four varieties 123, 122, 5975 and 331 raised at Nandyal in the 1958-59 season were subjected to fibre tests and the test results showed that for these varieties the differences in fibre-properties between different pickings were small and non-significant.

2. *Tests on Sea Island Andrews from Andhra Pradesh.*—Four samples each raised at a different centre of Sea Island Andrews representing stray pickings collected by the Cotton Specialist, Nandyal, in the 1958-59 season were received for fibre tests. The trials were arranged in scattered places in the Agency tracts. The test results obtained are given in Table 39.

TABLE 39

Fibre test results for Sea Island Andrews in Andhra Pradesh.

Centre	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6} oz)	Maturity coefficient	Pressley strength index lb/mg.
Rampachodavaram	1·28	0·127	0·74	7·77
Araku Valley	1·28	0·132	0·77	7·19
Adakulagudam	1·41	0·139	0·77	7·08
Nandyal	1·30	0·129	0·76	7·06

These results compare quite favourably with those obtained for Sea Island Andrews in Kerala and Mysore States.

3. *Progenies of Giza 12 in Faridkot.*—Four samples, A, B, C, D raised in the 1958-59 season from the progeny of a plant of Giza 12, the seeds of which were supplied by the Indian Central Cotton Committee some five years ago, were received for tests. The plant has been acclimatised at Faridkot for five years. It was grown according to normal agricultural practices. Five irrigations were given and 50 lbs. N per acre in the form of ammonium sulphate was applied. The mean fibre-length lay in the neighbourhood of 1.02″ and the mean fibre-weight per inch 0.130 (10^{-6})oz. They were medium mature.

4. *Tests on Sea Island Andrews from Berhampore (West Bengal).*—A sample of Sea Island Andrews cotton raised in the State Agricultural Farm, Berhampore, in the 1959-60 season was received for fibre tests. The soil is sandy loam. It was sown on 27-5-59 which germinated on 4-6-59. The rainfall was 71.44″ from April to October 1959. It was heavily manured with 150 maunds cowdung, 100 lbs. ammonium sulphate, 200 lbs. superphosphate and 100 lbs. muriate of potash per acre. The previous crop was Brassica. Attack of leaf roller was controlled by Folidol spray. Virulent attack of Anthracnose disease was caused by colletorio gossypi. The crop was therefore sprayed with Perenox, 4 lbs. in 100 gallons of water solution at 21 days intervals. But, no change occurred. The stand and growth of the crop was good, but malformation of flowering shoot began

to appear at the boll formation stage. As a result, bursting of bolls was not upto the mark as expected. In major cases, bursting did not take place at all. The first picking was on 28-11-59, the second on 18-12-59 and the third on 13-1-60. One more harvesting was expected from the crop. It gave a ginning percentage of 29.6. Its fibre-properties compared quite favourably with those obtained for Sea Island Andrews from Kerala and Mysore States.

5. *Tests on Pot cultures from West Bengal.*—An experiment was conducted on planting dates with sowings at intervals of 30 days under "Potculture" conditions on the three varieties, D5 (West Bengal, American), Sea Island Andrews and H14 (Punjab-American) in 1958-59 season at the State Agricultural Research Institute, West Bengal, Calcutta. The sowing dates were 10-4-58, 10-5-58, 9-6-58, 9-7-58, 8-8-58, 7-9-58 and 7-10-58. Ginning percentage and fibre tests were carried out on these samples. It was found that there was a sudden fall in mean fibre-length for Sea Island Andrews when sown after August. Similarly, the percentage of immature fibres increased considerably in all three varieties when sown after August. Even August sowings showed this tendency in the case of H14. Consequently, the mean fibre-weight became considerably finer in these cases for the two Americans.

6. *Yellow and white flowered Sea Island Andrews under Pot culture.*—The white-flowered type of Sea Island Andrews and the yellow-flowered type of Andrews with brown lint were tried under 'Pot culture' in the above experiment. It was found that the yellow-flowered type gave a 6 per cent higher ginning percentage than the white-flowered and was also much coarser in staple.

7. *Russian type G5901 at PIRRCOM, Coimbatore.*—Irrigated and rain-fed samples of this Russian cotton were received for fibre tests from the PIRRCOM centre at Coimbatore. They were sown on 14-9-59 and the first picking was made on 11-1-60. Rainfall during crop growth was 17.80″ in 20 rainy days. The irrigated crop received seven irrigations. It was found that both samples had practically the same ginning percentage (35.6). The rain-fed sample was somewhat shorter but 23 per cent finer in staple than the irrigated sample. Both samples were medium mature.

IV. RESEARCH WORK IN PROGRESS

A. Ginning Probelms.

1. ***Pre-cleaning and Ginning tests on Indian cottons.***—It was stated in the previous report that the Technological Leaflet on 170-Co.2 cotton was under preparation and that the pre-cleaning and ginning tests on Vijalpa cotton were in progress. During the period under review, leaflet on 170-Co.2 cotton was published; pre-cleaning and ginning tests, spinning, yarn and fibre tests etc. on Vijalpa cotton were completed. The results obtained from these tests were written up ; the manuscript for the leaflet prepared and sent for publication as a Technological Leaflet.

Further, kapas sample of 134-Co.2M, selected for the pre-cleaning and ginning tests for the next season, is expected to be received shortly. The present report, therefore, deals with the conclusions drawn from the tests made on Vijalpa cotton, which are given below:--

(i) *Pre-cleaning.*—The output in H.E. opener was more than four times that in the other two openers. The power consumed by Platts' opener was more than twice that by F.E.C. and four times that by H.E., which is partly due to the absence of ball bearings in the Platts' Opener. The amount of trash removed by all the three openers was nearly the same, being about 2%.

(ii) *Effect of pre-cleaning.*—(a) When ginned in the saw-gin the unopened seed cotton gave a higher output of lint per hour and a lower power consumption, while that opened in Platts' Opener gave a lower output per hour than that opened in other openers. The ginning percentage of the unopened seed cotton was lower than that opened in all the three openers. (b) When ginned in Double Roller gin the unopened seed cotton gave a higher output of lint per hour and a lower power consumption than that opened in other openers. The yarn strength, on the whole, was unaffected by pre-cleaning treatment.

(iii) *Comparison of Gins.*—(a) As usual, the saw ginned samples gave about one per cent lower ginning percentage than roller ginned samples. (b) The single roller gin consumed more power than the other two gins. (c) Samples ginned on saw gin gave stronger yarns than those ginned in the two roller gins. (d) The yarns obtained from saw-ginned samples were more neppy than those obtained by the roller ginned samples. (e) Grader's valuation for saw-ginned lint was higher than that for roller-ginned samples.

(iv) *Effect of feed in Saw gin.*—(a) Output of lint per hour was increased and power consumption decreased with the increase of feed step from No. 2 to No. 4 with the saw shaft speed of 680 R.P.M. (b) Grader's valuation for the samples ginned with feed step No. 2 was higher than that ginned with feed step No. 3 and 4.

(v) *Effect of overlap and speed in Double Roller gin.*—(a) An overlap of 3|8″ gave higher output of lint per hour and lower power consumption than an overlap of 5|16″ at both the speeds. (b) The samples ginned with higher speeds of 1030 o.p.m. gave higher output of lint per hour and lower power consumption than the lower speed of 960 o.p.m., for both the overlaps. (c) The samples ginned with different speeds and different overlaps, did not show any marked effect on fibre properties, ginning percentage, blow-room loss, neppiness and yarn strength. (d) Grader's valuation for the samples ginned with lower speed of 960 o.p.m. was higher than for the samples ginned with higher speed of 1030 o.p.m. for both the overlaps.

(vi) *Effect of overlap and speed in Single Roller gin.*—(a) The output of lint per hour was higher and the power consumption lower at both the speeds of the roller when the overlap was 3|8″. (b) The higher speed of 210 R.P.M. of roller

gave a higher output of lint per hour than the lower speed of 180 R.P.M. for all the overlaps. Such high speeds, however, cannot be recommended for continuous work at the factory. (c) Grader's valuation for the lint ginned with shortest overlap of $\frac{1}{4}''$ was lower than that for the lint ginned with highest overlap of $3/8''$ at the higher roller speed of 210 R.P.M.

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

2. *Investigation on the formation of neps during ginning.*—The effect of pre-cleaning and ginning, of feed steps in saw ginning and of various overlaps and speeds in single and double roller ginning on the formation of neps was being investigated during the last few years, with a view to finding out which treatment is most suited to get lint with least number of neps without sacrificing the quality and the output of lint. In all, 12 cottons viz., Cambodia Co.2, Laxmi, Karunganni, Westerns-1, M.C.U.1, Kalyan, Jayadhar, Gaorani-6, 320F, 170-Co.2, Sea Island Andrews and Vijalpa were tested ; the last one was tested during the period under review.

A paper entitled "Formation of neps during ginning" embodying the results obtained from the above investigation was presented at the Second All India Spinners, Breeders and Ginners Conference held in February-March 1960.

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

3. *Economic and Technical Survey of the existing gins in India.*—It was mentioned in the last Annual Report that out of the 350 factories selected on a random sample basis, replies to the Questionnaire issued by the Laboratory had been received from 224 factories. During the period under review, replies were received from 45 more factories totally making up 269 factories. Most of these factories from whom replies are yet to be received are in the Punjab and Maharashtra States. Reminders have been issued. In the meanwhile, the data so far obtained are being analysed.

This work is being supervised by Shri V. Venkataraman.

4. *Fabrication of an Extractor for improving the ginning of kapas.*—Few parts for the fabrication of a small size extractor for removing immature locks and hulls from the seed cotton were prepared and few others required for it were given to local workshop for fabrication. These parts have been received recently and further work on the assembly and fabrication of other parts etc. is in progress.

This work is being done by Shri D. G. Shete.

B. Investigations of Fibre-Properties.

5. *Work of pulling of fibres from seed in relation to fibre properties and percentage of seed coat removal.*—Broad conclusions obtained from this investigation were reported in last year's Annual Report. During the period under con-

sideration, the data were further analysed and a paper embodying the chief findings of this investigation is being written up.

This work is being done by Shri Jai Prakash.

6. *Study of variation between seeds of the same strain.*—(a) *Fibre-length uniformity.*—A paper on the study of variation of fibre-length within and between the seeds of the same strain was prepared and sent for publication in the Indian Cotton Growing Review.

This work was done by Shri T. V. Krishnan.

(b) *Bundle strength.*—It was mentioned in the last Report that 17 cottons were tested for Stelometer-value at two regions of a seed (side and chalazal), on 25 seeds of each variety. During this period, five cottons were tested, of which two were repetitions. Thus the results for 20 cottons are available.

Mention was also made in the last Report that results for 14 cottons were analysed. In addition to this, 2 more cottons were statistically analysed during the period under review. The results of all 16 cottons confirmed the same trend and range given in last Annual Report, namely :

(1) The coefficient of variation of bundle strength ranged from 12.9% to 22.6% for side-region fibres and from 12.9% to 24.9% for chalazal-region fibres.

(2) In general, the coefficient of variation of chalazal region strength was higher than that of side-region strength.

(3) The seed weight plotted against embryo-weight showed good relation between the two attributes. The ratio, seed weight/embryo-weight, was nearly 1.90. The seeds of G. *hirsutum* variety were heavier as compared with the seeds of G. *arboreum* and G. *herbaceum* species.

(4) The seed-weight did not bear any significant relationship with the fibre-strength of chalazal region, for 13 cottons. For 3 cottons, it was significant.

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

(c) *Chalazal fibre-immaturity.*—A paper comprising the chief results of the above investigation was submitted at the 2nd All India Spinners, Breeders, and Ginners Conference held at Bombay in February-March, 1960. Some of the important conclusions are given below :

(i) The mean maturity coefficient for side region fibres was invariably higher than that for chalazal region fibres although cottons with high side region fibre maturity generally exhibited a similar trend in the chalazal region fibre maturity, the correlation coefficient between the two being +.572.

(ii) The coefficient of variation of maturity coefficient from seed to seed for chalazal region within a cotton was considerably higher as compared to that of side region although, between cottons, c.v. of side and chalazal maturity coefficient showed a very high correlation, +0.722 (significant at 1% level).

(iii) The difference between side and chalazal region fibre maturity coefficients, expressed as percentage of the latter was found to be highly correlated with the number of neps per gram in the corresponding yarns of 20s count.

(iv) The seed weight and embryo weight showed a very high relationship, both within and between varieties, the overall correlations being +0.870 and +0.983 respectively, highly significant statistically. It was observed that generally c.v. of embryo weight was higher than that of seed weight although the c.v. for both were highly correlated.

(v) The correlation coefficient between seed weight and chalazal fibre maturity within variety was found to be highly significant.

This work is being done by Shri Jai Prakash and Shri V. G. Munshi.

7. *Study of the properties of fibres collected from bolls of different ages.*—

(a) *Structural Properties.*—In continuation of the tests carried out earlier on Vijalpa, Devitej, L.S.S. and Virnar cottons, degree of thickening, reversals per cm., convolution angle and bundle strength at 1/8″ gauge length were determined on the chalazal and side regions of fibres of 170-Co.2 cotton extracted from bolls at six stages of development. Tests on Vijalpa for the second season are under way.

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

(b) *Chemical analysis of fibres.*—The D.P. Value has been estimated on some samples, after dewaxing, soaping and conditioning the samples taken from different stages of boll development i.e., 31, 38, 45, and 59 days in case of varieties, viz., Deviraj, Vijalpa, 170-Co.2 and 2087. The result obtained indicated that there was, in general, a gradual increase in D.P. value with increase in the age of the boll. Investigation is in progress and is being done by Shri S. N. Pandey.

8. *Study of fibres from chalazal and side region of the seed.*—(a) and (b) *X-ray angle and Bundle strength.*—22 X-ray diffraction photographs for fibres collected from side and chalazal regions of the seeds for 11 cottons were taken. The x-ray angles for most of the cottons have been measured and the rest are in progress. It may be mentioned here that, generally, the x-ray angle for the side regions is lower than that for the chalazal region. Further work is in progress.

Bundle strength which is being done on these samples also indicate that the side fibres are stronger than the chalazal fibres.

(d) *Fibre-maturity.*—The fibres from side and chalazal regions were separated from 50 seeds of each of five cottons, viz., Cambodia-Co.2, 0394-Buri,

170-Co.2, K-5 and Jayadhar, and maturity tests were made on the sliver using caustic-soda method. It was noted that the maturity index of side region was generally higher than that of chalazal region.

The work is in progress and is being done by Shri V. G. Munshi.

(e) Moisture relation studies on the fibres collected from side and chalazal region could not be feasible as the sample obtained was too small to give any reliable information about the differences, if any, between moisture absorption for side and chalazal regions. It is, therefore, proposed to study the moisture absorption for some of the cottons widely varying in maturity.

9. *X-ray studies on the relationship between the structural features and physical properties of cotton.*—(a) The work on this problem was continued with a view to finding out the relationship between the bundle strength at 0 and 1|8″ gauge length with x-ray angle for cottons belonging to different botanical species. The samples being studied under problem 17(a) of this report are being photographed for x-ray angle also. X-ray photographs on 26 cottons were recorded during this period and the angles for most of them were measured. Further work is in progress.

(b) *Inheritance of X-ray angle.*—In a paper presented at the 2nd All India Spinners, Breeders and Ginners Conference held in February-March 1960, the problem of inheritance of structural properties, including x-ray angle, was presented and it was decided at the Conference to appoint a Committee to chalk out the programme of work in this connection. Further work on this problem will be taken up after the Committee is formed and the programme finalised.

(c) *Standardisation of X-ray technique.*—An experimental design was formulated to investigate the effects chiefly due to (i) sample size, (ii) density measurement and measurement of angle by graphical means and (iii) tension applied to bundle in the x-ray angle studies. In this connection, a new fibre stretcher is being designed which will enable the study of cotton fibre under different known tensions.

This work is being done by Shri Jai Prakash.

10. *Convolution angle and bundle strength.*—A paper entitled "Structural properties of cotton fibres Part I — convolution angle and its relation to tensile strength" has been published in the Journal of Scientific and Industrial Research.

The above study has been further extended to include the cottons representing all the ranges of strength in each species, with a view to finding out whether or not there is any inter-species differences in the relationship between strength and convolution angle. 52 cottons have been tested so far, which include 30 cottons tested during the period under review. Wih the testing of a few more *barbadense* cottons the present study will be concluded and the results analysed.

This investigation is being carried out by Dr. S. M. Betrabet.

11. *The determination of birefringence of cotton fibre.*—Refractive indices in direction parallel and perpendicular to the fibre axis were determined on 10 more cottons thereby bringing the total number of cottons examined so far to 22. Convolution angle and strength were determined previously on these cottons.

Correlations between birefringence and strength ($r = 0.682$), spiral angle and strength ($= 0.746$) and spiral angle and convolution angle ($r = 0.648$) were found to be significant. However, refractive index parallel to the fibre axis and strength ($r = 0.333$) were found to be not correlated.

The contention of Meredith that spiral angle of the fibrils in the original unconvoluted fibres may be about the same for all varieties of cotton needs to be confirmed. How far the convolution angle influences the spiral angle within a sample is also being investigated.

Birefringent properties of fibres at different stages of secondary thickening are also being studied. During the period under review, birefringence was determined on chalazal and side regions of 30, 36, 42, 45, 48 and 51 days old fibres of 170-Co.2 cotton.

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

12. *Fibre reversals and bundle strength.*—The enumeration of reversals per unit length at the middle region of the fibre was standardised and 12 cottons have been scanned for this property so far ; out of these, six were tested during this year. The work is now concentrated on the *hirsutum* group of cottons which have large number of reversals as compared to *desi* cottons and how far their number influences the bundle strength and fall in strength of cotton fibres at increasing gauge lengths is being investigated.

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

13. *Rigidity of fibre bundles.*—A note on the determination of bulk torsional rigidity of cotton fibres was prepared and sent for publication.

This was done by Shri N. Balasubramanian.

14. *Effect of neutron irradiation of cotton.*—The investigation was continued as stated in the previous report and nine samples of Virnar cotton, irradiated with pile neutrons, having a total integrated flux ranging from $10 \times 10^{12} n/cm^2$ to $504 \times 10^{12} n/cm^2$ were tested for fluidity measurements and fibre bundle strength values. While the fluidity values showed an increase from 1.166 (for the control) to 10.140, and microscopical tests by the mushroom technique showed some degradation, there was practically no change recorded in bundle strength values. Hence it was decided to get the samples irradiated at a higher dosage ranging from $6 \times 10^{14} n/cm^2$ to $1000 \times 10^{14} n/cm^2$ and the feasibility of getting the desired irradia-

tion dosage was discussed with the Rector Superintendent. Further, a comprehensive project was prepared on the "effect of high energy radiation on textile materials", for getting financial assistance from the U.S. Government under P.L. 480 Scheme.

For the time being, the work on this project is temporarily held up for want of suitable containers which might resist leakage of water when immersed deep in the reactor. Efforts are being made to secure them and when they are obtained, the work will be continued.

This work is being done by Shri Jai Prakash, Dr. S. M. Betrabet and Shri S. N. Pandey.

15. *The comparison of Stelometer-value (1/8" gauge length) with the intrinsic-strength as measured on single fibres at 1/8" gauge length.*—As proposed in the last Annual Report, the Stelometer-values at zero and 1|8" gauge lengths and the Pressley-strength index at zero gauge length was determined for seven cottons. The extension was also recorded. The results obtained confirmed the earlier findings.

Further, nine cottons were tested on the Stelometer and Balls Magazine Hair Tester to compare the bundle strength (zero and $\frac{1}{8}$" gauge lengths) with individual fibre-strength ($\frac{1}{8}$" gauge length) respectively. The individual fibre strength at 1 cm. gauge length was determined for M.C.U.1, Vijalpa, Sea Island (St. Vincent), Sea Island (Andrews), Karnak, Giza-30, Giza-45, Kalyan and Jayadhar.

The statistical analysis of the results of 19 cottons revealed the following interesting points :

(i) The bundle-strength ($\frac{1}{8}$" gauge length) and intrinsic strength (single fibre wt. in oz./hair weight 10^{-6}oz./inch) showed high degree of association with each other, while intrinsic strength ($\frac{1}{8}$" gauge length), when correlated with bundle-strength (zero gauge length) gave correlation of border line significance.

(ii) Approximately, 50% of single fibre strength ($\frac{1}{8}$" gauge length) was realized in bundle strength ($\frac{1}{8}$" gauge length).

(iii) The percentage fall in strength with the increasing gauge-length from 3.175 mms. ($\frac{1}{8}$") to 10 mms. was different in four botanical species. G. barbadense group recorded least percentage fall in strength.

(iv) The ratio of bundle-strength ($\frac{1}{8}$" gauge length) to the corresponding bundle-strength at zero gauge-length, gave higher values for long, fine cottons than short, coarse cottons.

A paper entitled "Single fibre-strength and bundle strength at different gauge lengths" based on these results was submitted to All-India Spinners, Breeders and Ginners Conference

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

16. *Comparison of various methods of measuring fibre maturity.*—(i) A paper on the performance of cotton Grader was written up and will soon be sent for publication.

(ii) Further, it was proposed to study the performance of various methods of measuring fibre maturity (e.g. Caustic soda method, Polarised light method, Cotton Grader, air flow method etc.) in greater detail. For this purpose, a comprehensive programme was drawn up and after the standardisation of the different methods of measuring fibre maturity, data for fibre maturity by different methods have been collected on more than 75 cottons, belonging to different species and covering a wide range of maturity. This work is in progress and is being done by Shri K. N. Seshan under the guidance of Shri Harirao Navkal.

17. *Stress-strain studies of cotton using the Instron tensile tester.*—(a) *Bundle strength at various gauge lengths to determine the bundle strength gradient for different Indian cottons.* In continuation of last year's annual report, bundle strength tests on 1 mm. gauge length were determined on 8 out of 22 cottons tested at various gauge lengths last year. The others are to be tested.

Further, in order to investigate the fall in bundle strength with gauge length and its relationship with structural imperfection (e.g. number of convolutions and spiral reversals etc.) in different botanical species of cotton, about 40 more cottons both Indian and foreign, were selected so that along with 22 cottons already tested, they constitute 10 to 12 cottons under each botanical species having a wide range of Pressley values. From the results obtained it appears that cottons belonging to *Barbadense* group not only show more uniformity of strength along the length of the fibre but that the variation of the fall in bundle strength with increase in gauge length from 0 to $\frac{1}{8}''$ was much less in the cottons of this specie as compared with those belonging to other species.

It was also thought desirable to determine transmission of strength from single fibres to bundles of fibres and yarns and to investigate factors, if any, on which these transmission coefficients depend. For this purpose, a special device — single fibre mounting jig — was designed to fit the Instron Tensile tester. This jig can accommodate about 50 single fibres and can be adjusted for any desired gauge-length. The fibres, after once mounting, can be brought one by one in the direction of the application of the force simply by rotating the jig on its central axis. The working of this jig has been checked and it is proposed to test the 22 cottons, tested earlier for bundle strength tests on the Instron, for single fibre strength also on the Instron. Further work is in progress.

(b) *Cotton roving strength in relation to fibre properties.*—Further work on this problem had to be discontinued as the load cell A of Instron Tensile tester went out of order and is to be sent to the U.S.A. for repairs.

(c) *Comparative study of different instruments to test the bundle strength in relation to Pressley tester.*—It was reported in the last Annual Report that an attachment was being fabricated to adopt Pressley clamps on Schopper machine. This attachment was completed and the cottons tested earlier on Pressley, Stelometer, Scott Tester and Instron, were tested on Schopper machine also during this period. In addition, some further tests were carried out on Pressley tester using the Stelometer vice, in order to see the influence of constant torque and tension given to fibres in comparison to the unknown and variable torque given by ordinary vice. An increase of 8 to 10 per cent in the value of Pressley Index was recorded due to Stelometer vice. Further, the influence of removing short fibres from bundles to be tested on Pressley tester was also found by testing about 40 cottons. It has been found that the increase in Pressley Index varies within wide limits from one cotton to another and the increase does not show any definite relationship with the percentage of short fibres present in different cottons.

From the comparative bundle strength results on different instruments it was concluded that the low bundle strength values obtained on Scott tester might be due to the limited range of 2 kgms. of our Laboratory Scott Tester and the likelihood of breakage of some fibres from the thin tuft needed for this machine during handling etc. Arrangements were, therefore, made to get suitable attachments for bundle strength tests on IP4 tester in Victoria Jubilee Technical Institute and already 10 cottons have been tested. Further work is in progress.

These items of work are being done by Shri Jai Prakash.

18. *Effect of simplification of sample preparation on micronaire test result.* In continuation of the work reported in the last year's report, the data collected were subjected to rigorous statistical analysis. The salient features obtained from this analysis were (a) a very high correlation of +0.98 between the two methods, (b) the results obtained on samples opened by hand fluffing were higher than those obtained on bow opened samples, on an average by a constant of 0.17.

During the period under review, the above investigation was further extended to ascertain whether the maturity value, predicted by using a $\frac{3}{8}$" spacer on micronaire, was affected by the method of opening (hand v|s. bow). From the analysis of data obtained on 40 cottons covering a wide range of maturity, it was found that hand opening gave significantly higher differences between the micronaire values with and without spacer as compared with bow opening method. The difference obtained by hand opened method was on an average 0.235 higher than that for the bow opened method. This difference, though significantly higher in case of hand opened samples, was not of much practical importance except that it necessitated the fitting up of a different regression equation. The standard errors of both the methods were of the same order and both had highly significant correlation coefficients with maturity coefficient obtained by caustic soda method.

It was, therefore, concluded that the simpler hand opening method could, for all practical purposes, be conveniently used in place of time consuming bow open-

ing method and this new method of opening the samples for micronaire, is being used in the Laboratory at present.

It is proposed to write up the findings of both these investigations in the form of a paper and send the same for publication.

This work which was being done by Dr. Sundaram is continued by Shri Jai Prakash.

19. *Investigation to see whether separate micronaire scales are necessary for different botanical species of cotton in order to get a better estimate of fibre weight per unit length.*—This investigation was taken up after the receipt of a communication from the Indian Standards Institution regarding the necessity or otherwise of preparing separate micronaire scales for cotton belonging to different species. Cottons covering a wide range of fibre weight in each species, were selected and were tested for fibre weight by counting method and on micronaire. Fibre maturity was also determined for all these cottons. From graphical analysis, it was observed that cottons belonging to *Indicum* species were overestimated, while those belonging to *Herbaceums* were underestimated by Micronaire as compared to counting and direct weighing method. Cottons belonging to *Hirsutum* and *Bengalensis* fell more or less on the equality line. Taking fibre maturity also into account and plotting micronaire value against the product of maturity coefficient and fibre weight per unit length the scatter was considerably reduced but still *Herbaceum* cottons appeared to fall on a different line. Data on 20 cottons belonging to *Barbadense* group has also been collected and will be soon analysed.

This work is being done by Shri Jai Prakash.

20. *Nickerson-Hunter Cotton Colorimeter tests.*—(a) Tests were made with the Nickerson-Hunter Cotton Colorimeter on a large number of surfaces for six different cottons with a view to determine the minimum number of tests that will yield a reliable value for reflectance percentage (Rd) and degree of yellowness (+b). It was found that by testing a minimum of six surfaces Rd can be obtained with $\pm 2\%$ accuracy and +b with $\pm 5\%$ accuracy at 99% confidence limits.

(b) *Effect of storage during monsoon under two different atmospheric conditions on colour, mean fibre length and length irregularity of cotton.*—As proposed previously, tests for reflectance percentage (Rd) and degree of yellowness (+b) were made on eight samples of cotton prior to monsoon. The mean fibre length and fibre length irregularity percentage of each of these samples were also determined. Each of these samples was then divided into two portions, one portion was stored in conditioned room (where relative humidity and temperature were maintained constant at $65\% \pm 2\%$ and $80°F \pm 4°F$)and the other portion was stored in unconditioned room. Tests for Rd, +b, mean fibre length and fibre-length irregularity percentage on the two lots were made at the end of the monsoon.

Analysis of the results showed that the reflectance percentage of cotton was significantly lowered by storage in either of the rooms. Also the portion stored in

unconditioned room showed a greater decrease in Rd value than that stored in conditioned room. The degree of yellowness was significantly increased for both the lots. However, the change in this property was more for samples stored in conditioned room than in unconditioned room. It is proposed to continue this investigation for one more year.

A paper was written on the basis of the results of this investigation and read at the 2nd All India Spinners, Breeders and Ginners Conference.

These items of work are being done by Shri N. Balasubramanian.

21. *Fabrication of lustremeter.*—As no proper instrument for evaluation of lustre was available, it was thought desirable to fabricate one lustre-meter which may be compact, convenient and capable of recording values at various degrees of reflection. For this purpose, the required components were purchased and the assembling of the electronic part of the lustremeter was started on the lines similar to ATIRA lustremeter. It is expected to finish this part soon and then the fabrication of the optical set up of the lustremeter would be taken up.

This work is being done by Shri Jai Prakash and Shri P. G. Oka.

C. *Fibre-Properties and Yarn-Characteristics.*

22. *Ballistic work of rupture of fibre-bundle and the corresponding single yarns.*—Further work on this problem could not be carried out during this period for want of time. It will be continued.

23. *Balance for determining weight of single fibres.*—The phosphor-bronze ribbon to be used as a cantilever in the balance was obtained and the balance for weighing single fibres was constructed. Further work on it is in progress.

This work was done by Shri N. Balasubramanian.

24. *Performance of Mixings of Indian cottons with special reference to their fibre properties.*—A paper was written up and the conclusions drawn therefrom were given in the last Report. The paper is being sent for publication.

This work was done by Shri V. V. Gupte.

25. *Effects of counts, twist and drafts in the ring frame on the yarn strength.* During the period under review this work was extended to coarser counts. From the results obtained it appears that in the coarser counts, there is a tendency for the corrected C.S.P. to be less as the actual count spun gets finer in relation to the nominal counts.

This work is being done by Shri V. V. Gupte and Shri V. Venkataraman.

26. *Relationship between the staple length and spinning value in respect of extra-long staple cottons of 1.1/16" and above.*—The Standing Expert Committee to examine the work of extra-long staple cotton schemes at their meeting at

Abohar in October 1959 decided that the relationship between the staple length and spinning value in respect of extra long staple cottons of 1.1/16″ and above should be worked at the Laboratory in view of the fact that while desirable length might be achieved, the other factors contributing towards spinning value like fineness, strength and fibre-maturity may not be upto the standard. Accordingly, correlation coefficients are being worked out between the fibre-properties and the spinning values of the available results for such cottons. A short note on the subject is being prepared for circularisation to the Cotton Breeders.

This work was done by Shri V. Venkataraman.

27. *Regression coefficients between fibre-properties and spinning value on tract-wise basis.*—The Special Sub-Committee to discuss the question of low spinning quality of long staple cottons in their Report after the meeting in March 1959 had recommended that the regression coefficients should be worked out on tract-wise basis for the various characters from the data available in the Laboratory for different cottons and the regression equations should be made available to the Cotton Breeders for their guidance. Accordingly, data for each tract have been collected and correlation coefficients have been worked out. A note on the subject is being prepared.

This work is being done by Shri V. Venkataraman.

28. *Relationship between yarn evenness and fibre properties.*—During the period under review, the fibre length distribution of 20 samples of cotton was determined by Balls Sorter tests and the irregularity of 40s yarn spun from each of them was measured with the Uster Evenness tester. The results showed that amongst the fibre properties, only fibre length variation had a marked influence on yarn irregularity. The absence of any association between yarn irregularity and fibre fineness confirms the view that the size of the sub-slivers of which a fibrous strand is supposed to be composed of may not be influenced much by the fineness of the fibre within the range of fibre-weight investigated.

This work was done by Shri N. Balasubramanian.

D. Spinning and Yarn-Characteristics.

29. *Standardisation of yarn evenness.*—A paper is being written up on the basis of the results of this investigation.

Further, it is proposed to find out as to how far the classing of yarns for evenness by examination of black-board wrappings by comparison with graded photograph standards agrees with the irregularity values obtained from Uster evenness tests.

This work is being done by Shri N. Balasubramanian.

30. *Study of evenness of material in different stages with different systems of processing.*—As proposed previously, the roller setting at the back zone of the

two-zone high draft roving frame was reduced in two steps from 62/32" to 54/32" and the irregularity of the roving was determined in each case with the Uster evenness tester. Results of tests on three cottons showed that although there was some improvement in the regularity of the roving at lower settings, the roving made at the high draft roving frame even at the lowermost setting was found to be considerably more irregular than the roving produced by the normal sequence.

Work was also undertaken to see as to how much improvement in regularity of yarn was obtained by using double roving and casablanca apron system of drafting at the ring frame. Irregularity tests on 15 cottons showed that with this system about 15% more regular yarns are obtained and that the extent of improvement varied from cotton to cotton. Further work is in progress, and is being done by Shri V. V. Gupte and Shri N. Balasubramanian.

31. *Effect of distribution of draft in the speed frames on the evenness of the product.*—As stated in the last report the draft in the slubbing frame was increased from 3.1 to 5.7 in 5 steps and the draft in the inter was reduced in corresponding steps from 6.1 to 3.3, so that the total draft in each sequence was the same. The irregularity of each of the slubbings and inters was measured with the Uster evenness tester. Tests made on two cottons showed that the irregularity of inter is not much affected by the manner of draft distribution at the slubber and inter frames provided the total draft remains the same. It is proposed to extend the draft variation in each frame to a greater range and study its effect on the irregularity of the final product.

This work is being done by Shri N. Balasubramanian and Shri V. V. Gupte.

32. *Variation of yarn irregularity with draft in the ring frame.*—Tests for irregularity were made with the Uster evenness tester on samples of yarn spun from the same roving using different drafts in the ring frame. Results of tests on five cottons showed that yarn irregularity increases with the draft. On the basis of these results, correction factors for variation of yarn irregularity with count are being worked out.

This work is being done by Shri N. Balasubramanian.

33. *Relationship between yarn irregularity and yarn strength gradient.*—During this period, strength gradient values were obtained for 5 more samples of yarn by determining yarn strength at each of five different gauge-lengths with the Scott tester. The results showed that yarn strength gradient, which is a measure of drop in strength with increase in gauge-length, increases as yarn irregularity increases.

Yarn strength irregularity (single thread) and yarn mass-per-unit-length irregularity were determined for 22 cottons during this period. A significant association was found to exist between these two characters. It was also noted that other factors such as variation in strength between bobbins may influence this relation-

ship. It is proposed to test a few more yarn samples and work out the influence of fibre properties on these two measures of yarn irregularity.

This work is being done by Shri N. Balasubramanian.

34. *Variance-length curve studies.*—Variance-length curves of two yarns were determined with the Uster evenness tester and integrator by the methods of (1) Locher, (2) Grosberg and Palmer and (3) Grignet and Monfort. It was found that while the latter two methods gave very nearly the same curve, Locher's method gave a somewhat lower curve. The extent of discrepancy caused by Locher's approximations was observed to be influenced considerably by the slope of the variance length curve and hence it was concluded that it was not advisable to employ Locher's method in determining and comparing variance length curves of yarns.

Based on these findings a paper was written and read at the 2nd All India Spinners, Breeders and Ginners Conference.

Work was also undertaken to compare the variance-length curves obtained by Uster evenness tester and integrator with that got by the classical cut-and-weigh method. For this purpose, templates of 0.01 m. 0.02m and 0.1m were made and a simple apparatus was devised for cutting different length pieces of yarn under constant tension. The cut pieces were weighed and the points for the variance-length curve were obtained from these weighings. The variance length curve of the yarn was also determined with the Uster evenness tester and integrator by the 'inert' test method. Tests on one yarn sample showed that there is good agreement between the curves obtained by the two methods. The work on another yarn sample is in progress.

Another study was undertaken to see how far Grosberg's equation which enables the determination of the B(L) curve of the yarn from the total variance of the slivers made during the drafting of the yarn, fits the 'cotton' system. For this purpose, the B(L) curve of the yarn was determined with the Uster evenness tester and integrator. The irregularity of the material at each stage of processing, from drawing to yarn, was measured with the Uster evenness tester. The index of irregularity at each stage was calculated from which the B(L) curve of the yarn was derived (using Grosberg's equation). Tests on three yarn samples showed that the derived B(L) curve was found to be too high as compared with the actual curve. The reasons for this discrepancy are being studied.

This work is being done by Shri N. Balasubramanian.

35. *Combing of good quality Indian cottons.*—A paper on combing of Indian and African (Kampala) cottons has been finalised and was published in the March issue of the Indian Cotton Growing Review. Two of the important conclusions drawn are:—(1) Combing improves the two fibre properties, the length and irregularity percentage to such an extent that quite a large proportion of the improvement in the yarn strength can be said to be due to improvement in these two

properties. (2) The conditions when these experiments were carried out were such that the cost of combed material from Indian cottons was less than the cost of carded stock from African cottons.

It is proposed to extend this work to two new varieties of cotton, viz., 134-Co.2 and I.S.C.67 with two different waste percentages at the comber when suitable samples of these cottons are available.

36. *Ballistic work of rupture of a single thread.*—A paper on the subject was written up and read at the Second All-India Spinners, Breeders and Ginners Conference held in February-March 1960 at Bombay.

37. *Miniature Spinning plant for spinning Microsamples.*—From the number of samples received at the Technological Laboratory for micro-spinning tests, it can be safely said that the micro-samples spinning has come to stay in the cotton breeding work. This has also been appreciated by the Visiting Committee of the Laboratory. It is, therefore, proposed to fabricate one ring frame fitted with super-high-draft equipment especially suited for this purpose. Work on the construction of this ring frame is in progress and is being done by Shri V. V. Gupte.

38. *Variation in yarn quality at different portions of the bobbins.*—It is well known that the stresses and strains while spinning on the ring frame vary from one portion of the bobbin to another. Therefore an experiment was designed to find out the variation in count and strength due to the position of the yarn on the bobbins. The analysis of the results of this experiment was completed during the period under review. From this detailed analysis it is concluded that the yarn count gets finer as one goes down the bobbin. The variation in strength due to the position on the bobbin depends on the counts being spun but in the coarser count the strength falls as one goes down the bobbin.

This work is being done by Shri V. Venkataraman and Shri V. V. Gupte.

39. *Comparison of strength and extension values of single thread by three types of instruments with ballistic work of rupture.*—This investigation was continued on the same lines as described in the last annual report and 11 samples of 20s and five samples of 30s yarn, covering extreme ranges of strength in both cases, were tested on the Scott tester, Goodbrand Single thread tester, Instron and Ballistic tester. Further, out of 12 samples of 30s yarn tested on Instron last year, seven were tested on other instruments this year and five more are yet to be tested. Further work is in progress and is being done by Shri Jai Prakash.

40. *Upgrading of Indian cottons.*—A paper on this topic was written up and presented to the Second All-India Spinners, Breeders and Ginners Conference. The following five methods for upgrading the cottons were indicated in the paper:—

(1) Upgrading by combing.

(2) Upgrading by spraying the cottons with liquids of the type of syton.

(3) Upgrading by using a higher twist.

(4) Upgrading by maintaining optimum atmospherical conditions in the processing department.

(5) Upgrading by using such aids as double roving on Casablanca or double apron high draft system.

Considerable work on the last mentioned aid was carried out on Indian cottons having one inch and longer lengths, during the period under review. From these experiments it has been found that the double roving casablanca high draft treatment gives a better test for the yarns than that imparted by the normal three roller single roving way of spinning and the mean difference between the C.S.Ps. of the two ways of spinning is about 16%. However, it has been noted that the benefit conferred on various types of cottons is not uniform and the causes of this differential response are being investigated.

This is being done by Shri V. V. Gupte.

E. Chemical Problems.

41. *Evaluation of D.P. values of Indian cottons by different methods.*—As stated in the last report, experiments were carried out to find out D.P. measurements with cupri-ethylene diamene, using Cannon Fenske Viscometer, under nitrogen atmosphere. It is proposed to carry out D.P. determination on some cottons by this method and compare the same with the cuprammonium hydroxide method.

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

42. *Investigations on the mercerisability of Indian cottons.*—Investigation on the mercerisability of the Sea Island 'Andrews' cotton which is grown now in India was carried out during the period. In order to carry out these investigations, samples of 20s yarn of Sea Island 'Andrews' cotton were doubled in the doubling machine and the doubled yarns were bleached and boiled under identical conditions. Small hanks of these yarns were mercerised also under identical conditions. Then, mercerised as well as unmercerised bleached yarns were examined for lustre number, barium activity number and axial ratio. It was found that Andrews cotton had given high values for lustre number and barium activity number and low value for axial ratio, indicating good mercerisability, similar to Egyptian Karnak cotton.

Further work will be continued on the problem for improving the mercerisability of Indian cottons by giving different treatments.

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

43. *Studies in the chemical modification of cottons.*—Further work on this problem could not be carried out as the monomer acrylonitrile could not be obtained.

44. *Determination of the oil content of different varieties of cotton seeds.*—

Oil content of 147 cotton seed samples was determined during this period. The reports were sent to the respective breeding stations.

Some new strains of cotton seeds were received from Coimbatore breeding station for oil estimation. The results of a few samples are given below:—

Serial No.	Variety	% of oil content	Remarks
1	Moco	20·50	Perennial cotton
2	Cernum Garo hill cotton	13·78	Wild cotton
3	Lintless Downy	17·91	Lintless Mutant
4	G. Anomalum	5·95	Wild cotton
5	Nandyal Hairy Linters	13·94	Lintless Mutant

To study the effect of the hormone, alpha-naphthalene acetic acid, on oil and linter contents of cotton seeds, two varieties, viz., 320F and Desi local were taken for their oil and linter contents. The results indicated slight improvement in the oil and linter contents of the seeds with the dosage 10 parts in a million applied twice, (1) at 4-5 leaves, (2) at flowering stage.

This work is being done by Kumari Indira G. Bhatt and Shri S. N. Pandey.

F. Miscellaneous.

45. *Commercial Grading of cotton.*—The testing assistants recruited under this scheme were given a thorough training and thereafter they were detailed for testing samples received for this investigation. 193 samples received under this scheme were tested for mean fibre length, bundle strength, swollen hair diameter, fibre-maturity, micronaire value, shirley analyser loss and yarn strength after micro-spinning. Afterwards the entire data were classified and tabulated incorporating the necessary details from the proforma supplied by the Cotton Superintendent, Surat, and was sent to the Agricultural Marketing Directorate for analysis.

This work was supervised by Shri Jai Prakash, Shri S. Samson and Shri V. V. Gupte.

46. *Reduction of neps in neppy Indian cottons.*—As stated in the last report this investigation was continued by concentrating attention on the more neppy cottons. I.S.C.67, 134-Co.2-M and M.C.U.2 have been selected for the purpose. Single plant produce from 50 plants of each variety together with control representing the general crop of the year have been received and the tests for neps, mean length, maturity, ginning percentage, incidence of immature and insect attacked seeds etc. are in progress.

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

47. *Study of the effects of different agronomic treatments on fibre properties.* (a) *Effect of different frequencies of irrigation and manurial treatments.*—(i) 48 samples of LL 54 cotton, grown at Faridkot, combining three frequencies of irrigation, four levels of nitrogen and four replications were studied for two seasons. The layout was split plot with irrigation in main-plot and levels of nitrogen in sub-plot.

First Year samples. (1957-58) In addition to the properties mentioned in the last report, bundle strength (zero-gauge-length) and fibre maturity were determined and fibre-length irregularity percentage for 48 samples of LL-54 cotton calculated. The properties studied were not significantly affected by any treatment.

Second Year samples. (1958-59) The properties such as lint weight, seed weight, ginning percentage, fibre weight, fibre maturity and mean fibre length were determined for 48 samples of LL-54 cotton. Only seed-weight, lint-weight and ginning percentage were determined for 48 samples of 320F. Other properties were not studied. The analysis of the results is being done.

(b) *Effect of differential irrigation (different frequencies of irrigation and intensities of irrigation) and levels of nitrogen.*—81 samples of 320F, grown at Faridkot, combining three frequencies of irrigation, three intensities of irrigation, three levels of nitrogen with three replications were studied. The system of lay-out was split-plot with frequencies and intensities in main plot and nitrogen in sub-plot.

First Year samples. (1957-58).

1. Lint weight, seed-weight, ginning percentage, fibre-weight per unit length were not affected by any of two agronomic treatments.

2. Mean fibre length was increased by increasing quantity of water used in irrigation though nitrogen itself had no effect on mean fibre-length.

3. Irregularity percentage was not affected by irrigation but nitrogen treatments significantly affected irregularity percentage.

4. Analysis of fibre maturity showed that not only irrigation and nitrogen treatments but also their interaction were significant. Further analysis confirmed that high irrigation coupled with heavy nitrogen treatments was found to be more beneficial to maturity of fibres.

5. Bundle strength was found to be significantly affected by irrigation but nitrogen had no effect. It was observed that moderate irrigation produced maximum bundle strength.

Second Year Samples. (1958-59). The properties, lint weight, seed weight, ginning percentage, mean fibre-length, fibre maturity, fibre weight per unit length were determined. Lint weight, seed weight, and ginning percentage were affected very little by the treatments. Further analysis is being done.

(c) *Effect of alpha-naphthalene acetic acid on physical properties of cotton.*—It was stated in the last report, based on the tests of first year's samples that the application of alpha-naphthalene acetic acid did not produce any significant effect on the properties examined except in case of *desi* cotton for which small dose of the hormone was found to depress the fibre-maturity to some extent.

Second Year samples (1958-59). 56 samples of 320F and Desi, grown at Patiala, in randomized block design, with treatments of two doses of alpha-naphthalene acetic acid at two stages combined with control, were studied.

The properties, mean-fibre-length, fibre weight per unit length, bundle-strength, lint weight, seed-weight and ginning percentage were determined and fibre-length irregularity percentage calculated.

The mean fibre length, and fibre-weight per unit length are affected very little by hormone treatment. The interaction of variety with treatment was significant, showing that 320F and Desi cottons reacted differently.

These items of work were done by Shri T. V. Krishnan and are being continued by Shri V. G. Munshi.

Work done in pulling fibres from the seed. Samples belonging to two experiments mentioned above were tested for this purpose. The replications were not examined separately but were pooled together.

As regards the first experiment, after pooling the replications, 12 samples were available each for LL 54 and 320F. 12 samples belonging to LL 54 were tested last year and the remaining 12 samples of 320F were tested during the current year in a similar manner as reported last year. Further, bundle strength tests were also done on these 12 samples of 320F cotton both from side and chalazal regions of the seed.

As regards the second experiment, the pooled produce gave 10 samples in all. Five samples of 320F from this experiment were tested and reported last year. During the current year tests on the remaining five samples of Desi cotton were completed. Further, bundle strength tests were also done on five samples of 320F reported last year.

The data are being analysed and these items of work are being done by Shri Jai Prakash.

Regarding oil-content tests, this has already been dealt with under item 44.

48. *Effect of changes in condition of growth.*—(a) *Effect of locality.* 18 samples of P 216F, P23F and H.14 grown at Coimbatore, Palur and Aduthurai for two seasons 1956 and 1958 were received and X-ray studies made on them. Results of this investigation seem to confirm the view that locality has little effect on the strength structure relationship although strength and X-ray angles showed variations from place to place.

(b) *Effect of Irrigation.*—X-ray angles and bundle strength were determined on 170-Co.2 cotton grown in the irrigated and non-irrigated fields at six localities. From the data, it was observed that cottons grown in irrigated farms were generally weaker and possessed higher X-ray angles than the corresponding non-irrigated samples. A paper combining the findings of 48(a) and (b) was written up and presented at the 2nd All India Spinners, Breeders and Ginners Conference held at Bombay in February 1960.

These were done by Shri Jai Prakash.

(c) *Studies on cotton grown both at Srivilliputhur in summer and at Coimbatore in winter.*—Investigation on the possible differences on the X-ray angle of cotton grown at Srivilliputhur in summer and Coimbatore in winter was continued. 12 X-ray photographs on I.V. and M.C.U.1 cottons belonging to 1958 season and P216F, 0484, M.C.U.2 and M.C.U. 1 belonging to the 1959 season were recorded. Measurement of angles is being done.

This work was done by Shri Jai Prakash.

I.V. and M.C.U.1 cottons grown in summer at Srivilliputhur and in winter at Coimbatore were tested for bundle strength, fibre reversals, and convolution angle. It was revealed that I.V. cotton at Srivilliputhur had much higher strength, lower convolution angle and less number of reversals as compared with the one grown at Coimbatore. M.C.U.1 grown at both the places has high and almost the same convolution angle but the one at Srivilliputhur has less number of reversals and higher strength.

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

49. *The skein strength of the yarn in Metric system.*—A paper on the above topic was read at the Indian Standards Institution Convention at Hyderabad and at the second All-India Spinners, Breeders & Ginners Conference and it was received with appreciation. The published paper deals with counts upto 40s. During the period under review, the work was extended for fine counts like 60s, 70s and 80s. Tests carried out on six of these samples confirm the previous findings made in the case of coarser counts, viz., the C.S.P. of the English system, is more or less equal to the strength index of the metric system even in the case of fine counts.

This work is being done by Shri V. V. Gupte.

50. *Designing an instrument for finding the toughness of veins of a cotton leaf.*—As stated in the last report, this instrument was designed for the purpose of estimating the toughness of the veins of the cotton leaf in connection with studies on jassid resistance. One instrument had already been supplied to Indian Agricultural Research Institute. Two more instruments were fabricated and supplied to Punjab and Surat.

A summary of the research work carried out by the Senior Assistants (Technological) attached to the various Cotton Breeding Stations is given in Appendix I.

V. GINNING SECTION

Most of the work done in this Section during the year under report has been described under the head "Research work in Progress" and an outline of the chief items, is, however, given below:—

A Technological Leaflet on pre-cleaning and ginning tests on 170-Co.2 variety was published and the pre-cleaning and ginning tests and spinning, yarn, fibre and other tests on Vijalpa were completed and the results obtained were written up in the form of a leaflet and sent for publication.

Ginning percentages on 15 trade varieties of 1958-59 season and 13 trade varieties of 1959-60 season were determined with a view to include the results in Technological circulars which are being published on these trade varieties.

About 400 small samples obtained from agronomic experiments and from other agricultural centres were ginned in Laboratory Gin and their ginning percentages were determined.

For ginning of Sea-Island 'Andrews' cotton, three roller ginning factories consisting of both double and single roller gins have been newly started in Kerala State. The erection, setting and working of gins, etc., were done under the supervision and guidance of the Engineering Assistant (Ginning). The entire produce grown in Kerala State was ginned in these factories.

The Engineering Assistant (Ginning) has also attended to the ginning of Sea-Island 'Andrews' cotton grown in Mysore State.

For the fabrication of an extractor, few parts which could not be made at the Laboratory were sent for fabrication in local workshop. These parts have been received recently and further fabrication of the machine will be continued during the monsoon months.

VI. PUBLICATIONS

A list of publications issued by the Laboratory during the year, together with the summaries of the Bulletins and articles published is contained in Appendix II.

VII. SUMMARY

This Report gives an account of the work carried out at the Laboratory during the year 1959-60. Good progress has been recorded in the various activities of the Laboratory, as will be seen from the report, a summary of which is given below.

I. *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 3,645 as against 3,230 received during the previous year, recording an increase of 13 per cent. The number of samples for micro-spinning tests alone rose from 1,607 to 2226 registering an increase of as much as 39 per cent. Most of these samples were tested and reports of different categories were issued. The

testing work mainly related to the evaluation of the quality of new strains and improved varieties and reports on them proved of immense utility to the Breeders in their selection work. Some of them belonged to the improved varieties under various stages of multiplication. A few items of special interest are quite briefly summarised below:

1. Comparative tests carried out on Deviraj (170-Co.2), Laxmi and I.S.C.67 in Baramati area indicated that I.S.C.67 gave a better spinning value than Deviraj while Laxmi yielded a lower spinning value than Deviraj.

2. Tests carried out on normal picked and last picked samples of Deviraj in the Ahmednagar and Poona areas indicated that the last picked sample was definitely inferior not only in spinning value but in all other respects also.

3. Tests carried out on Deviraj under rain-fed and irrigated conditions in Saurashtra area showed that the rain-fed samples gave better spinning values than the corresponding irrigated samples in most cases.

4. Results for six varieties raised in four centres in Uttar Pradesh indicated that 51/50 gave the finest fibres and significantly better spinning value than the other varieties.

5. Mill tests were arranged to be carried out on a large number of improved varieties from most of the States and reports were issued to the respective Officers.

6. Samples belonging to several agronomic experiments such as manurial, spacing, sowing date, mixed cropping, irrigations, rotation etc. etc. from all States were tested and the results reported to the respective Breeding Stations.

7. Samples of Sea Island Andrews from 18 centres in Kerala and 21 centres in Mysore State were tested and reported. Mill tests were also carried out on a few of them. The mill had reported that this variety was barely suitable for 60s warp and 80s weft.

II. *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 each trade variety were issued as soon as tests were completed. Results of tests for Tanganyika cottons, Mwanzas and Central Line, were included in the Trade Varieties Bulletin for the first time. Results of tests for maturity coefficient obtained by micronaire have been added for the first time. A summary table giving the results of all trade varieties of the latest season was added in this bulletin to facilitate reference to all results at a glance in the same Table. These publications proved quite useful to the cotton trade and the textile industry.

The Testing House of the Laboratory received a large number of samples for various tests, the total during the year being 1,517. Tests on some of them were of a special nature such as the causes for ribbon effect in dyed poplin, efficiency of treatments to resist mildew attack, causes for yellow and black stains in canvas, etc., etc.

III. *Research Work.*—Substantial progress was recorded in most of the items of research work. Progress in each item is briefly described below :

A. Investigations on ginning :

1. A Technological Leaflet (No. 54) on the pre-cleaning and ginning tests on 170-Co.2 variety was published. The pre-cleaning and ginning tests, spinning, yarn, fibre and other tests on Vijalpa cotton were completed and the results obtained were written up in the form of a Technological Leaflet (No. 66) and sent for publication.

2. A paper on the formation of neps during ginning embodying the results obtained for the investigation for studying the effect of pre-cleaning and ginning, of feed-steps in saw ginning, of overlaps and speeds in roller gins on the formation of neps with a view to finding out which treatment was most suited to get lint with least number of neps without sacrificing its quality and output was prepared and read at the Second All India Spinners, Breeders and Ginners Conference held in February-March 1960.

3. 269 factories out of 350 have so far replied to the questionnaire issued by the Laboratory on the economic and technical survey of the existing gins in India. The data so far obtained were being analysed.

4. Some parts for a small size extractor for removing immature locks and hulls from the seed-cotton were prepared and few others were fabricated in a local workshop. Fabrication of the extractor is in progress.

B. Investigations on Fibre-properties :

5. A paper embodying the chief findings of the investigation carried out for the work of pulling of fibre from seed in relation to fibre-properties and percentage of seed-coat removal was partially written up after the completion of the tests.

6. A paper on the study of variation of fibre-length within and between seeds of the same strain was prepared and sent for publication in the Indian Cotton Growing Review.

7. Tests for bundle strength for its variation between seeds of the same strain were continued during the year.

8. A paper comprising the results for the study of the variation of fibre-maturity from single seeds in relation to seed and embryo-weights was written up and read before the Second All India Spinners, Breeders and Ginners Conference in February-March 1960.

9. A study of the properties of fibres collected from bolls of different ages for the various properties, degree of thickening, reversals per cm., convolution angle, bundle strength, D.P. values etc. was continued during the year.

10. Study of fibres from chalazal and side regions of the seed for their bundle-strength, X-ray angle, D.P. values, moisture relations, fibre-maturity etc. was in progress.

11. X-ray studies on the relationship between the structural features and physical properties of cotton, standardisation of the X-ray technique, study about the inheritance of X-ray angle etc. were made during the year.

12. A paper on the convolution angle and its relation to tensile strength was written up and published in the Journal of Scientific and Industrial Research. The study is being further extended to include cottons representing all ranges of strength in each species.

13. Tests on 22 cottons have so far been carried out for the determination of birefringence of cotton fibre and its relation to strength, relation of spiral angle and strength, spiral and convolution angle etc. How far the convolution angle influences the spiral angle within a sample is also being investigated.

14. Work was also carried out on fibre-reversals and bundle strength studies on *hirsutum* group of cottons which have larger number of reversals compared to *desi* varieties.

15. A note on the determination of bulk torsional rigidity of cotton fibres was prepared and sent for publication.

16. Comparative studies of the bundle strength by the Stelometer ($\frac{1}{8}''$ gauge length) with intrinsic strength calculated from strength tests on single fibres (also at $\frac{1}{8}''$ gauge length) were made. 19 cottons have so far been studied.

17. A note on the determination of cotton fibre-maturity using the cotton Grader was written up for publication.

18. A comprehensive programme for the study of the various methods of measuring fibre-maturity and their comparison was drawn up after standardising the different methods and this work is in progress.

19. Stress-strain studies of cotton using Instron tensile-tester, bundle strength at various gauge lengths to determine the bundle-strength gradient for different Indian cottons, transmission of strength from single fibres to bundles of fibres and yarns, comparative study of different instruments to test the bundle strength in relation to Pressley tester were made and these studies are in progress. A special device — jig for mounting and testing single fibres on the Instron Tensile Tester — was fabricated.

20. The investigation on the effect of simplification of sample preparation for micronaire test was completed during the period and it is proposed to write up the findings in the form of a paper for publication.

21. An investigation to see whether separate micronaire scales are necessary for different botanical species of cotton to get a better estimate of fibre-weight per unit length was also made and the work is in progress.

22. Tests were made on the Nickerson-Hunter Cotton Colorimeter on a large number of surfaces to determine the minimum number of tests to yield a reliable value for reflectance percentage and degree of yellowness. The study of the effect of storage during monsoon in a conditioned room and in an unconditioned room on reflectance percentage, degree of yellowness, mean fibre-length and fibre-length irregularity percentage was also continued during the year. A note on the basis of results obtained for one year was read at the Second All India Spinners, Breeders and Ginners Conference held in February-March 1960.

23. A lustremeter which is compact and convenient was being fabricated at the Laboratory for the correct evaluation of lustre of cotton.

C. Fibre Properties and Yarn-characteristics :

24. The work of constructing a delicate balance for weighing single fibres was nearly completed.

25. A paper on the performance of mixings of Indian cottons with special reference to their fibre-properties was written up.

26. Correlation coefficients between the staple length and other properties with spinning value in respect of extra-long staple cottons of 1.1/16″ and above were worked out as desired by the Standing Expert Committee on the subject.

27. Regression coefficients for the various characters from the available data on tract-wise basis were also worked out in order that regression equations for each tract may be made available to the Breeders for their guidance.

28. The study of the relationship between yarn-evenness and fibre-properties was continued.

D. Spinning and Yarn Characteristics :

29. A paper was partially written up on the basis of the results of the investigation for the standardisation of yarn-evenness.

30. A study of evenness of material in different stages with different systems of processing was being made. Effect of distribution of draft in the speed frames on the evenness of the product was also studied. For finding out the variation of yarn-irregularity with draft in the ring frame, tests were made on five cottons for irregularity with the Uster Evenness Tester. The relationship between yarn-irregularity and yarn-strength gradient was also studied.

31. Based on the findings of a study of variance-length curves with the Uster Evenness Tester and the integrator, a paper was written up and read before the

Second All India Spinners, Breeders and Ginners Conference held in February-March, 1960.

32. A paper on combing of Indian and African (Kampala) cottons was finalised and was published in the Indian Cotton Growing Review (March 1960 issue).

33. A paper on a study of the ballistic work of rupture of a single thread was read before the Second All India Spinners, Breeders and Ginners Conference held in February-March 1960.

34. A ring frame fitted with super-high draft equipment is being fabricated to meet the ever-increasing demand for micro-spinning tests by the Breeders.

35. A study of the variation in yarn quality at different portions of the bobbin is being made and it was found that the yarn gets finer as one goes down the bobbin. The variation in strength due to the position on the bobbin depended on the count of the yarn.

36. The investigation on the comparison of strength and extension values of single thread by three types of instruments with ballistic work of rupture was continued during the year as described in the previous Report.

37. A paper on the methods of upgrading of Indian cottons was written up and presented at the Second All India Spinners, Breeders and Ginners Conference held in February-March 1960.

E. Chemical Problems :

38. Experiments were carried out to find out D.P. measurements with cuprietheylene diamine using Cannon Fenske Viscometer under nitrogen atmosphere.

39. Tests for the mercerisability of Sea Island Andrews cotton in comparison with Egyptian were made and it was found that it compared quite favourably with Egyptian in this respect.

40. Oil contents for 147 seed samples were determined during the period. Oil content tests were also made on the samples with different hormone treatments.

F. Miscellaneous :

41. 193 samples received for tests for the Commercial Grading Scheme sponsored by the Agricultural Marketing Adviser to the Government of India were all tested for different properties and the entire data were sent to the Directorate for analysis.

42. The study of the effects of different agronomic treatments comprising different frequencies of irrigation, intensities of irrigation, manurial treatments and hormone treatments for the two seasons, 1957-58 and 1958-59 was continued during

the year. The study of the effect of changes in conditions of growth such as locality, summer and winter crops etc. was also made.

43. A paper on the skein strength of the yarn in the metric system was read at the Indian Standards Institution Convention held at Hyderabad in December 1959 and at the Second All India Spinners, Breeders and Ginners Conference in February-March 1960. The work on this problem was extended to counts finer than 40s.

44. Two more instruments for estimating the toughness of the veins of cotton leaf in connection with studies on jassid resistance were fabricated during the period and supplied to Punjab and Surat.

(iv) *Other Activities.*

1. The Second All-India Spinners, Breeders and Ginners Conference which was sponsored by the Technological Laboratory was held in Bombay on the 29th February and 1st March, 1960. It was held in three sessions, Cotton Growing, Cotton Spinning and Cotton Ginning. It was inaugurated by Shri Chimanlal B. Parikh. A number of interesting papers on each subject was discussed.

2. The Visiting Committee of the Indian Central Cotton Committee for reviewing the work of the Laboratory for the three years, 1955-58, submitted their Report which was considered by the Indian Central Cotton Committee at its meeting held in February 1960. The various recommendations made therein are being implemented.

3. The Laboratory has been recognised by the Bombay University as a post-graduate institution for guiding students for the Ph.D. Degree by research in Textile Physics.

VIII. MISCELLANEOUS

(i) As usual, a large number of distinguished persons and students from Technological Colleges and Institutions visited the Laboratory during the period under review and among them mention may be made of the following:—

1.	Mr. K. M. Hamzas	Consulate General of the Republic of Sudan.
2.	Shri Manilal H. Patel	East India Cotton Association Ltd., Bombay.
3.	Shri Jamnadas Ramdas	
4.	Dr. Sam R. Hoover	Assistant Director, U.S. Department of Agriculture.
5.	Shri Bhant B. Mithel	Chief Research Officer, Birla Institute of Scientific & Industrial Research, Birla-gram.
6.	Mr. J. Carlay	Agricultural Attache to the French Embassy, Delhi.

7.	Mr. James C. Morton	Chairman and members of the Visiting Committee appointed by the Indian Central Cotton Committee for reviewing the work of the Technological Laboratory.
8.	Shri R. D. Shah	
9.	Dr. George Foges	
10.	Dr. Gursham Singh	
11.	Mr. Abd. El. Latif Ezzat	Under Secretary for Cotton, Ministry of Economics, Cairo.
12.	Brig. J. R. Samson	Director of Armaments, Ministry of Defence, New Delhi.
13.	Mr. T. L. W. Bailey	Cotton Technologist with the Foreign Agricultural Service of the U.S. Department of Agriculture.
14.	Mr. W. E. Hassler	United Nations Technical Assistance Board.
15.	Mr. K. D. Bickers	Vice-President, M|s. Continental Gin Co., Birmingham, Ala., U.S.A.
16.	Shri Jal Patel	Engineer, M|s. Nowrosjee Wadia & Co. (Private) Ltd., Bombay-1.

(ii) *Staff* — (a) *Officers.*

Dr. S. M. Betrabet, Junior Research Officer, was appointed as Officiating Senior Research Officer, with effect from the 20th July, 1959, vice Shri K. S. Bhujang on deputation to the office of the Textile Commissioner, Bombay.

Shri V. G. Munshi, Research Scholar, was appointed as Officiating Junior Research Officer, with effect from the 15th June, 1959.

Dr. V. Sundaram, Senior Research Officer, was selected by the Government of India for advanced training in Cotton Technology in United Kingdom under the Colombo Plan and he was relieved from the Laboratory on the 11th September, 1959. He reported for training at the Manchester College of Science and Technology on the 14th October, 1959.

Shri S. N. Pandey was appointed as Officiating Junior Research Officer from the 17th December, 1959.

Dr. R. L. N. Iyengar, Director, proceeded on leave for one month from the 12th May, 1960. During this period, Shri V. V. Gupte, Spinning Master, attended to the normal duties of the Director.

(b) *Establishment.*

Shri P. S. Sambamurthy, Senior Assistant (Technological) at Coimbatore was transferred to the Laboratory as Senior Assistant (Testing) with effect from the 17th August, 1959.

Shri K. V. N. Nayar, Head Assistant (Testing) was transferred to Coimbatore as Senior Assistant (Technological) from the 9th November, 1959. Shri H. R. Nayak, Senior Assistant (Technological), Nanded, was transferred to the Laboratory as Head Assistant (Testing) with effect from the 24th November, 1959.

Shri P. D. Ghangurde, Senior Assistant (Statistical), resigned from 2nd November, 1959, and Shri A. P. Bambardekar was appointed in his place with effect from the 2nd April, 1960.

Shri A. G. N. Iyengar, 1st Spinning Assistant, retired from service on 29th December, 1959. The resultant vacancy has been provisionally filled in by the promotion of Shri M. S. Bhawsar, 2nd Spinning Assistant.

The resignations of Shri K. P. R. Pillay, Officiating Senior Assistant (Testing) and Sarvashri R. Narayana Rao and B. N. Lalwani, Junior Assistants (Testing), were accepted and they were granted terminal leave, permitting them to take up new appointments elsewhere.

Vacancy of a Turner in the Engineering Section was filled in by promotion of Shri H. Mastan Shaikh, Mechanic, with effect from the 14th August, 1959. The resultant vacancy of Mechanic was filled in by the appointment of Shri P. V. Shridhankar.

The Scheme for Commercial Grading of Cotton, financed by the Directorate of Marketing and Inspection, Ministry of Food & Agriculture, was undertaken at the Laboratory from August, 1959. Four temporary posts of Junior Assistants (Testing) provided for in the scheme were filled in by the appointment of Sarvashri R. Narayanan, A. Rajagopalan, A. V. Ukidve and K. S. Shama Rao.

Shri K. M. Abraham, Junior Clerk, was promoted as Senior Clerk in the office of the Secretary, Indian Central Cotton Committee, Bombay, with effect from the 26th October, 1959, and in his place, Shri Thampi Verghese was appointed as a Junior Clerk.

A new post of Senior Clerk was created in the Laboratory and Shri F. C. Fernandez, Junior Clerk, was promoted to this post on 1st March, 1960.

Shri T. V. Krishnan, Research Scholar, was permitted to take up the post of Research Assistant in the Atomic Energy Establishment, Trombay, and he was relieved from the Laboratory on 8th March, 1960.

Shri H. M. Almeida, Junior Assistant (Testing) resigned from the 16th April, 1960.

The post of Junior Assistant (Technological) for Andhra Pradesh was converted into Senior Assistant (Technological) and Shri R. Dwarkanath, Junior Assistant (Testing) was appointed to the new post with effect from 17th March, 1960. Shri T. Kameshwara Rao, former Junior Assistant (Technological) for

Andhra was absorbed in the Laboratory establishment as Junior Assistant (Testing) vice Shri B. N. Lalwani resigned.

Shri N. Geo Paul, Senior Assistant (Technological), Abohar, was transferred to the Laboratory as Senior Assistant (Testing) with effect from the 18th May, 1960.

Shri M. T. Sundaram, Head Assistant, was removed from service from 23rd May, 1960, and in his place, Shri N. A. Kazi, Senior Clerk, Office of the Secretary, Indian Central Cotton Committee, Bombay, has been appointed as officiating Head Assistant.

(iii) The following equipments were added to the Laboratory:—

(1)	Stelometer 26-10-1959	1
(2)	Binocular Model Microscope	1
(3)	Leitz inclined Monocular Microscope	1

(iv) *Training.*

(i) The six students selected for the 1959 training in Cotton Technology at the Laboratory completed their course on 11th July, 1959.

(2) Shri D. N. Puri, a Post-graduate student of the Indian Agricultural Research Institute, New Delhi, was given facilities at the Laboratory for carrying out the technological portion of his programme of work with effect from 9th March, 1960. He is still continuing the work at the Laboratory.

(3) Three Cotton Superintendents of the Rajkot Division and the Assistant Cotton Botanist, In-charge of the Scheme for the Breeding of Extra Long Staple Cotton at Abohar visited the Laboratory for study of its working and to be acquainted with the various techniques for fibre tests and the use of instruments available at the Laboratory.

(4) Shri K. Venkateswaran was deputed for training in statistics in the Institute of Agricultural Research Statistics (Indian Council of Agricultural Research), New Delhi, for the Senior Certificate Course for one year from August 1958 to July 1959. He has passed the examination in the First Division.

(v) *Other Activities.*

(1) The Visiting Committee appointed by the Indian Central Cotton Committee for reviewing the work of the Technological Laboratory visited the Laboratory on the 8th and 9th February, 1960. The report of the Visiting Committee was considered by the Indian Central Cotton Committee at its meeting held in February, 1960, and necessary action is being taken on the various recommendations contained in the report.

(2) The Second All-India Spinners, Breeders and Ginners Conference which was sponsored by the Technological Laboratory, was held in Bombay on the 29th

February and 1st March, 1960 at the Committee Hall of the Indian Central Cotton Committee. The Conference was held in three Sessions, one on Cotton Growing, the second on Cotton Spinning and the third on Cotton Ginning. It was inaugurated by Shri Chimanlal B. Parikh while each Session was presided over by Dr. S. M. Sikka, Shri Narain V. Ullal and the writer respectively. A number of papers on Cotton Growing, Cotton Technology and Cotton Ginning were discussed.

(3) The Junior Technological Assistants working at the various Cotton Breeding Stations attended a fortnightly refresher course and training at the Laboratory in November, 1959. During this course, all the assistants were given sufficient practice in some of the important and more commonly used testing instruments and were acquainted with the latest developments and the principles and working of the new instruments acquired by the Laboratory.

(4) Dr. Sam R. Hoover, Assistant Director, Eastern Utilization, Research & Development Division, Agricultural Research Service, U.S. Department of Agriculture, Washington, visited the Laboratory in November, 1959, and discussed projects that could be sponsored under P.L. 480 Research Scheme of the U.S. Government. Proposals for the following two projects to be taken up at the Laboratory under P.L. 480 Research Scheme were therefore submitted for the consideration of the Indian Central Cotton Committee at its meeting held in February, 1960:—

(i) Microbial decomposition of cellulose with special reference to cotton and cotton fabrics and

(ii) Effect of high energy radiation on textile material with special reference to cotton.

These two proposals were approved by the Committee and have been forwarded to the Government of India for their approval and for obtaining the necessary aid under P.L. 480 Research Programme.

(5) The Laboratory has been recognised by the Bombay University as a post-graduate institution for the purpose of guiding students for the Ph.D. Degree *by research* in Textile Physics. So far four students for M.Sc. and one student for Ph.D. have registered their names.

(6) *Exhibitions.*—The Laboratory participated at the World Agricultural Fair held at Delhi from 11th December, 1959 to 29th February, 1960. A variety of exhibits, viz., raw cotton, yarns from improved varieties of Indian cottons, halocards, and apparatus and instruments designed at the Laboratory were displayed at the exhibition with instructive charts and literature. A Testing Assistant was posted on duty at the Exhibition Stall to demonstrate the working of the apparatus and machines and explain matters to the visitors. Exhibits from the Laboratory were also displayed at the Cotton Show arranged by the Indian Central Cotton Committee in connection with their meetings held in September, 1959 and February, 1960.

(7) Dr. R. L. N. Iyengar, Director and Shri Jai Prakash, Senior Research Officer, attended the Fifth Indian Standards Convention held at Hyderabad from 27th December, 1959 to 2nd January, 1960. Two technical papers (i) "Standardization of Moisture Regain Figure for raw Indian Cotton, Cotton Yarn and Fabric" by Dr. R. L. N. Iyengar and Jai Prakash and (ii) "The Skein Strength of the Yarn in Metric System" by Dr. R. L. N. Iyengar and V. V. Gupte contributed by the Laboratory were accepted for discussion at the Convention of which the former is being published in the September 1960 issue of the Indian Standards Institution Bulletin.

(8) *Staff Research Council.*—Four meetings of the Staff Research Council were held during the year under review. Programme of work of the Laboratory and the progress made on research problems were discussed in some of these meetings. Advantage was taken of the visit of Mr. T. L. W. Bailey, Cotton Technologist with the Foreign Agricultural Service of the United States Department of Agriculture to the Laboratory on the 5th May, 1960, and a meeting of the Staff Research Council was held when a special lecture on the latest developments in cotton technology by the visitor was arranged, followed by a general discussion on the subject by the research officers of the Laboratory. Some interested outside persons engaged in the mill industry also attended this meeting.

(9) Fabrication.—Several instruments were fabricated locally; tested and supplied to various Laboratories, Institutions, etc., during this year. Of these mention may be made of the following instruments:—

(i)	Ginning Percentage Balance	3
(ii)	Apparatus for measuring the toughness of the veins of a cotton leaf	3

(10) *Library.*—The number of books in the Library at the beginning of the year was 1,511. 48 books were added during the year bringing the total to 1,559. The number of bound volumes of Journals at the beginning of the year was 1,390 which was increased to 1,460 during the year by the addition of 70 bound volumes.

ACKNOWLEDGMENTS.

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 very large number of experimental, trade, standard and technological samples of cotton.

My thanks are also due to the authorities of the various mills for their valuable help in carrying out mill tests on a large number of improved varieties of cotton which has proved useful to the Committee for assessing the performance of the new varieties under mill conditions.

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,

Director,

Technological Laboratory.

APPENDIX I

Brief account of the Technological work done at the Cotton Breeding stations in India during the year ended 31-3-1960.—Details regarding the staff, the number of samples tested during the year and the nature of the tests carried out are given below. It may be mentioned in this connection that check cottons covering the wide range in all the important fibre properties were sent to all the Technological Assistants to enable them to calibrate and maintain their instruments in proper working order.

Cotton breeding station at	Staff		No. of samples tested for			
	Senior Assistant (Technological)	Junior Assistant (Technological)	Fibre length	Fibre weight	Fibre maturity	Strength index
Abohar	Shri N. Geo. Paul	Shri Om Prakash Bansal	913	894	367	421*
Bulandshahr	Shri M. Radhakrishnan		664†	265	37	49
Coimbatore	Shri K. V. N. Nayar	Shri S. K. Iyer‡	444	421	200	443§
Dharwar	Shri M. S. Sitaram	Shri Y. R. Yardi Shri T. G. Shankar-narayan	1,135	1,135	306¶	340//
Indore	Shri N. C. Chiplonkar	Shri W. R. Sharma** & Shri N. B. Joshi	615	615	528	406
Achalpur	Shri L. R. Jambunathan††	...	286	223	317‡‡	273§§
Nanded	Shri W. R. Sharma	...	500	500	62	184¶¶
Surat	Shri M. U. Parmar	Shri R. G. Sankalia & Shri K. R. Desai	1,292	643	141	249
Trichur	Shri K. S. Marar	...	413	263	255	858// //

* All the samples were tested on Pressley Strength tester by breaking 6 bundles only in each case.

† 583 samples were tested by taking two tufts only in each case on A. N. Stapling apparatus. In addition, some samples were tested for seed coat nep-proneness, seed weight, lint weight, swollen hair diameter and ginning percentage.

‡ From 13th April 1959 to 9th November 1959, Shri S. K. Iyer, Junior Assistant (Tech.) was working alone as the Senior Assistant's post was not filled up after Shri. P. S. Sambamurty joined as Senior Assistant (Testing) at the Technological Laboratory.

§ 233 samples were tested by breaking 8 tufts per sample, 28 samples with 6 tufts per sample and the rest with 10 tufts per sample.

¶ 306 samples were tested for maturity by examining only one slide containing 120-180 fibres.

// 210 samples were tested for Pressley Strength by breaking 5 tufts only in each case. In addition, ginning percentage was also determined on 18 samples.

** Transferred to Nanded as Senior Assistant (Tech.) with effect from 14th November 1959.

†† The laboratory was shifted from Nagpur to Achalpur in the last week of November 1959.

‡‡ 200 samples were tested for maturity by examining one slide only.

§§ 150 samples were tested for Pressley Strength by breaking 2 tufts only in each case. In addition, seed weight and embryo weight were done on 100 samples.

¶¶ 179 samples were tested for Pressley strength by breaking 5 tufts only in each case.

// // 603 samples were tested by breaking 6 tufts only and the rest by breaking 9 tufts in each case.

1. Abohar

Some of the A.C. and LL strains from Hansi have shown better fibre properties than last year. They are above one inch in mean fibre length, are fine and combine

very good Pressley strength (above 8.4 lbs/mg.) with high percentage of mature fibres. From the exotic materials selection 856 has given high mean length 1.20" very low fibre weight (.088 $\times$ 10^{-6}oz./in) with fairly good maturity (about 70%) and high Pressley strength (8.3 lbs./mg.). Amongst Desi strains, two D.C. Strains from Jullundar have given mean length about 0.9" although they are somewhat coarse.

Investigation for the genetic selection on the basis of high Pressley strength index is being continued. This year, Pressley strength tests on single seeds could not be done as the locks were eaten away by rats. However, Pressley strength index of individual plants was determined.

From further analysis of data on seed and fibre properties, it has been observed that the correlation between halo length and Pressley index is highly significant for plants within varieties as well as for seeds within plants although between varieties it is not significant. Between seeds within plants, the coefficient of correlation is negative although the same was reported non-significant last year. Similarly between varieties the correlation was reported to be positive and significant last year while it is non-significant this year. A highly significant correlation has been found to exist between lint index on the one hand and mean fibre length, fibre weight per unit length and maturity coefficient on the other between plants within progenies. However, in case of Pressley strength, it is found to be associated with lint index only between progenies within varieties.

A note entitled, "Variation in Halo length at different positions on single seeds" was presented at Second All India Breeders, Ginners and Spinners Conference held at Bombay in February-March 1960, under the joint authorship of Dr. Gursham Singh and Shri N. Geo Paul. The Junior Assistant (tech.) attended Refresher's course at the Technological Laboratory, Bombay, in the month of November 1959.

2. Bulandshahr

The new strain U.P. No. 1 has again recorded somewhat better length and significantly finer fibres than the control, 35/1. A number of selections from *arboreum* cross, with Virnar as one parent have given better spinning performance and very high ginning percentage and also higher mean length. CJ73 hybrid has given almost double the yield of the control 35/1. Several single plant selections from *Hirsutum* strains have been found quite promising in yield and mean fibre length. Sealand seems to impart good length in American hybrid selections and gives promise of being successfully used for improving the staple length of crosses.

From the investigation on the variation of fibre properties and ginning outturn with characteristics of individual seeds, it has been established by replicated progeny row trials that the selection for reduced seed-coat neps would not lower the yield of the progeny, as was expected earlier. It has also been observed that the seed coat nep proneness increases with increase in relative humidity and therefore drying of kapas before ginning may help to reduce this seed coat neps.

In order to find out factors influencing the increase of ginning percentage of early sown cottons, bolls belonging to 8 varieties, both April and May sown, and having two common dates of flowering, were picked and seed weight, lint index and ginning percentage were determined. It has been found that time of sowing affects the seed weight, lint weight and ginning percentage of bolls developed under identical environments.

Under scheme of agronomic research, samples from NPK trial and spacing-cum-manuring-cum-sowing date trials are being tested and some preliminary conclusions have been indicated.

Based on the principle of capillary viscometer, an instrument is being designed to measure the fineness of cotton fibre and some preliminary testing work has been done. In the joint authorship of Shri P. S. Gupta and Shri M. R. Radhakrishnan, a short paper, "A proposal for standardisation of ginning techniques at cotton breeding station", was contributed to the Second All-India Spinners, Breeders and Ginners Conference held at Bombay in February-March 1960.

3. Coimbatore

A few strains have been evolved at Srivilliputhur having mean fibre length above 1.1 inch with fibres more uniform in length, comparatively more mature and also stronger than the Control MCU2. Strain LO313 needs special mention because of its high mean fibre length (1.15″) with highest uniformity of length, the length irregularity percentage being almost half (16.2%) of the Control. Its mean fibre weight is also lower than the Control although it is somewhat immature and weak. From progeny row cultures, strain 0494 has given very good fibre length of 1.10″ against 1.01″ for Control, K6 and it is also finer and somewhat stronger. Some of the *arboreum anomalum* crosses have given quite interesting results. While fibre length and fineness do not seem to have improved, there is a remarkable improvement in uniformity of length (some of the crosses have given about 13% fibre length irregularity percentage against 22.2% for the Control, K6), percentage of mature fibres and considerable increase in strength. Several promising strains, having higher and more uniform length, have been developed at Aduthurai in connection with Rice Fallow Scheme, although they are somewhat coarser and weaker than the Control 216F.

The fibre properties of 9030G, 9030-8-5 and PK924 and MCU1 (Control) grown at eleven localities at Madras State have been tested. The results have shown that the individual strains show somewhat differential repouse at different localities with respect to fibre length and its uniformity mean fibre weight, maturity and bundle strength.

A number of samples were also tested from the breeder's problem on the study of the causes of bad boll opening of MCU2 cotton at Rajapalayam and also at Srivilliputhur. The samples were collected from six localities each from both the places and had a number of treatments, manurial, plant protecting chemicals

and foliar spray at different phases of growth. It has been found from the analysis of data that while mean fibre length or bundle strength was not affected by any of the treatments at both the places maturity coefficient and mean fibre weight showed a significant variation due to treatment at Rajapalayam and Srivilliputhur respectively.

The fibre properties of wild cotton hybrids grown at Coimbatore, could not be studied during this year.

Junior Assistant (Tech.) attended Refresher's course at Technological Laboratory, Bombay, from 9th November to 21st November 1959 and he also presented a paper entitled "A new device for testing the fineness of cotton fibres" in collaboration with two others at the Agricultural College Day Conference, Coimbatore.

4. Dharwar

The performance of some varieties is better than Jayadhar in ginning percentage, mean fibre length and fineness. Some of Laxmi cotton samples from Chennagari taluka of Mysore State have given very good mean fibre length (above 1.03″), good maturity and fineness although Pressley strength is rather low. Most of the long and extra long staple cotton grown at Mandya while combining very good length (over 1.10 inch) with good maturity (about 70%) and fineness are generally very weak in strength. It would be worthwhile checking these cottons for microbial damage, if any, and also to make a detailed study of their structural properties.

From the investigation on the effect of locality-cum-sowing date-cum-manure on the fibre properties of Laxmi and Jayadhar cottons it has been found that the mean fibre length, its irregularity percentage and mean fibre weight are not affected by any of the treatments while ginning percentage shows varying behaviour in different seasons.

The investigation regarding the effect of foliar application of urea and other manures on fibre properties of Jayadhar cotton has shown that none of the important fibre properties is affected by these treatments although there is a highly significant effect on ginning percentage.

Junior assistants (Tech.) attended Refresher's course at Technological Laboratory, Bombay, in the month of November 1959.

5. Indore

A number of CTI hybrids from Badnawar and Khargone have recorded fibre length over 1.1″ and in addition, possess good combination of maturity, fineness and strength (Pressley strength index between 8 and 9 lbs./mg.). Some of the *desi* strains from Khargone have been found to possess staple length about 0.9″ and medium fineness (from 0.136 to 0.187 x 10^{-6}oz./in.), the calculated counts from them varying between 28 and 33.

Fibre tests on samples of first and second pickings were carried out and it is found that the difference between mean fibre weight for the first and second picking is not appreciable. Therefore, the factors responsible for higher ginning percentage for the second picking need further investigation as it is not due to mere difference in fibre weight per unit length.

Statistical calculations with regard to study of the effect of different seed rates, different new fertilizers on the properties of Bhoj cotton, and differential response of desi and American cottons to manure treatments, have been completed and the conclusions arrived at will be written down in the form of a paper.

'Aerosol' apparatus was obtained during this year to ensure higher humidity during the dry season.

6. Achalpur

Several *arboreum* strains from Deshi strain tests and from F3, F4 crosses, have yielded strains having mean length above 0.95″, and possess average fineness and maturity although they have good Pressley strength (about 8 lbs./mg.). At Nagpur, the performance of a number of cottons from USSR, Egypt and Pakistan was compared with two local Hirsutum Controls 0394 and 147. While none of the USSR and Pakistan cottons fared well, Egyptian cottons exhibited high length (1.12″ to 1.28″), good fineness (0.097 to 0.122 x 10^{-6}oz/in.), satisfactory maturity and with one exception better strength than the controls.

The investigation on the relationship between embryo weight on the one hand and the Pressley strength index, maturity and seed weight on the other, was continued in a similar manner as last year. The conclusions arrived at again show departure from those of last year in some cases. Thus while last year a positive and significant correlation was observed between embryo weight and Pressley index and a highly significant correlation between embryo weight and maturity, and between Pressley strength index and maturity for *arboreum* cottons, this year all these associations are very poor and non-significant. Similarly no association was observed between Pressley strength and maturity for *Hirsutum* cottons last year while this year they show a significant relationship. As expected, the very close relationship between embryo weight and seed weight is maintained.

Regarding the problem — 'place effect study on *arboreum* and *hirsutum* cottons' not much progress was made during this period. In continuation of the fibre tests on the material collected last year, the three *arboreum* cottons from four different centres were further tested for mean length and maturity. The entire data, including that of last year, was re-analysed by a more suitable method. It was found that place effect and variety × place interaction was non-significant for mean length and maturity coefficient for *arboreum* cottons. Regarding Pressley strength for *arboreum* cottons, the place effect was just short of significance level (contrary to last year's conclusion) while, variety × place interaction was non-significant in conformity with last year's observation. As a result of the modified statistical analysis

carried out this year, *Hirsutum* cottons also have given conclusions which are somewhat at variance with those of last year. Thus, this year, variety × place interaction has been found to be non-significant for *Hirsutum* cottons, as regards maturity is concerned. Other conclusions are, more or less, same as last year.

According to recommendations of the Expert Sub-Committee appointed by the Indian Central Cotton Committee, the testing laboratory of the senior assistant (Tech.) was shifted from Nagpur to Achalpur during this period.

7. Nanded

Several promising *arboreum* strains from Nanded have given mean fibre length above one inch and some of them are of medium fineness also. Pressley strength in most of the cases lies between 7 and 8 lbs./mg. while the estimated count lies near about 50 in many of the cases. Strain 4247 with estimated count of 48 and ginning percentage 38 is worth mentioning. At Parbhani also strains 6821 and 5583 have approached 1″ in mean fibre length with fibre weight 0.178 and 0.152 x 10^{-6}oz/in. respectively.

Twenty-four samples of Green manurial trial were tested but no conclusions are given as the work is still in progress. The field experiment on the other problems approved last year, is over and the samples are ready for test but the Senioi Assistant (Tech.) has stated that if the rush of routine testing continues, the testing of the research samples may have to be postponed for succeeding years.

8. Surat

Four samples each from the two promising segregates 115 and 198 (obtained from the cross 2087 x 2334) showed a variation in fibre length from 1.01″ to 1.06″ and 1.04″ to 1.07″ respectively, compared to mean length of 0.93″ for the control. Some of the promising samples from Indo-American cottons at Surat have recorded mean length above 1.15″ with fairly good strength but they are poor in maturity. From large scale trials of extra long staple cotton scheme at Talod none of the samples showed any improvement in mean fibre length because of irrigation although they exhibited slightly increased maturity (though still very poor) and higher fibre weight when irrigated. Several selections from Interspecific hybrids such as 170-Co.2, 134-Co.2 M, I.S.C.-67, and B-C-68 etc. gave a mean fibre length over 1.10″ but all of them are very immature. From Broach a promising strain (E22 × 1802) F8-92 and its progenies were found quite superior to Vijay and Digvijay (Controls) in mean fibre length and fineness. The maturity and strength of this strain have not been determined. From Viramgam crosses of Kalyan and W87 with cross 14, cross 15, cross 16 from Dharwar and types 2711, 4282 and 4287 from Madras recorded a mean length about 0.9″ although they were all rather coarse. Four outstanding segregates obtained at Amreli from the crosses of CJ-73 with 29-7-6, W-31, W-81 and 2164 gave a mean fibre length of about 1.0″ as compared to 0.93″ of control CJ-73 although there was not much improvement in fineness.

Some samples from straight crosses of Madras *arboreums* with Virnar showed appreciable improvement in fibre quality.

From the investigation on the effect of soils and climatic conditions on the fibre properties of four types 115, 198, 2087 and Digvijay, grown under district trials at ten different places, only data regarding fibre-length and fibre weight have been collected but no details regarding the climatic conditions and soil at those ten places have been given. From the mean values of fibre length and fibre weight of 10 places for each variety 115 and 198 appear to be superior to the other two in mean fibre length although slightly coarser than Digvijay.

9. Trichur

Selection of single plants of Sea-Island Andrews cotton on the basis of high ginning outturn (over 33%) and Pressley strength (over 6.5 lbs./mgm.) is in progress. Some suitable plants from Trichur and Mangalore have been selected whose progenies will be tested next year.

A few samples of Sea Island cotton of varietal trials from Trichur, Mangalore and Nilambur and 10 samples of Germ Plasm Bank from the first two farms were tested for fibre properties. Amongst varietal trials Sea Island White flower, and Sea Brook were comparable to Andrews in fibre properties while under Germ Plasm Bank most of the varieties except Sea Island white flower showed differential response at the two places. From fibre tests on Sea Island (Andrews) cotton samples from Screened bulk, seed nucleus and geenral bulk grown at Trichur and Mangalore, while seed nucleus samples appear to give somewhat longer and mature fibres than those from the general bulk in case of Mangalore samples, no such difference is observed in case of Trichur farm. Between screen bulk and seed nucleus bulk there is no appreciable difference.

In addition to above, there were a number of other experiments such as time of sowing trials, spacing trials, hormone trials, mulching trials, comparison of Sea Island (Andrews) cotton collected from white and yellow flower components for fibre properties, and manurial trials etc. etc. While the details regarding each cannot be given here, it may be stated that in general that regarding sowing experiment, samples sown just after mid-June were better than others in maturity and fibre strength. In spacing trial experiment while fibre properties are not affected at Nilambur, 18″ spacing between plants gives somewhat lower fibre length at Mangalore. The results from hormone trials at different phases of growth, mulching trials and fibre tests on white and yellow flower components of Sea Island Andrews cotton, were more or less, negative. From manurial trials, it is observed that except improvement in maturity by the treatments of K alone, P + K, N + P, N + K and N + P + K, the other properties remained, more or less unaffected in case of Mangalore samples. In case of samples from Nilambur centre, however, the variations due to treatments were significant for mean fibre length and Pressley strength index and highly significant for fibre weight and maturity.

APPENDIX II

The following publications were issued from the Laboratory during the period under review:—

I. Technological Bulletin Series 'A'.

(i) Technological Bulletin Series A No. 101. Technological Reports on Standard Indian Cottons, 1959, by R. L. N. Iyengar, D.Sc., F.T.I.

(ii) Technological Bulletin Series A No. 102, Technological Reports on Trade Varieties of Indian Cottons, 1959, by R. L. N. Iyengar, D.Sc., F.T.I.

II. Technological Bulletin Series 'B'.

(i) Technological Bulletin Series B No. 67, A note on the Universal yarn numbering system by Harirao Navkal, M.Sc., and R. L. N. Iyengar, D.Sc., F.T.I.

(ii) Technological Bulletin Series B. No. 68, Assessment of spinning value of cotton by spinning a small sample by V. V. Gupte, B.Sc. (Tech.).

(iii) Technological Bulletin Series B. No. 69, Economic and Technical Survey of the existing Gins in India, by R. L. N. Iyengar, D.Sc., F.T.I. and C. Nanjundayya, M.Sc., Ph.D. (Manch.), F.T.I.

(iv) Technological Bulletin Series B. No. 70, Dynamic mechanical properties of high polymers and the importance of their study by Jai Prakash, M.Sc.

(v) Technological Bulletin Series B. No. 71, Neppiness of Standard Indian Cottons by A. N. Gulati, M.Sc., Ph.D., F.T.I. and R. L. N. Iyengar, D.Sc., F.T.I.

(vi) Technological Bulletin Series B. No. 72, The skein strength of the yarn in metric system, by R. L. N. Iyengar, D.Sc., F.T.I., V. V. Gupte, B.Sc., (Tech.), Harirao Navkal, M.Sc., and V. N. Modak, B.Sc.

(vii) Technological Bulletin Series B. No. 73, Structural Properties of Cotton Fibres : Part I — Convolution angle and its relation to tensile strength by S. M. Betrabet, M.Sc., Ph.D., K. P. R. Pillai, B.Sc., A.T.I., and R. L. N. Iyengar, D.Sc., F.T.I.

III. Technological Leaflets.

(i) Technological Leaflet No. 51. An Instrument for the determination of the toughness of veins of cotton leaves by R. L. N. Iyengar, D.Sc., F.T.I.

(ii) Technological Leaflet No. 52. Relationships between the fibre characters measured by the Fibrograph with similar characters obtained by the Balls Sorter, by Harirao Navkal, M.Sc.

(iii) Technological Leaflet No. 53. Recent Advances in Cotton Technology and their bearing on Cotton Breeding in India, by R. L. N. Iyengar, D.Sc., F.T.I.

(iv) Technological Leaflet No. 54. Pre-cleaning and Ginning Tests on Indian Cottons, (36) Tests on 170-Co.2 cotton (1956-57 season), by R. L. N Iyengar, D.Sc., F.T.I. and D. G. Shete, L.M.E.

(v) Technological Leaflet No. 55. Defects in some of the superior long staple cottons of India and some remedial measures by Harirao Navkal, M.Sc., and R. L. N. Iyengar, D.Sc., F.T.I.

(vi) Technological Leaflet No. 56. Whether the standard cottons have deteriorated in quality, by R. L. N. Iyengar, D.Sc., F.T.I.

(vii) Technological Leaflet No. 57. What is the difference between the standard cotton and the corresponding trade variety, by V. Venkataraman, M.A. and R. L. N. Iyengar, D.Sc., F.T.I.

(viii) Technological Leaflet No. 58. Does the quality of cotton deteriorate in the different stages of multiplication, by R. L. N. Iyengar, D.Sc., F.T.I. and V. Venkataraman, M.A.

(ix) Technological Leaflet No. 59. The relationships between the single thread strength irregularity percentage and the chief fibre properties, by Harirao Navkal, M.Sc.

(x) Technological Leaflet No. 60. The Application of X-Ray diffraction Method for the evaluation of Fibre quality by V. Sundaram, M.Sc., Ph.D.

(xi) Technological Leaflet No. 61. Installation of delinters in the Ginning Factories, by K. S. Bhujang, M.Sc. (Tech.).

(xii) Technological Leaflet No. 62. Reduction of Neps in Indian cottons, by R. L. N. Iyengar, D.Sc., F.T.I. and K. P. R. Pillai, B.Sc., A.T.I.

(xiii) Technological Leaflet No. 63. Comparative Mill and Laboratory Tests on improved varieties and Trade varieties of Indian cottons, by R. L. N. Iyengar, D.Sc., F.T.I. and V. Venkataraman, M.A.

(xiv) Technological Leaflet No. 64. Reduction of neps in Standard Indian Cottons, by R. L. N. Iyengar, D.Sc., F.T.I. and K. P. R. Pillay, B.Sc., A.T.I.

(xv) Technological Leaflet No. 65. A note on the relationship between the mean fibre-length and the fineness of Indian Cottons by Harirao Navkal, M.Sc., V. Sundaram, M.Sc., Ph.D., and R. L. N. Iyengar, D.Sc., F.T.I.

(xvi) Technological Leaflet No. 66. Pre-cleaning and Ginning Tests on Indian Cottons, (37) Tests on Vijalpa cotton, (1958-59 season).

IV. Articles and Papers

The following articles were published in the Indian Cotton Growing Review:—

(i) An instrument for the determination of the toughness of the veins of cotton leaves by R. L. N. Iyengar, I.C.G.R. July 1959 (Leaflet No. 51).

(ii) Relationships between the fibre-characters measured by the Fibrograph with similar characters obtained by Balls Sorter by Harirao Navkal, I.C.G.R. July 1959 (Leaflet No. 52).

(iii) Recent advances in cotton technology and their bearing on cotton breeding in India — by R. L. N. Iyengar, I.C.G.R. July 1959 (Leaflet No. 53).

(iv) The skein strength of the yarn in Metric system by R. L. N. Iyengar, V. V. Gupte, Harirao Navkal and V. N. Modak, I.C.G.R. September 1959 (B.72).

(v) Reduction of Neps in Standard Indian Cottons, by R. L. N. Iyengar and K. P. R. Pillay, I.C.G.R. Sept. 1959 (Leaflet No. 64).

(vi) Comparative Mill and Laboratory Tests on Improved varieties and Trade varieties of Indian cottons by R. L. N. Iyengar and V. Venkataraman, I.C.G.R. Sept. 1959 (Leaflet No. 63).

(vii) A note on the relationship between fibre length and the fineness of Indian cottons, by Harirao Navkal, V. Sundaram and R. L. N. Iyengar, I.C.G.R. Nov. 1959. (Leaflet No. 65).

(viii) Combing of Indian and African (Kampala) cottons by V. V. Gupte and R. L. N. Iyengar, I.C.G.R. March 1960. This paper will be reprinted as a Technological Bulletin Series A.

The following paper was sent for publication in the Indian Cotton Growing Review:—

Study of the variation of fibre length within and between seeds of the same strain by T. V. Krishnan and R. L. N. Iyengar. This paper will be reprinted as a Technological Bulletin of Series B.

The following articles were published in various journals as given below:—

(i) Dynamic mechanical properties of high polymers and the importance of their study by Jai Prakash, Journal of Scientific and Industrial Research, New Delhi, Vol. 18A, No. 9. September 1959. (B. No. 70.)

(ii) Structural Properties of Cotton Fibres : Part I — Convolution angle and its relation to tensile strength by S. M. Betrabet, K. P. R. Pillai and R. L. N. Iyengar, Journal of Scientific and Industrial Research, Vol. 19A, Feb. 1960 (B. 73).

(iii) The skein strength of the yarn in Metric system, by R. L. N. Iyengar, V. V. Gupte, Harirao Navkal and V. N. Modak, Indian Textile Journal, March 1960.

(iv) Universal yarn numbering system by Harirao Navkal and R. L. N. Iyengar, Metric Measures; January 1960.

(v) Skein strength of yarn in Metric system, by R. L. N. Iyengar and V. V. Gupte. ISI Bulletin, Nov.-Dec. 1959.

(vi) Has Cotton Research paid dividends to 1. the Farmer, 2. the trade, 3. the Textile Industry: Cotton and Textile Annual 1959.

The following papers were contributed to the Indian Standards convention 1959, held in Hyderabad during December 27, 1959 to January 2, 1960.

(i) The skein strength of the yarn in Metric system by R. L. N. Iyengar and V. V. Gupte.

(ii) The standardization of Moisture Regain Figure for Raw Indian Cotton, Cotton yarn and Fabric by R. L. N. Iyengar and Jai Prakash.

The following paper was contributed to the 47th session of the Indian Science Congress, held in Bombay, during January 1960.

Study of the effect of differential irrigation and levels of nitrogen on physical properties of cotton by T. V. Krishnan and R. L. N. Iyengar.

The following papers were contributed to the 2nd All India Cotton Spinners, Breeders and Ginners Conference, held in Bombay on 29th February and 1st March 1960.

(i) Cotton requirements of the Indian Textile Industry — How far it is possible to meet them by R. L. N. Iyengar.

(ii) Effect of growing conditions on strength structure relationship and the study of inheritance of structural properties of cotton by V. Sundaram, Jai Prakash and R. L. N. Iyengar.

(iii) Single fibre strength and bundle strength at different gauge lengths by V. G. Munshi, V. Sundaram and R. L. N. Iyengar.

(iv) Study of effect of irrigation and nitrogen treatments on physical properties of cotton by T. V. Krishnan and R. L. N. Iyengar.

(v) Study of the effect of α-Naphthalene acetic acid on physical properties of cotton by T. V. Krishnan and R. L. N. Iyengar.

(vi) Study of the variation of fibre-maturity from single seeds in relation to seed and Embryo-weights by Jai Prakash, V. G. Munshi and R. L. N. Iyengar.

(vii) Upgrading of long staple Indian cottons — by V. V. Gupte and R. L. N. Iyengar.

(viii) The skein strength of the yarn in the metric system by R. L. N. Iyengar, V. V. Gupte, Harirao Navkal and V. N. Modak.

(ix) Variance length relations in textile yarns and the importance of their study by N. Balasubramaniam and R. L. N. Iyengar.

(x) Effect of storage under two atmospheric conditions on the colour and quality of cotton by N. Balasubramaniam and R. L. N. Iyengar.

(xi) Formation of Neps during ginning by S. M. Betrabet and R. L. N. Iyengar.

The following papers were sent for publication during the period under review.

(i) Cotton Research — Its necessity, achievements and future horizons by R. L. N. Iyengar ; Textile Stores and Machinery Directory 1960.

(ii) How to choose cotton by V. V. Gupte, Textile Stores and Machinery Directory, 1960.

(iii) Moisture regain of raw cotton, cotton yarn and cotton fabric at 65% R.H. and 80°F. by R. L. N. Iyengar and Jai Prakash, Indian Textile Journal.

(iv) A study of the relationship between yarn irregularity with fibre properties and its effect on yarn strength by N. Balasubramaniam and R. L. N. Iyengar, Indian Textile Journal.

The following papers were written up and sent to the Indian Central Cotton Committee for approval of the Editorial Sub-Committee for publication in the Indian Cotton Growing Review.

(i) A note on the determination of bulk torsional rigidity of cotton fibres by N. Balasubramaniam and R. L. N. Iyengar.

(ii) Oil content and linter content of Indian Cotton Seeds by Indira G. Bhatt, K. S. Bhujang and R. L. N. Iyengar.

These two papers after publication will be reprinted as Technological Bulletin of Series B of the Laboratory.

V. Technological Circular No. 1117 to 1157 as per list given below:—

Technological Circular No.	*Title*	*Date of publication*
1117	Fibre and Spinning Test Report (No. 5513) on samples of Jayadhar (Hubli) cotton, 1958-59.	July 1959
1118	Fibre and Spinning Test Report (No. 5514), on samples of Gaorani 6 cotton, 1958-59.	July 1959
1119	Fibre and Spinning Test Report (No. 5515), on samples of Jayadhar (Bailhongal) cotton, 1958-59.	July 1959
1120	Fibre and Spinning Test Report (No. 5516), on samples of Digvijay cotton, 1958-59.	July 1959
1121	Fibre and Spinning Test Report (No. 5517), on samples of Vijalpa (2087) cotton, 1958-59.	July 1959

Technological Circular No.	*Title*	*Date of publication*
1122	Fibre and Spinning Test Report (No. 5521), on samples of Virnar (East Khandesh) cotton, 1958-59.	July 1959
1123	Fibre and Spinning Test Report (No. 5522), on samples of Virnar (West Khandesh) cotton, 1958-59.	July 1959
1124	Fibre and Spinning Test Report (No. 5523), on samples of Virnar 197-3 (Berar) cotton, 1958-59.	July 1959
1125	Fibre and Spinning Test Report (No. 5524), on samples of 320F Punjab American cotton, 1958-59.	July 1959
1126	Fibre and Spinning Test Report (No. 5525), on samples of Laxmi (Gadag) cotton, 1958-59.	July 1959
1127	Fibre and Spinning Test Report (No. 5526), on sample of Gaorani 12 cotton, 1958-59.	July 1959
1128	Fibre and Spinning Test Report (No. 5527), on sample of Navsari cotton, 1958-59.	July 1959
1129	Fibre and Spinning Test Report (No. 5528), on sample of Surat cotton, 1958-59.	July 1959
1130	Fibre and Spinning Test Report (No. 5529), on samples of Vijay cotton, 1958-59.	July 1959
1131	Technological Report on samples of Virnar (197-3) cotton, 1958.	Aug. 1959
1132	Technological Report on Gaorani 6 cotton, 1958-59.	Aug. 1959
1133	Fibre and Spinning Test Report (No. 5530), on samples of Jayadhar (Bagalkot) cotton, 1958-59.	Aug. 1959
1134	Fibre and Spinning Test Report (No. 5531), on samples of Jayadhar (Bijapur) cotton, 1958-59.	Aug. 1959
1135	Fibre and Spinning Test Report (No. 5532), on sample of 170-Co.2 (Veraval) cotton, 1958-59.	Aug. 1959
1136	Fibre and Spinning Test Report (No. 5535), on samples of Wagad (Saurashtra) cotton, 1958-59.	Aug. 1959
1137	Fibre and Spinning Test Report (No. 5536), on sample of 170-Co.2 (Manavdar) cotton, 1958-59.	Aug. 1959
1138	Technological Report on samples of Vijalpa (2087) cotton, 1958-59.	Aug. 1959
1139	Technological Report on Laxmi (9-3) cotton, 1958-59.	Sept. 1959
1140	Technological Report on Digvijay cotton, 1958-59.	Sept. 1959

Technological Circular No.	*Title*	*Date of publication*
1141	Fibre and Spinning Test Report (No. 5615), on sample of Malvi cotton, 1958-59.	Oct. 1959
1142	Technological Report on Jayadhar cotton, 1958-59.	Oct. 1959
1143	Fibre and Spinning Test Report (No. 5636), on sample of Kalyan cotton, 1958-59.	Oct. 1959
1144	Fibre and Spinning Test Report (No. 5637), on sample of A.R.B.P.52 cotton, 1959.	Oct. 1959
1145	Fibre and Spinning Test Report (No. 5638), on sample of A. R. Busoga cotton, 1959.	Oct. 1959
1146	Fibre and Spinning Test Report (No. 5702), on samples of H.420 cotton, 1958-59.	Dec. 1959
1147	Fibre and Spinning Test Report (No. 5703), on samples of K.2 (Sattur) cotton, 1958-59.	Dec. 1959
1148	Fibre and Spinning Test Report (No. 5709), on samples of M.C.U.1 (Avanashi) cotton, 1958-59.	Jan. 1960
1149	Fibre and Spinning Test Report (No. 5710), on samples of M.C.U.1 (Dharapuram) cotton, 1958-59.	Jan. 1960
1150	Fibre and Spinning Test Report (No. 5711), on samples of Karunganni 5 (Coimbatore) cotton, 1958-59.	Jan. 1960
1151	Fibre and Spinning Test Report (No. 5712), on samples of Farm Westerns cotton, 1958-59.	Jan. 1960
1152	Fibre and Spinning Test Report (No. 5713), on samples of M.C.U.2 (Summer) cotton, 1959.	Jan. 1960
1153	Fibre and Spinning Test Report (No. 5834), on sample of Malvi cotton, 1959-60.	May 1960
1154	Fibre and Spinning Test Report (No. 5835), on samples of Gaorani 6 cotton, 1959-60.	May 1960
1155	Fibre and Spinning Test Report (No. 5836), on samples of Virnar (East Khandesh) cotton, 1959-60.	May 1960
1156	Fibre and Spinning Test Report (No. 5837), on sample of Virnar (Madhya Pradesh) cotton, 1959-60.	May 1960
1157	Fibre and Spinning Test Report (No. 5838), on sample of 216F P.A. Malout cotton, 1959-60.	May 1960

Summaries of Technological Bulletin Series B Nos. 67 to 73 are given below:—

Technological Bulletin Series B, No. 67.

A NOTE ON THE UNIVERSAL YARN NUMBERING SYSTEM

With the introduction of the metric system in this country, the fibre and yarn-properties will have to be expressed in certain new units which will gradually replace those that are being used at present. This bulletin states or recommends what these new units should be for the purpose of expressing both the fineness and tenacity of fibres as well as of yarns when these are tested either individually or in groups. The Ballistic work of Rupture (Lea) as well as the twist multiplier are also considered in this connection. A number of equations and tables are given to facilitate the conversion of the values expressed in the present units into those in the proposed units.

Technological Bulletin Series B, No. 68.

ASSESSMENT OF SPINNING VALUE OF COTTON BY SPINNING A SMALL SAMPLE

A standard way of assessing the value of cotton at the Technological Laboratory is by the term H.S.W.C. or more correctly H.S.C. i.e. Highest Standard Counts. Usually this value for every cotton is found out by spinning a 10-lb. sample into three counts. A method of finding the value of H.S.C. by spinning a small or micro sample weighing about 120 gms. in two counts (60 gms. for each count) is fully described in the paper. There is a high correlation 0.94 between the values obtained by bulk and Micro Methods. Regression equation connecting the two is also given in the paper.

Technological Bulletin Series B, No. 69.

ECONOMIC AND TECHNICAL SURVEY OF THE EXISTING GINS IN INDIA

The present survey was undertaken at the instance of the Indian Central Cotton Committee and in co-operation with the Directors of Agriculture and of Industries and Commerce of the different States of the Indian Union, as it existed in 1955. Printed copies of the questionaire, both in English and Hindi, were distributed to all the ginning factories and 541 replies after duly filling in the proforma, were received. The replies could be considered more or less representative of the states so far as their number is concerned, but they might not be considered to be random in nature, as the replies were voluntary and some of the inferior or small size factories may not have replied. It is therefore, likely that in the present data, there is a slight bias in favour of the superior and large-sized factories. This point should be borne in mind while drawing conclusions from the data.

Storage.—It would be seen from the foregoing facts that the kapas was almost universally handled by manual labour It was stored mostly in the open yard of the ginning factory and was usually protected from rains, if any.

Cleaning.—The kapas was clean in a few factories, but was generally of medium cleanliness and often trashy. Yet only a few factories used cleaning machines for cleaning the kapas before ginning. It is suggested that the factories dealing with trashy varieties of kapas should be asked to install cleaning machines and at the same time the cotton merchants and mill owners should be asked to offer adequate premium for the cleaned samples in order to encourage marketing of Indian cottons in a much cleaner state than at present.

Gins.—The gins in India, at present, are almost all roller gins. Only one saw gin factory has been set up, although more are in the offing. Of the roller gins, 75 per cent of the factories had single roller gins and the remaining 25 per cent double roller gins, the latter predominantly in Madras, Andhra, Karnatak and Hyderabad States.

Make of gins.—All the roller gins were of Platt Bros. make, except a few double roller gins which were of other makes. The number of gins installed in a factory was small in most cases, less than 10 in 35 per cent of the factories and less than 20 in 53 per cent of them.

Age of gins.—Some of the gins are a century old and 35 per cent of the factories have gins more than 50 years old.

Economics.—In some parts of the country there are too many factories competing with one another, rendering the ginning uneconomical. A rational plan is to be chalked out for either scrapping or transferring the extra factories to different zones, where they may be needed. Further there should be a planned lay out of new factories as regards both location and type of machinery.

Settings.—Although an appreciable number of factories provided correct data for the various items of settings, there are quite a few who have not answered satisfactorily. It seems that either the questions were not clearly understood or the gin fitters would not reveal their 'secrets' or their ignorance. This feature was particularly noted with regard to overlap setting.

Speeds.—The speeds employed at the ginning factories, although varied among themselves, were, in general, lower than those used at the Technological Laboratory. The high speeds that might be adopted at the latter place (because the gins run for a short period) might not be feasible at the factories, where the gins had to work for long intervals at a stretch.

Roller.—82 per cent of the factories used rollers made of leather, while the rest used those of newspaper or coir board. As the latter was considerably cheaper, the economics of using either types of roller material is worthwhile investigating.

Output.—The output of lint per hour was low in some ginning factories but was generally satisfactory. The low output may be probably due to old and obsolete gins. As the output is one of the main considerations of profit, the managements are much interested in increasing it. In doing so, whether the quality or grade of the lint would be affected, is worth considering by further enquiry.

Production.—Many of the factories were of small size and gave low production per day and in the whole season. Yet there were some factories which gave more than 100 bales per shift and more than 15,000 bales in a season.

Power.—The installed power was also mostly small but was large in factories which were combined with presses. The motive power was generally steam and diesel although it was being switched on to electricity, wherever it is available.

Charges.—The ginning charges varied widely but in most cases they were between Rs. 10/- and Rs. 15/- for ginning a bale of lint, although in some cases it rose to as much as Rs. 30/-. The pressing charges varied to a lesser extent, from Rs. 7/- to Rs. 12/-, for pressing a bale of lint in different States.

Off-season work.—In three quarters of the number of factories, no work is done during the off-season and the factories are invariably closed down. In some, however decortication of groundnut, oil extraction, flour milling, rice hulling, etc., are undertaken during off-season period.

Ownership.—The ownership of the factories was private in 79 per cent, under limited liability companies in 18 per cent and under co-operative agencies in a bare 3 per cent of the cases.

Modernisation.—Very little improvement appears to have taken place in renovating or modernising the ginning factories. In a few cases motive power was changed, cleaning equipment was added, ball bearings were fitted and new gins were installed.

Difficulties.—Several difficulties, both administrative and technical have been pointed out.

Technological Bulletin Series B, No. 70.

DYNAMIC MECHANICAL PROPERTIES OF HIGH POLYMERS AND THE IMPORTANCE OF THEIR STUDY

In this paper the importance of the study of the dynamic mechanical properties of high polymers, with special reference to textiles, has been emphasized, and the various methods employed in the determination of these properties have been summarized and their limitations have been pointd out. The dependence of dynamic Young's modulus on the static strain applied to the specimen as well as on the dynamic strain-amplitude has been discussed for yarns of different structures with a view to showing the possibility of dynamic determination in solving the problems

of yarn geometry which, otherwise, are quite complicated to be solved mathematically. Also, the dependence of dynamic modulus on structural order (orientation and crystallinity) has been shown, and coupled with X-ray diffraction techniques, dynamic modulus determination may provide information about the changes in orientation and crystallinity at different stages of processing of artificial fibres. The relationship between static and dynamic measurements has been discussed, and the fact that dynamic modulus, if determined at high frequency will permit the specimen to undergo only elastic elongation, has been shown to be useful in determining the contribution of the immediate elastic component, primary creep and secondary creep in the total strain when a body is subjected to a particular load under static conditions.

Technological Bulletin Series B, No. 71.

NEPPINESS OF STANDARD INDIAN COTTONS

The present paper is an account of the intensive study made on Neppiness of eleven standard Indian Cottons of three successive seasons.

Two methods of counting neps in cotton lint and a modification of one for applying it to nep counts in yarn are described. The use of the former is suggested for determining the nep-potentiality of raw cotton.

A classification of neps and related structures in these cottons shows that if neppiness has to be reduced, the incidence of the following should be controlled in raw cotton.

(a) Matted fibre in all cottons.

(b) Immaturity in all cottons when it exceeds 30 per cent.

(c) Incidence of fibre-deformities, when it encourages fibre breakages as in Jarila, N.14 and Surat 1027 A.L.F.

(d) Propensity to throw off seed-coat fragments in ginning in general and notably in Gadag 1.

(e) Leafiness in Jayawant.

Incidence of neps at stages of spinning shows that they abound most in the lap, are reduced in the card, and again finally in the yarn.

Reduction of neps is possible in yarn manufacture, if the blow room treatment is softened, carding intensified, spewing avoided in drafting and short fibres kept under control again in drafting.

Neps per gram counted in ginned lint, carded material and those from yarn are highly correlated positively.

Neps are found to be significantly correlated with mean fibre length, immature long fibres, and fibre length irregularity. They are also correlated to broken ends

found in carded and ring frame material. Neps are, therefore, a product of initial entanglement of fibre-ends, fibre-breakage, and rolling up of broken and entangled fibre-bits as a result of such short bits going out of control in drafting.

Both the leaf-bits and seed-coat-fragments contribute to the ugliness of yarn. While the leaf-bits stick inextricably to fibres by means of short stiff hair, the seed-coat fragments get entry into the lint on account of a natural tendency of seed-coat to come off from the base of the raphae on the seed, and the incidence of insect-attacked seeds and immature ovules in seed-cotton. The number of leaf-bits occurring in yarn go hand in hand with the incidence of stiff, stellate or single but numerous hair on the leaf parts, such as leaves, stipules and bracteoles. The fate of these bodies during processing is controlled by their fragility, state of entanglement, and the efficacy of the eliminating processes. Their incidence follows almost the same pattern as the neps at different stages of spinning except that neps are maximum in lap, while leaf and seed-bits are maximum in the ginned lint.

It is suggested that full use be made of the techniques described to determine the nep-potentiality of lint, not only for selection of new strains, but also for eliminating undesirable material from selections already made. The technique could also be used advantageously by the cotton buyer for industrial use.

Technological Bulletin Series B, No. 72.

THE SKEIN STRENGTH OF THE YARN IN METRIC SYSTEM

It is well known that the product of the skein (lea) strength and the count, known as C.S.P. is an Index of cotton quality as measured at present in the English System. A new yarn Index which is the quotient of skein (100 meters) strength in grams and its tex number is recommended in the paper for universal adoption in the metric system. By testing several yarn samples for these two measures namely C.S.P. and Strength Index, it was found that there is close agreement between the values of these two, the average difference between them being 2.95 per cent. The correlation co-efficient between these two values was found to be + 0.9931. To obtain the value of one from the other with a greater accuracy regression equations connecting the two are given in the paper.

Technological Bulletin Series B, No. 73.

STRUCTURAL PROPERTIES OF COTTON FIBRES:

PART I — CONVOLUTION ANGLE AND ITS RELATION TO TENSILE STRENGTH

A quick method for determining the number of convolutions per unit length of cotton fibre, and thereby the convolution angle, has been described. High cor-

relation between tensile strength and convolution angle of 22 cottons, representing all the species cultivated in India, has been observed; a good correlation has also been observed between X-ray angle and convolution angle for 13 cottons. Irrespective of the species, it has been found that Indian cottons fall in line with the correlation of strength and convolution angle. This observation is not in accordance with Meredith's finding on Indian cottons.

APPENDIX III

Scientific and Technical staff of the Technological Laboratory as on the 31st May, 1960

	Designation	Name
1.	Director	Dr. R. L. N. Iyengar, D.Sc., F.T.I.
2.	Spinning Master	Shri V. V. Gupte, B.Sc., Tech. (Manch.), B.Sc.
3.	Senior Research Officer	Dr. V. Sundaram, M.Sc., Ph.D., A.R.I.C.
4.	—do—	Shri Jai Prakash, M.Sc.
5.	—do—	Dr. S. M. Betrabet, M.Sc., Ph.D.
6.	Junior Research Officer	Shri V. Venkataraman, M.A.
7.	—do—	,, N. Balasubramanian, B.Sc., B.Sc. (Tech.)
8.	—do—	,, V. G. Munshi, M.Sc.
9.	—do—	,, S. N. Pandey, M.Sc.
10.	Supdt. Testing House	,, K. G. Deo
11.	Head Assistant (Testing)	,, H. R. Nayak
12.	—do—	,, V. N. Modak, B.Sc.
13.	Senior Asstt. (Testing)	,, P. S. Sambamurthy
14.	—do—	,, R. G. Panvalkar, B.Sc.
15.	—do—	,, P. V. Nachane, B.Sc.
16.	—do—	,, S. Samson, B.Sc., LL.B.
17.	—do—	,, S. B. Mogre, M.Sc.
18.	—do—	,, P. D. Vakil
19.	—do—	,, N. Geo Paul, B.Sc.
20.	—do—	,, C. A. S. Iyer, B.Sc.
21.	—do—	,, S. Ramanathan
22.	Senior Asstt. (Chemical)	Miss Indira G. Bhatt, M.Sc.
23.	Junior Asstt. (Testing)	Shri J. M. Shah, B.Sc.
24.	—do—	,, R. Braganza, B.Sc.
25.	—do—	,, K. N. Seshan, B.Sc.
26.	—do—	,, P. G. Oka, B.Sc.
27.	—do—	Smt. S. B. Pai, B.Sc. (Hons.)

	Designation	Name
28.	Junior Asstt. (Testing)	Shri G. G. Phadnis, B.Sc.
29.	—do—	,, M. S. Sawant, B.Sc.
30.	—do—	,, T. K. Rao, M.Sc.
31.	—do—	,, M. G. Rege, B.Sc.
32.	—do—	,, M. N. Upponi, B.Sc.
33.	—do—	,, S. Sreenivasan, M.Sc.
34.	—do—	Smt. K. L. Datar, B.Sc.
35.	—do—	Shri A. N. Balan, B.Sc.
36.	—do—	,, C. K. Ramachandran, B.Sc.
37.	—do—	,, V. M. Kamath, B.Sc.
38.	—do—	,, S. R. Ganatra, B.Sc.
39.	—do—	,, A. W. Shringarpure, B.Sc.
40.	—do—	,, P. N. Elayathu, B.Sc.
41.	—do—	,, E. S. Abraham, B.Sc.
42.	—do—	,, A. V. Ravindranathan, B.Sc.
43.	—do—	,, C. V. Raman, B.A.
44.	—do—	,, Seshadri Srinivasan, B.Sc.
45.	—do—	,, R. Narayana, B.Sc.
46.	—do— (Temp.)	,, A. Rajagopalan, B.Sc.
47.	—do— (,,)	,, A. V. Ukidve, B.Sc.
48.	—do— (,,)	,, K. S. Shama Rao, B.Sc.
49.	Senior Asstt. (Stat.)	,, K. Venkateswaran, B.A.
50.	—do—	,, A. P. Bambardekar, M.Sc. (Stat.)
51.	Junior Asstt. (Stat.)	Kum. S. P. Gupte, M.A.
52.	—do—	Shri S. G. Nayar, B.Sc.
53.	Eng. Asstt. (Ginning)	,, D. G. Shete, L.M.E.
54.	Eng. Asstt. (Electrical)	,, H. V. Tamhankar, L.M.E., L.E.E.
55.	1st. Spg. Asstt. (Offg.)	,, M. S. Bhavasar, B.Sc., L.T.M.
56.	2nd Spg. Asstt.	,, S. A. Shankaranarayanan, B.Sc. (Text.)
57.	Draughtsman	,, Y. N. Tendulkar
58.	Turner	,, M. Mastan Shaikh
59.	Mechanic	,, P. V. Shridhankar

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