TECHNOLOGICAL LABORATORY

INDIAN CENTRAL COTTON COMMITTEE

ANNUAL REPORT

OF THE

DIRECTOR

TECHNOLOGICAL LABORATORY

FOR THE

YEAR ENDING 31st MAY, 1961.

PRICE Rs. 6.50

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

For the Year Ending 31st May, 1961

This is the Thirty-seventh Annual Report of the Technological Laboratory, and deals with the work done during the year 1960-61. It will be observed from the data presented, that the peak figures recorded last year have been outstripped, recording an appreciable improvement in all 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 6,229, as against 5,357 last year recording an increase of 16 per cent. The total number of samples received from the State Departments of Agriculture for full-scale and micro-spinning tests rose from 3,645 to 3,890 recording an increase of 7 per cent. The number of samples received for micro-spinning tests alone increased from 2,216 to 2,638 registering an increase of 19 per cent.

The work done on these samples is summarised in Tables 2, 3, 4 and 5 from which it will be seen that during the year under review 5,393 samples were tested as against 4,955 last year registering an increase of 9 per cent, 3,040 samples were spun as against 2636 which is an increase of 15 per cent. and 799 reports of all kinds were issued as against 803 during last year. Thus the average number of samples per report is some 19 per cent higher than last year. Further, the Cotton Breeders were provided with the technological data on their samples in time for the next sowing in accordance with the scheduled programme.

It will be noticed from the figures given in Table 17 that 1,882 samples were received for tests in the Testing House of the Laboratory as against 1,517 of last year, recording an increase of over 24 per cent.

The research activities continued to be concentrated on the structural, developmental and agronomic effects 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.

The Laboratory is participating in the calibration programme of the U.S.D.A. and calibration and check samples received from the U.S.D.A. are being tested regularly and the results forwarded for the calibration of micronnaire and Pressley strength tester. The results of this Laboratory fall in line with those of the

other laboratories. A similar calibration programme has been arranged for the breeding stations in India. Eight to ten check samples are being sent annually to each of the Senior Assistants (Technological) for carrying out tests for various fibre-properties and forwarding the results to the Laboratory. These are being checked with the results obtained in the Laboratory and the Assistants are advised to rectify any errors that might have cropped up either in the instruments or methods of tests.

The construction of the additional building and alterations to the existing building are being carried out by the Central Public Works Department of the Government of India. The ground floor has been nearly completed. The remaining portions of the construction are expected to be completed by the end of this year. Arrangements are, in the meantime, being made for the procurement of the new machinery. The Government of India has been addressed for providing the foreign exchange required for this purpose.

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			1-6-56 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	1-6-60 to 31-5-61
	1943-1948	1948-1953	1953-1958					
1. Agri. Dept.'s strains:								
Full spg. tests	372	807	728	768	905	832	737	1128
Micro-spg. tests	..	..	1,081	1,092	1,626	1,607	2,216	2,638*
2. Standard cottons	20	17	20	22	23	25	22	24
3. Technological samples ..	267	63	135	291	251	234	320	271
4. Trade Variety cottons	38	37	41	45	35	46	53	80
5. Spg. tests (Paid)	73	76	92	66	78	63	61	112
6. Fibre tests (Paid)	261	169	269	219	330	176	313	402†
7. Fibre tests (Agr.)	..	128	325	391	594	766	373	100
8. Yarn tests ..	97	190	233	242	243	405	174	263
9. Cloth tests ..	95	105	391	422	373	354	188	195
10. Samples for valuation ..	147	83	41	9	81	41	..	..
11. Moisture tests ..	2	5	140	186	473	825	881	1,006
12. Miscellaneous	8	9	32	55	32	102	19	10
Total ..	1,380	1,689	3,528	3,808	5,044	5,476	5,357	6,229

* Includes 76 samples received for Commercial Grading.

† Includes 99 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 6,229 as against 5,357 received during the previous year recording an increase of 16 per cent. There was an increase in the number of samples received for all categories of tests except for the agricultural samples for fibre tests alone. This was because the breeders wanted micro-spinning also to be done along with fibre tests. The number of samples received from the Agricultural Departments rose from 3,645 to 3,890 recording an increase of 7 per cent.

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

TABLE 2

Number of samples tested

Type of test	1956-57	1957-58	1958-59	1959-60	1960-61
Spinning with or without Fibre test ..	2,126	2,277	2,531	2,545	2,719
Fibre test	496	713	971	891	932
Yarn test	242	243	405	174	263
Cloth test	422	373	354	188	195
Moisture test	186	615	806	821	1,004
Valuation test	9	81	41	..	..
Technological test	291	251	234	320	271
Miscellaneous test	55	16	50	16	9
Total ..	3,827	4,569	5,392	4,955	5,393

It may be mentioned that all the samples received upto the end of 1959-60 season have been tested and reports issued by early 1961. Tests on the samples received in 1960-61 are bei g made in the order in which they are received, giving priority to the breeder's samples in order to issue reports on them before the next sowing starts. Many of these reports have already been issued and tests on the remaining samples are in progress. It may be mentioned that there is a time lag between the receipt of the samples and the issue of reports. 2,101 samples remained pending examination and report at the end of the year.

Table 3 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 periods, 1943-48, 1948-53 and 1953-58.

TABLE 3

Number of Reports issued

Type of Report	Average			1956-1957	1957-1958	1958-1959	1959-1960	1960-1961
	1943-1948	1948-1953	1953-1958					
Spinning Test ..	149	220	328	397	339	368	418	408
Fibre Test	54	73	104	115	135	102	178	132
Yarn Test	47	109	92	95	94	145	84	122
Cloth Test	50	56	189	269	152	150	83	96
Moisture Test ..	..	3	11	17	28	24	34	39
Miscellaneous ..	2	2	9	14	7	15	6	2
Total ..	302	463	733	907	755	804	803	799

As will be seen from following Table 3, the total number of Reports issued during the period under review remained practically the same as last year. However since the number of samples tested increased by 9 per cent the average number of samples included in each report was 9 per cent higher.

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 4 and 5 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 4

Number of samples spun

State	Average			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960	1960-1961
	1943-1948	1948-1953	1953-1958						
Maharashtra ..	..	..	..	..	..	..	..	514	816
Gujarat	208	429	1,038	923	1,087	1,696	1,398	736	741
Mysore	..	..	80	..	231	180	491	354	402
Madras	24	94	120	111	94	119	67	61	58
Uttar Pradesh ..	28	29	84	87	112	113	153	197	242
Madhya Pradesh ..	30	113	232	352	133	213	144	131	156
Punjab	35	61	110	176	150	70	54	58	43
Rajasthan	..	2	35	44	20	..	41	25	31
Andhra	..	..	70	71	96	97	122	111	135
Kerala	..	..	..	..	..	..	24	71	74
Miscellaneous ..	5	18	53	78	49	78	42	3	1
Total ..	330	746	1,822	1,842	1,972	2,566	2,536	2,261	2,699*
Standard cottons ..	22	18	21	24	22	20	27	16	22
Trade tests ..	233	233	213	203	263	224	183	359	120
Tech. tests									199
Grand Total ..	585	997	2,056	2,069	2,257	2,810	2,746	2,636	3,040

* 2,069 are Micro-spinning samples.

TABLE 5

Number of yarn spun

State	Average			1955-1956	1956-1957	1957-1958	1958-1959	1959-1960	1960-1961
	1943-1948	1948-1953	1953-1958						
Maharashtra ..	..	..	..	..	..	..	..	898	1,367
Gujarat	329	728	1,508	1,258	1,806	2,448	2,093	1,271	1,212
Mysore	..	..	153	..	446	318	875	729	707
Madras	67	198	236	240	241	217	135	121	153
Uttar Pradesh ..	83	71	169	196	212	224	278	395	361
Punjab	103	112	221	414	298	134	74	180	63
Madhya Pradesh ..	28	154	338	452	251	374	310	305	307
Rajasthan	..	..	12	..	60	..	89	27	80
Andhra	..	..	48	..	122	119	146	143	193
Kerala	..	..	..	..	..	..	64	79	93
Miscellaneous ..	393	443	499	1,103	65	120	80	6	3
Total ..	1,003	1,706	3,184	3,663	3,501	3,954	4,144	4,154	4,539*
Standard tests ..	152	115	139	165	142	130	141	96	138
Trade tests ..	657	753	564	593	766	500	492	704	347
Tech. tests ..									199
Grand Total ..	1,812	2,574	3,887	4,421	4,409	4,584	4,777	4,954	5,223

* 2,069 are Micro-spinning.

Tables 4 and 5 show that the number of samples spun increased by 15 per cent while the number of counts spun also registered a small increase of 5 per cent. An

additional count is also 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. (a) *Seven Desi Varieties in four centres in Vidarbha area.*—The six varieties, AK 235, AK 277, No. 331, Y1, 183, AK 14 were raised along with the control Virnar, in the four centres, Akola, Nagpur, Buldana and Yeotmal in the 1959-60 season. It was observed, on statistical analysis of the test results, that these varieties were significantly shorter in staple at Yeotmal than at the other three places and significantly finer in staple at Nagpur than at other places. These samples at Buldana and Nagpur had significantly higher strength index value than at Akola and Yeotmal. These varieties raised at Akola and Nagpur were significantly better in spinning value than those raised at Buldana and Yeotmal. Among the varieties, AK 235 and No. 331 were definitely longer in staple and AK14 had the lowest strength index value. All six varieties yielded significantly better spinning value than the control Virnar. No. 331 gave the best spinning performance among them.

1. (b) Another set of seven Desi varieties together with the two American varieties, Buri 147 and Buri 0394, were raised in three places, Akola, Buldana and Yeotmal in the 1959-60 season. The Desi varieties included AK 235, AK 277 and Y1 besides 2204, 1946 and 1422 along with the control Virnar. It was found, on statistical analysis, that Buri 147 was definitely longer and finer in staple but had a significantly lower maturity coefficient and yielded significantly better spinning value than the others. Buri 0394 was also significantly longer than all Desi varieties and yielded definitely better spinning value than the Desi varieties except 2204 (Daulat). Among the Desi varieties, 2204 and 1946 gave significantly better spinning value than the control Virnar. Considering the places, these samples when raised in Buldana are likely to be definitely longer in staple but with significantly lower pressley strength index value than when grown in Akola and Yeotmal.

2. *Four varieties in Jalgaon and Dhulia districts.*—The four varieties, W 81, Y1, C.J. 73 and Virnar were tried in Jalgaon and Chopda in Jalgaon district and in Dhulia in Dhulia district in the 1959-60 season. It was observed, on statistical analysis, that C.J. 73 yielded significantly better spinning value than the other three samples. Growing these varieties in these three places did not produce any significant change either in fibre-properties or in spinning value.

3. *A sample for tests from Khadi production centre, Parbhani.*—A sample of cotton was sent for tests by the Khadi production centre, Parbhani, through the Cotton Breeder. It was drawn from a pressed bale used for hand-spinning by the Khadi centre. It was reported that there was great difficulty in obtaining clean slivers and good hand-spun yarn of normal counts without breakage. The Spinning Master reported that it was dirty containing leaf, cut seed and full seeds. Though the blow-room loss was 9½%, it would be very difficult to get rid of foreign matter by hand method of opening and cleaning without the aid of an efficient mechanical opener-cleaner. A dirty sliver would naturally result in numerous breakages at the spinning device. The fibre-properties resembled thoseof Gaorani-6, but it was found suitable only for 22s standard counts which was definitely lower than what is usually obtained for trade samples of Gaorani-6 cotton.

4. *Mill tests on improved varieties (Maharashtra).*—(i) *Y1 and Virnar.* It may be remembered that mill and Laboratory tests were carried out on these two varieties raised at Jalgaon and Dhulia in the three seasons, 1956-57, 1957-58 and 1958-59, the results for which were given in the last Report. They were carried out in the 1959-60 season also. But, Y1 sample from Jalgaon was not available for Laboratory tests. Comparative results of tests obtained in all four seasons are given in Table 6 below:—

TABLE 6

Lea strength (lb) for 20s yarns

	1956-57				1957-58				1958-59				1959-60			
	Jalgaon		Dhulia		Jalgaon		Dhulia		Jalgaon		Dhulia		Jalgaon		Dhulia	
Variety	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test
Y1	85.5	86.1	80.4	87.1	81.0	91.9	78.5	91.3	76.5	82.3	87.1	87.0	91.0	..	82.0	84.9
Virnar	77.4	84.7	56.9	78.0	71.1	79.4	68.6	87.7	76.2	80.5	81.0	75.5	85.8	85.3	69.3	76.5

It may be observed that Y1, 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 where the difference in the test between the two varieties was small but still in favour of Y1.

(ii) *Buri* 147. Unirrigated Farm sample of B.147 of 1959-60 season supplied by the Extra Assistant Director of Agriculture, Achalpur, was subjected to mill and Laboratory tests. It gave a test of 70.6 lbs for 30s yarns in the mill. According to Laboratory tests, it was found suitable for spinning upto 43s standard counts.

(iii) 3591 *against Gaorani-22 at Badnapur.* Mill and Laboratory tests were carried out on samples of these two varieties, 3591 and Gaorani-22 raised at Badnapur in the 1959-60 season. Comparative results of tests obtained in the mill and in the Laboratory are given in Table 7 below:—

TABLE 7

Lea strength (lb) for 30s Yarns

	Mill test	*Laboratory test*
3591	59.6	54.7
Gaorani-22	58.2	54.5

It may be seen that both varieties gave about the same yarn-strength at the mill and at the Laboratory.

II. Gujarat State

5. *Four varieties at four different centres in North Gujarat.*—The four varieties, 597B, 797, 394-3 and Kalyan, were raised at four different centres, Dhanduka, Rampura, Bavla and Viramgam in the 1959-60 season. At Bavla, they were raised with two different spacings, $2' \times 9''$ and $2' \times 2'$. Statistical analysis of the results indicated that 597B and Kalyan were significantly finer in staple and had significantly lower maturity coefficient than 797 and 394-3. But, 394-3 and Kalyan had definitely lower strength index value than 597B and 797. Furthermore, all three varieties yielded significantly better spinning value than Kalyan. Among them, 597B was the best, 797 came next in order while 394-3 took the third place. Regarding the centres, these varieties raised in Viramgam and Rampura gave significantly better spinning value than when grown at Bavla and Dhanduka.

6. (i) *Four varieties raised in five centres in South Gujarat.*—170-Co2, 134-Co2M-21, I.S.C. 67 and Vijalpa were raised in five different centres, Surat, Talod, Bardoli, Kholwad and Dabhoi in the 1959-60 season. It was found on statistical analysis, that I.S.C. 67 and 134-Co2 M-21 were significantly longer, finer in staple and significantly lower in maturity coefficient than 170-Co2 and Vijalpa. It is noteworthy that Vijalpa had significantly higher strength index value than the others. I.S.C. 67 and 170-Co2 gave significantly better spinning value than 134-Co2 M-21 and Vijalpa. These varieties when raised at Talod yielded definitely better spinning value than when grown at Surat and Bardoli.

(ii) 115 *and* 198 *against Vijalpa in Gujarat.* These three varieties were raised in four centres, Surat, Bardoli, Hansot and Dhaman in the 1959-60 season. It was found by statistical analysis that neither the varieties nor the centres indicated any significant difference either in fibre-properties or in spinning value.

7. *Mill tests on improved varieties (Gujarat).—Deviraj (170-Co2) at Junagadh.* It may be recalled that mill and Laboratory tests were carried out on this variety in the 1957-58 and 1958-59 seasons and the test results were given in the last Annual Report. These tests were repeated in the 1959-60 season also and the comparative results of tests obtained in all three seasons are summarised in Table 8 below:—

TABLE 8

Lea strength (lb) for 40s yarns

	1957-58		1958-59		1959-60	
	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test
Deviraj (170-Co2) ..	41.1	40.4	45.4	45.4	40.5	36.2

This variety recorded improvement in 1958-59 over its 1957-58 counterpart, but in 1959-60 it has again reverted to its performance of 1957-58.

8. *Establishment of permanent cotton plots.*—Samples of Digvijay raised in Broach, Samni (Amod taluka, Broach District) and Thasra were received for tests in the 1959-60 season. In the case of the two former places, the 1st, 2nd and 3rd picking samples were supplied separately. Similar samples of Vijalpa from different pickings were received for tests in the 1959-60 season from Navsari and Ankleswar. Samples of 170-Co2 from different pickings were also received from Gokharwala (Limbdi taluk, Surendranagar district) for these tests in this season. One sample of Kalyan from Bachau (Kutch) was further tested for this experiment.

It was observed that the spinning value declined for later pickings at Broach, Samni and Navsari while the reverse was the case at Ankleswar. For 170-Co2 also, the last picking gave weaker yarns than the two earlier pickings. It is noteworthy that Digvijay raised at Thasra gave definitely better spinning value than when raised at Broach and Samni.

9. *Agronomic Experiments (Gujarat).* (i) *Deviraj (170-Co2) in rain-fed and irrigated conditions in Saurashtra area.*—Mention was made in the last Report that acreage under rain-fed conditions of Deviraj was increasing as the farmers preferred to grow without irrigation. In order to study which would be beneficial to cultivators, test results for rain-fed and irrigated samples from six centres in 1958-59 were reported therein. Samples were supplied from these centres in the 1959-60 season for tests.

Though the rain-fed samples gave better spinning values than the corresponding irrigated samples in 1958-59 significantly in two cases, no such difference was observed in 1959-60 season.

(ii) *Spacing Experiments at Bavla.*—Mention was made in the last Annual Report that six varieties were tried with two spacings, 2′ × 9″ and 2′ × 2′ at Bavla in the 1958-59 season and their results were reported. In 1959-60 season, nine varieties were raised with these two spacings.

It was observed that there were no significant differences either in fibre-properties or in spinning value between the two spacings. 597B gave the best spinning value

while 742-B, 694, 797 and 14/1 came next in the given order. These five varieties yielded definitely better spinning performance than Kalyan.

(iii) *Spacing Experiments at Kadiadra.*—The four varieties, A7, Buri 147, 68×24 and 170-Co2-126 were tried with two spacings, 5′ × 2′, and 2½′ × 2′, at Kadiadra in the 1959-60 season. These samples were subjected to fibre and micro-spinning tests. The two spacings did not show any significant difference either in fibre-properties or in spinning value.

(iv) *Spacing cum sowing date trial at Halvad on Deviraj* (170-*Co*2).—The object of these tests, as stated in the last Report, was to evaluate the best time for sowing of 170-Co2 in combination with adequate spacing under canal irrigation at Halvad. The results for 1958-59 season were given in the last Report. They were repeated in 1959-60 season. The samples were sown on 15th May, 1st June, 15th June, 1st July and 15th July in each season (18th July in 1960) under three spacings, 3′ × 3′, 3′ × 4′ and 3′ × 5′. They were subjected to fibre and micro-spinning tests.

It was observed that neither the spacings nor the sowing dates had significantly affected the fibre properties or spinning value.

(v) *Irrigation trials on* 170-*Co*2 *at Halvad.*—The object of these tests, as stated in the last Report, 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 results for 1958-59 season were given in the last Report. In this season, fibre and micro-spinning tests were carried out.

It was found in the 1958-59 season that the sample which received three irrigations at 28 days intervals gave definitely better spinning value than the other samples. But, in this season (1959-60), the unirrigated sample was found to be somewhat longer in staple and yielded stronger yarns than the three irrigated samples. Among them, it may be noted that the sample with maximum irrigation yielded definitely weaker yarns than the other samples.

(vi) *Hot weather Sann green manuring trial on* 170-*Co*2 *at Halvad.*—The object of this experiment, as stated in the last Report, was to determine the effect of hot weather sann green manuring on cotton with and without fertiliser doses to both. Sann was raised in hot weather and burnt with P_2O_5 as per treatment and the cotton was then raised. Fibre and micro-spinning tests were carried out on them.

It was noticed that though all five treated samples yielded stronger yarns than the control in 1958-59 season, this was not the case in 1959-60 season. It was found that the use of sann green manuring has somewhat depressed the yarn-strength.

(vii) *Green manuring with sann and Guar raised in between rows of* 170-*Co*2 *at Halvad.*—Six different treatments were given to the crop for this experiment in 1959-60.

It was observed that the cotton with 4.5′ and three rows of Sann has the longest staple and has given stronger yarns than all the other samples. However, these results are only for one season.

(viii) *Rotation Experiments at Broach.*—It may be recalled that test results for Digvijay cotton raised at Broach in the 1957-58 and 1958-59 seasons after jowar, after lang and after mixed jowar and lang were discussed in the previous report. Similar samples were received for tests in the 1959-60 season.

It was found that though Digvijay after jowar gave somewhat weaker yarns in the 1957-58 season, no such difference was observed between the three samples in the two subsequent seasons, 1958-59 and 1959-60.

III. MYSORE STATE

10. 15-39X, 16X, 16Y and Jayadhar were raised in eight centres in Mysore State in the 1959-60 season. It may be recalled that similar results from ten different centres for these four varieties raised in the 1958-59 season were discussed in the last report. Samples obtained in 1959-60 season were subjected to fibre and spinning tests. It was found on statistical analysis that, as in the case of last year, 15-39X, 16X and 16Y were all significantly finer in staple, gave significantly lower maturity coefficient and yielded significantly better spinning value than Jayadhar. 15-39X also gave significantly better pressley strength index and better spinning value than 16X and 16Y. These varieties, when raised at Hungund and Mudhol, yielded definitely lower spinning value than the other six centres among which there is nothing much to choose in this respect.

11. *IHX and IHU against Laxmi in four centres.*—The three varieties, IHX, IHU and Laxmi were raised in four different centres, Gadag, Ron, Dundur and Manjalapur in the 1959-60 season. On statistical analysis, it was found that these three varieties did not differ significantly from one another either in fibre-properties or spinning value. But, these varieties yielded the best spinning value when raised at Dundur.

12. *Sea Island Andrews from Mysore State.*—Six samples of Sea Island Andrews from different centres were received for full-scale spinning tests in the 1959-60 season. The Mangalore sample gave the best spinning performance, the Shimoga sample came next in order while the Kollegal and the two Bangalore samples took the third place. The sample from Mysore yielded the weakest yarns.

13. *Mill tests on improved varieties (Mysore State).* (i) *B.C.1. against Jayadhar.*—Mill and Laboratory tests were carried out on these two varieties raised at three different centres, Bagalkot, Hungund and Bijapur, in the 1959-60 season. But, B.C.1 samples were not available for mill tests from Bagalkot and Bijapur. Similar tests carried out on the samples of 1957-58 and 1958-59 seasons grown at Bagalkot were discussed in the last Report. Comparative results of tests obtained

at the mill and at the Laboratory for all three seasons are summarised in Table 9 below.

TABLE 9

Lea strength (lb) for 30s yarns

Variety	1957-58		1958-59		1959-60					
	Bagalkote		Bagalkote		Bagalkote		Hungund		Bijapur	
	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test
B.C. 1	60.0	56.7	52.4	50.0	..	..	42.5	49.5	..	..
Jayadhar	56.4	50.7	51.8	48.4	49.9	40.5	42.5	37.1	48.0	43.6

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 1958-59 season and also in the mill test for 1959-60 season for Hungund samples.

(ii) *IHX*-11 *against Laxmi.*—Mill and Laboratory tests were carried out on these two varieties raised at three different centres, Gadag, Kurtakoti and Rattihalli in the 1959-60 season. It may be recalled that similar tests carried out for Gadag samples in the 1958-59 season were given in the previous Report. Comparative results of tests obtained at the mill and at the Laboratory in the two seasons are given in Table 10 below.

TABLE 10

Lea strength (lb) for 30s yarns

Variety	1958-59		1959-60					
	Gadag		Gadag		Kurtakoti		Rattihalli	
	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test	Mill test	Lab. test
IHX-11	35.8	59.2	66.8	58.2	61.4	59.6	59.5	59.6
Laxmi	34.0	58.6	68.3	64.4	58.9	58.9	61.4	58.5

It may be observed that the differences in yarn-strength between the two varieties are small and non-significant in all cases by the mill test and also by the Laboratory test except for 1959-60 samples of Gadag where Laxmi was found to be better than IHX-11.

(iii) 14-2 *and* 30-1 *against M.A.*5.—These three samples raised at Arisikere were subjected to both mill and Laboratory tests in the 1959-60 season. Comparative results of tests obtained at the mill and the Laboratory are given in Table 11 below.

TABLE 11

Lea strength (lb) for 30s Yarns

Variety	Mill test	Laboratory test
M.A. 5	49.5	52.2
14-2	55.6	55.6
30-1	58.2	54.7

It may be observed that both 30-1 and 14-2 gave stronger yarns than M.A. 5 both by the mill test and by the Laboratory test, the difference being more significant in the mill test.

14. *Agronomic Experiments (Mysore State).* (i) *NPK Experiment on Giza 12 at Mandya.*—32 samples of Giza 12 cotton raised in Mandya in the 1959-60 season with treatment combinations of 4 P treatments, P_0, P_1 (50 lbs P_2O_5), P_2 (100 lbs P_2O_5) and P_3 (150 lbs P_2O_5) and 4 K treatments, K_0, K_1 (50 lbs K_2O), K_2 (100 lbs K_2O) and K_3 (150 lbs K_2O) per acre and 2 N treatments, N_0 and N_1, (50 lbs N) were subjected to micro-spinning tests. Similar tests were also made in the two previous seasons, 1957-58 and 1958-59 and the results were discussed in the previous reports. It was found, on statistical analysis of the results, that these different treatments had not produced any significant difference in yarn-strength as compared with the control sample which was grown without any manure.

(ii) *NPK Experiment on M.A. 5 and Sea Island Andrews at Mandya.* Eight samples of each of these two varieties with the eight treatments, N, P, K, N+P, N+K, P+K, N+P+K and the control without any manure raised in 1959-60 season at Hiriyur and Mandya respectively 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. It was found that the differences in yarn-strength between the control and the manurially treated samples were small and non-significant.

(iii) *Sowing date trials at Dhadesugur.*—The four varieties, D.C. 417, D.C. 418, D.C. 407 and D.C. 286 were tried with three sowing dates, 11-7-59, 27-7-59 and 11-8-59 at Dhadesugur in the 1959-60 season. They were subjected to micro-spinning tests.

It may be observed that the earliest sowing yielded the strongest yarns and there is a progressive decrease in yarn-strength as the sowing date advanced. Among

the varieties, D.C. 418 gave the strongest yarn, D.C. 407 came next in order while D.C. 417 and D.C. 286 took the third place.

(iv) *Three varieties tried on red and black soils at Ranebennur.*—The three varieties, M.A. 5, 170-Co2 and Laxmi were raised both in red and black soils at Ranebennur in the 1959-60 season. Fibre and micro-spinning tests were carried out on them.

It was found that fibre-properties were not affected by growing in these two types of soils. In red soils, Laxmi was found to yield the strongest yarns while in black soils, 170-Co2 gave the strongest yarns. 170-Co2 alone yielded somewhat stronger yarns in black soil than in red soil while the reverse was the case for the other two varieties.

(v) *Study of different treatments on Sea Island Andrews at Mangalore.*—Samples of Andrews with different treatments such as mulching trial, place effect, Chilean nitrate vs. Ammonium sulphate trial, Insecticidal trial, manurial trials, white-flowered and yellow-flowered types etc. raised at Mangalore in the 1959-60 season were subjected to micro-spinning tests. Many of these treatments did not show significant differences. Similarly samples with different spacings, sowing dates and different levels of nitrogen also did not produce significant differences in yarn-strength of this variety.

IV. Kerala State

15. *Sea Island Andrews from Kerala State.* Six samples of Sea Island Andrews from different centres were received for full-scale spinning tests in the 1959-60 season. It was observed that the sample from Chittoor raised under irrigation had given a lower spinning value than the other under rain-fed conditions, which were suitable for spinning upto 90s counts and above.

16. *Mill tests (Kerala State).*—Mill tests were carried out on a sample of Sea Island Andrews cotton raised in 1959-60 season in a fine spinning mill in Bombay. The mill spun this sample into 100s and 120s counts after combing to the extent of 25 per cent and they gave the following results:

Actual counts	99.0	117.6
Lea strength (lb)	20.6	13.6
Count-strength product	2039	1599

The mill reported that this variety was suitable for spinning 100s warp under mill working conditions after combing to the extent of 25 per cent.

17. *Agronomic Experiments. Study of different treatments on Sea Island Andrews at Trichur.* Similar samples of Sea Island Andrews with different treatments as given under item 14(v) above raised at Trichur in the 1959-60 season were

received for tests. Here again as in the case of Mangalore samples, most of these treatments did not produce any significant effect on yarn-strength. In the case of mulching trials, however, the non-mulched sample yielded definitely weaker yarns than the two mulched samples at Trichur while no such difference was observed at Mangalore.

V. ANDHRA PRADESH

18. *P 216 F raised in the rice fallows in Krishna district.* Two samples of P 216 F raised in rice fallows in Serinchintala and Serikalavapudi in 1959-60 season in Krishna district were subjected to fibre and micro-spinning tests. The former sample (0.98″) was found to be 9 per cent longer in staple than the latter (0.90″). But, both samples were found to give the same yarn strength of 38 lbs when spun by micro-spinning technique into 40s yarns.

19. (i) *Mill tests on improved varieties (Andhra Pradesh)*—Mill and Laboratory tests were carried out on 3930 A and 3943 B raised at Adoni in the 1959-60 season. Comparative results of tests obtained at the mill and at the Laboratory are given in Table 12 below:—

TABLE 12

Lea strength (lb) for 30s yarns

Variety	Mill test	Laboratory test
3930 A	60.3	42.7
3943 B	59.3	43.5

Both the varieties gave practically the same test at the mill and at the Laboratory.

(ii) *Mill test on Sea Island Andrews from Andhra Pradesh.* Mill tests were carried out on a sample of Sea Island Andrews cotton raised in 1959-60 season in a fine spinning mill in Bombay. The mill spun this sample into 100s and 120s counts after combing to the extent of 25 per cent and the following results were obtained.

Counts actual	100.6	119.2
Strength (lb)	17.5	11.2
Count-strength product	1760	1335

The mill reported that, under mill working conditions, this sample is not capable of giving 100s warp yarn after combing to the extent of 25 per cent.

VI. UTTAR PRADESH

20. *Establishment of permanent cotton plots.* Three samples of 216 F cotton from the 1st, 2nd and 3rd pickings raised at Raya in the 1959-60 season were received

for tests. It was noteworthy that the third picking sample yielded some what better spinning value than the two earlier picked samples.

21. *Mill tests on improved varieties (U.P.).* (i) *Desi Varieties.* Mill and Laboratory tests were carried out on the two improved varieties 197-3 × 35/1 and [(197-3 × c 520) × 197-3] × c 520 in comparison with U.P. No. 1 and 35/1 raised at Raya in the 1959-60 season. It might be remembered that these tests were carried out on U.P. No. 1 and 35/1 last year when it was found that U.P. No. 1 gave definitely stronger yarns than 35/1 both by the mill test and the Laboratory test. These results were given in the last Report. Comparative results of tests obtained at the mill and at the Laboratory in the 1959-60 season for the four varieties are summarised in Table 13 below:—

TABLE 13

Lea strength (lb) for 10s yarns

Variety	Mill test	Laboratory test
U.P. No. 1	140.5	157.7
197-3 × 35/1	179.1	188.1
[(197-3 × c 520) × 197-3] × c 520	191.5	206.2
35/1	150.5	155.2

It may be observed that the two improved varieties gave definitely better yarn strength than U.P. No. 1 and 35/1 both by the mill test and by the Laboratory test. Among the two improved varieties, [(197-3 × c 520) × 197-3] × c 520 yielded definitely stronger yarns than 197-3 × 35/1 in both mill test and Laboratory test.

(ii) *American varieties.* The two hybrids, Iran 1 × P. Am. 1 and 100 F × Parb. Am. × 100 F/6, raised in the 1959-60 season at Raya were subjected to mill and Laboratory tests against the control 216 F as in the case of last year which were discussed in the last Report. Comparative results of tests at the mill and Laboratory for both seasons are given in Table 14 below.

TABLE 14

Lea strength (lb)

	1958-59			1959-60		
	Counts nominal	Mill test	Lab. test	Counts nominal	Mill test	Lab. test
Iran 1 × P. Am 1 ..	18s	97.3	104.4	30s	45.2	51.3
100F × Parb. Am × 100 F/6	„	98.5	101.8	„	46.7	50.5
216 F	„	95.8	103.2	„	41.5	56.8

According to the mill test, the two hybrids yielded definitely stronger yarns than 216 F in the 1959-60 season. The difference in yarn-strength between the two hybrids in the mill and in the Laboratory was non-significant. In 1958-59 also, the two hybrids gave some what stronger yarns than 216 F in the mill.

Agronomic Experiments (U.P.)

22. *Sowing-cum-spacing-cum manurial trial on* 35/1 *at Bulandshahr.*—35/1 was raised at Bulandshahr in the 1959-60 season with four sowing dates, 15-4-59, 30-4-59, 15-5-59 and 30-5-59, with four spacings, $2' \times 1'$, $2' \times 1\frac{1}{2}'$, $2' \times 2'$ and $2' \times 2\frac{1}{2}'$ and with three different levels of nitrogen, O lbs N, 25 lbs N and 50 lbs N per acre. These samples were subjected to micro-spinning tests.

It was found that the two middle sowing dates, 30-4-59 and 15-5-59 were more beneficial for this variety in respect of yarn-strength. The spacing, $2' \times 1\frac{1}{2}'$, was found to give the strongest yarns. The manured samples yielded significantly stronger yarns than the control with no manure.

VII. Punjab State

23. *Sea Island Andrews raised at Rauni (Patiala).*—A sample of Sea Island Andrews raised in the 1959-60 season at Rauni (Patiala) was received for full spinning tests. It was found that it had a mean fibre-length of 1.32″ and compared quite favourably with its Kerala counterpart both in fibre-properties and spinning value. This sample was found suitable for spinning upto 78s standard counts.

24. *Mill tests on P.A. H* 14 *against* 216 *F.*—Mill and Laboratory tests were carried out on these two varieties raised at Hansi in the 1959-60 season. But, sample of 216 F for Laboratory tests was not available and therefore only mill tests were made on 216 F. Similar tests for H 14 were made last year and the results were given in the last Report. Comparative mill and Laboratory tests are given in Table 15 below:—

TABLE 15

Lea strength (lb) for 30s yarns

	1958-59		1959-60	
	Mill test	Lab. test	Mill test	Lab. test
P.A.H. 14	52.4	49.9	54.7	52.4
P.A. 216 F	..	..	57.1	..

216 F gave some-what stronger yarns than H 14 at the mill in 1959-60.

VIII. Rajasthan State

25. *Agronomic Experiments. Sowing date and Spacing Experiment on M 48-4 at Bundi.* Samples of M. 48-4 raised with three sowing dates, 9-5-59, 24-5-59 and 8-6-59 and with three spacings, $1\frac{1}{2}' \times 1'$, $1\frac{1}{2}' \times 1\frac{1}{2}'$ and $2\frac{1}{2}' \times 1'$ in the 1959-60 season at Bundi were subjected to fibre and micro-spinning tests. It was observed that these sowing dates and these spacings on this variety did not have any significant effect either on fibre-properties or on spinning value.

IX. General

26. *Tests on improved varieties from distributed seed at various stages of multiplication.*—Nineteen improved varieties belonging to different stages, each received from different centres, were tested in the 1959-60 season. They were Daulat, B 147 and B 0394 from Maharashtra State; Digvijay, Vijalpa, Kalyan, Sanjay and Deviraj from Gujarat State; Laxmi, Jayadhar and Deviraj from Mysore State; M.C.U. 2, M.C.U. 1, K5, K6 and P 216F from Madras State; Farm Westerns 1 and Laxmi from Andhra State and C. Indore 1 from Rajasthan. It was found 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., Sanjay at Botad, Jayadhar at all three centres, M.C.U. 1 at Tiruppur and K5 at Palladam.

27. *Results for Extra long staple* (1-1/16″ *and above*) *cottons of* 1959-60 *season 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 on the material for use in their Breeding Programme. Accordingly, the available results for such cottons tested in the 1959-60 season at the Laboratory are given in table 16.

B. STANDARD INDIAN COTTONS

As in the past, extensive fibre and spinning tests were carried out on the Standard Indian cottons of the 1959-60 season which covered as much as 58 per cent of the total area under cotton cultivation in India. It was estimated that the growers of these improved varieties in place of the earlier varieties were benefited by an additional gross income of as much as 21.7 crores of rupees in the 1958-59 season alone. A technological bulletin (Series A, No. 104) embodying the results obtained for these varieties was published during the period under review.

The 1959-60 season has been marked, on the whole, by a general improvement in the quality of the cotton crop. Out of 20 varieties tested, as much as ten of them had recorded an improvement, six of them had maintained their performances

TABLE 16

Results for extra-long staple cottons (1-1/16″ and above) tested for full-scale spinning in 1959-60

Sl. No.	Name of Variety	Place	Mean fibre length (inch)	Mean fibre weight per inch (10^{-6}oz)	Maturity Coefficient	Pressley strength index lb/mg	Highest standard counts
	I. Gujarat State						
1	134-Co2 M-21 ..	Kadiadra	1.14	0.104	0.69	6.7	42s
2	134-Co2 M Kadiadra	,,	1.14	0.104	0.70	6.5	44s
3	I.S.C. 67	,,	1.12	0.105	0.75	6.3	41s
4	134-Co2 M-21 ..	Surat	1.11	0.104	0.70	7.3	36s
5	I.S.C. 67-4	,,	1.07	0.092	0.62	7.2	44s
6	I.S.C. 67-5-B	,,	1.13	0.096	0.65	6.4	43s
7	I.S.C. 67-5-5	,,	1.10	0.091	0.62	7.0	43s
8	I.S.C. 67-B-23 ..	,,	1.15	0.093	0.61	6.9	43s
9	I.S.C. 37-1	,,	1.07	0.111	0.70	6.9	40s
10	68-G-4-11	,,	1.10	0.112	0.72	6.6	44s
11	134-Co2 M-D-19 ..	,,	1.10	0.128	0.76	6.8	44s
12	134-Co2 M-26 ..	,,	1.16	0.118	0.74	6.9	40s
13	134-Co2 M-21 ..	Talod	1.14	0.087	0.59	6.6	43s
14	I.S.C. 67	,,	1.16	0.091	0.62	6.1	49s
15	68-G-4-11	,,	1.08	0.090	0.60	6.4	45s
16	134-Co2 M-21 ..	Kholwad	1.14	0.104	0.69	6.8	38s
17	I.S.C. 67	,,	1.14	0.094	0.63	6.2	42s
18	134-Co2 M	Vijapur	1.08	0.133	0.81	6.1	38s
19	I.S.C. 67	Dabhoi	1.07	0.086	0.57	6.9	48s
20	134-Co2 M-21 ..	,,	1.10	0.096	0.66	7.4	45s
21	134-Co2 M	,,	1.08	0.095	0.62	7.2	52s
	II. Maharashtra State						
22	170-Co2	Baramati	1.11	0.113	0.73	7.1	40s
23	I.S.C. 67	,,	1.10	0.114	0.73	6.9	44s
24	I.S.C.67	,,	1.22	0.098	0.64	6.6	33s
25	134-Co2 M-21 ..	,,	1.15	0.107	0.67	6.1	35s
26	170-Co2	Sreerampur	1.08	0.159	0.89	7.5	40s
27	170-Co2	Badnapur	1.10	0.133	0.77	6.8	45s
28	134-Co2	Nanded	1.14	0.120	0.73	7.1	38s
29	I.S.C. 67	,,	1.17	0.106	0.69	7.6	47s
	III. Mysore State						
30	Sea Island Andrews ..	Diff. centres	1.20 to 1.32	0.107 to 0.130	0.71 to 0.79	7.1 to 8.5	60s to 94s
31	D.C. 286	Dhadesugur.	1.08	0.120	0.76	8.9	35s
	IV. Madras State						
32	L. 0313 W	Srivilliputtur	1.12	0.135	0.78	7.1	48s
33	0892 B	,,	1.20	0.113	0.70	7.5	50s
34	M.C.U.2 (P.S.T.) ..	,,	1.13	0.123	0.83	8.7	42s
35	M.C.U.2 (S.F.) ..	,,	1.12	0.137	0.82	7.6	44s
36	EL 192	,,	1.11	0.121	0.74	7.2	50s
	V. Punjab State						
37	A.S. 105	Abohar	1.09	0.108	0.70	8.0	31s
38	A.S. 140	,,	1.10	0.113	0.73	8.6	42s
39	A.C. 89	Hansi	1.08	0.141	0.83	8.9	42s
40	Sea Island Andrews ..	Rauni	1.32	0.134	0.79	7.5	78s
	VI. Andhra Pradesh						
41	Sea Island Andrews ..	Nandyal	1.10	0.110	0.72	7.2	65s
	VII. Kerala State						
42	Sea Island Andrews ..	Diff. centres	1.23 to 1.32	0.102 to 0.131	0.68 to 0.80	7.2 to 8.1	81s to 94s

while only four varieties had registered a decline in spinning value. Digvijay and Kalyan in Gujarat State, Virnar, Gaorani 6 and Gaorani 12 in Maharashtra, Jayadhar and Laxmi in Mysore, L.S.S. in the Punjab, M.C.U. 2 (Summer) in Madras State and Nandyal 14 in Andhra Pradesh have all recorded an improvement in spinning value over the last season. Thus, the improvement recorded is spread over all the cotton growing States. Vijalpa, Surat 1027 A.L.F. and Vijay in Gujarat, Westerns 1 in Mysore, P.A. 320 F in the Punjab and Parbhani-American 1 in Andhra Pradesh have all maintained their performances. Only Jarila in Maharashtra which has gone out of cultivation and the three varieties, M.C.U. 1 (Winter), K. 2 and K 5 in the Madras State had registered a decline in spinning value.

Some of the standard cottons of the 1960-61 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 1959-60 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 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 (Series A, No. 105) entitled "Technological Reports on trade varieties of Indian Cottons, 1960" during the period.

The Indian Central Cotton Committee considered the revision of the list of trade varieties of Indian cottons with a view to include samples from selected centres in each tract in consultation with the East India Cotton Association and the Directors of Agriculture of various States. At its meeting held on 18th January, 1960, the Local Sub-Committee decided that 54 varieties, comprising of 11 from Maharashtra, 13 from Gujarat, 5 from Mysore, 3 from Andhra Pradesh, 3 from Madhya Pradesh, 5 from the Punjab, 9 from Madras State, 3 East African and 2 Tanganyika cottons, should be tested as trade varieties. Furthermore, technological circulars may be issued on nine other varieties, but their results need not be included in the bulletin. As the season was already advanced by the time this decision was communicated to the East India Cotton Association for the supply of 1959-60 samples, only 38 of the 54 varieties were supplied and their results are included in this bulletin.

Some of the trade varieties of the 1960-61 season have been received for tests during the period and technological circulars were 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 1,882 as against 1,517 of the last year recording an increase of over 24 per cent over the last year. The increase is noticeable in every case except under miscellaneous tests.

TABLE 17

Number of samples received in the Testing House

	Average No. of samples received			1956-1957	1957-1958	1958-1959	1959-1960	1960-1961
	1943-1948	1948-1953	1953-1958					
Spinning tests ..	75	68	89	75	76	68	64	101
Fibre tests	144	110	161	124	240	98	254	310
Yarn tests	97	188	233	242	243	405	174	263
Cloth tests	95	115	390	422	373	354	188	195
Moisture tests ..	2	5	168	186	615	806	821	1,004
Miscellaneous tests	7	6	29	55	16	50	16	9
Total ..	420	492	1,070	1,104	1,563	1,781	1,517	1,882

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 exporting and importing firms, individual merchants, textile mills, manufacturing concerns, Central Government departments, Agri. Produce Co-op. Marketing Societies, Bombay Municipal Corporation, Khadi & Village Industries Commission, 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) A reputed firm had sent two samples of cloth, one of which had a very much lower strength than the other. The cause of the lower strength of the former was investigated and the firm was given appropriate advice for avoiding purchase of such unsound materials.

(2) Cotton samples from the lap, card sliver, precombed material, standard combed product and specially combed product were tested for fibre length. It is interesting to note that while lap cotton, carded material, precombed material and standard combed product gave practically the same values for fibre length, the specially combed product gave significantly longer fibre length.

(3) In order to ascertain whether E.D.C.T. which was used for the fumigation of cotton had any deleterious effect on the cotton, three samples of cotton, one untreated, another exposed to E.D.C.T. vapours for 18 hours at 10 lbs/1000 c.ft. and the third soaked in E.D.C.T. and retained in chamber for 18 hours were tested for different fibre properties and for fluidity. The results did not reveal any appreciable change in any of the physical or chemical properties thus showing that the treatments had caused no damage to the fibres.

The total number of samples tested since the inception of the Testing House was 18,195, the average per annum being 728.

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 are done than on other types of samples.

(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 18, which shows that during the period under review, fibre tests were made on 2,305 samples.

TABLE 18

Number of samples tested in the Fibre Testing Section

	Average			1956-1957	1957-1958	1958-1959	1959-1960	1960-1961
	1946-1948	1948-1953	1953-1958					
Standard	20	17	22	21	30	22	18	26
Agricultural (spun)	446	475	701	794	759	820	929	841
Agri. (for fibre tests only)	116	190	447	610	736	1,055	1,170	969
Commercial ..	182	197	315	271	409	224	400	402*
Ginning	137	64	51	88	49	27	47	10
Technological ..	98	58	72	2	64	44	26	57
Miscellaneous ..	13	27	24	..	..	64	3	..
Total ..	1,012	1,028	1,632	1,786	2,047	2,256	2,593	2,305

* 99 samples received from the East India Cotton Association.

IV. RESEARCH WORK IN PROGRESS

A. Ginning Problems.

1. *Pre-cleaning and Ginning tests on Indian cottons.*—As indicated in the previous Report, a Technological Leaflet (No. 66) on pre-cleaning and ginning tests on Vijalpa cotton was published. The pre-cleaning and ginning tests on 134-Co2-M variety obtained for the same purpose were completed during the period under review and arrangements are being made to carry out the spinning, fibre and other tests.

From the results obtained from pre-cleaning and ginning tests, the following observations are made:—

(i) *Pre-cleaning.*—The output in H.E. Opener was more than five times that in the other two openers. As stated in the previous leaflets, the H.E. opener has no feeding arrangement and hence the values obtained for output and power consumption in this machine are approximate. The power consumed by the Platts' Opener was more than twice that consumed by F.E.C. and slightly more than three times that by H.E. which is partly due to the absence of ball-bearings in the Platts' machine. The amount of trash removed by F.E.C. was nearly twice that by the other two openers.

(ii) *Effect of Pre-cleaning.*

(a) When ginned in saw gin, the unopened seed cotton gave the highest output of lint per hour and a lower power consumption, while that opened in Platts' opener gave the lowest output and the highest power consumption. The ginning percentage of the unopened seed cotton was slightly lower than that opened in all the three openers.

(b) When ginned in double roller gin, the unopened seed-cotton gave lower output and higher power consumption than that opened in all the three openers, while the sample opened in F.E.C. opener gave highest output and lowest power consumption than that opened in other openers.

(c) When ginned in single roller gin, the differences in output and power consumption were not conspicuous.

(iii) *Comparison of gins.*

(a) As usual, the saw-gin gave one per cent lower ginning percentage than the roller gins.

(b) The single roller gin consumed nearly double the number of power units consumed by the double roller gin for ginning the same quantity of cotton inspite of the fact that the bush bearings of the former were converted to ball-bearings.

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

2. *Investigation on the formation of neps during ginning.*—Nep formation in cotton due to pre-cleaning and ginning with different speeds and settings is being investigated for the past few years. A paper entitled "Formation of neps during ginning" embodying the results obtained on 11 Standard Indian cottons is under publication in the Indian Cotton Growing Review.

It was concluded from these results that effect of gins was not uniform in all cottons but saw ginning significantly gave rise to more neps than roller ginning. Openers, or speeds and settings in gins, within the ranges employed in the investigation, had very little effect on the formation of neps. Hence, optimum treatment, to get maximum output without sacrificing fibre quality and the grade of cotton, that could be given to a cotton, is indicated.

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

3. *Economic and Technical survey of the existing gins in India.*—Mention was made in the last Annual Report that out of 350 factories selected on a random sample basis, replies to the Questionnaire issued by the Laboratory had been received from 269 factories. During the period under review, replies were received from 55 more totally making up 324. Almost all the factories from which replies are yet to be received are in the Maharashtra State. Reminders have been issued to expedite the replies. The data obtained from the other States were analysed during the period.

This work is being supervised by Shri V. Venkataraman.

4. *Fabrication of an Extractor for improving the ginning of kapas.*—Important parts like doffer-plates, beater cylinder pins etc. were made and the positioning of rollers and cylinders on the frame work is in hand. Substantial progress in the fabrication of the above machine could not be made due to heavy pressure of ginning work both at the Laboratory and at outstations during the current year. Further work will be taken up during the monsoon months.

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

B. Investigations on Fibre-Properties.

5. *The determination of work done in pulling out fibres from the seed-surface.*—During the period under review, data were collected regarding the power consumed in ginning and work required to be done to rupture the fibres in case of some of the varieties which were tested earlier for work of pulling per fibre. It was observed that even if allowance was made for running the ginning machinery idle, the power consumed in double roller gin for ginning a known quantity of seed cotton was, on an average, about 10 times that calculated from the average work done in pulling one fibre. This excess for power consumption is assigned to additional energy con-

sumed in bringing the seeds and the fibres into position and the slippage of some fibres without being pulled out by the stroke of the moving knife.

The work of rupture per fibre was found to be about four times the work done in pulling per fibre, thus explaining the fact that in a properly set gin the proportion of broken fibres is negligible as compared to those pulled out from the seed.

The bearing of the present investigation on the ginning process in the light of the above observations is also being incorporated in the paper now under preparation.

This work is being done by Shri Jai Prakash.

6. *Study of variation between seeds of the same strain.*

(a) *Fibre length.*—As indicated in the last report, a paper on this subject was published during the period under review.

(b) *Bundle-strength.*—The work was completed and the results were statistically analysed by grouping the cottons specie-wise. The analysis revealed the following observation in addition to those reported in the last Annual Report.

The correlation between side-region-strength at 1/8″-gauge-length and seed-weight was significant for two cottons, H.420 and Vijay, while it was non-significant for 14 cottons.

(c) *Chalazal fibre-maturity.*—As indicated in the last report, a paper on this subject was sent for publication.

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

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

(a) *Degree of thickening, convolution angle and reversals.*—These items were determined for fibres of the chalazal and side regions of Vijalpa cotton extracted from bolls at various stages of development, ranging from 30days old to 57 days old, for two seasons viz., 1958-59 and 1959-60. Similar-studies have been concluded on 170-Co2 cotton for the 1959-60 season. In all 52 samples were tested for the degree of thickening and 24 samples for convolution angle and fibre reversals. The results will be analysed after completing the tests on the samples received during 1960-61 season.

An exhaustive note on "Development studies on long staple Indian cottons" was prepared and circulated among the members of a Conference of Cotton breeders, agronomists, physiologists and technologists which was held at the Technological Laboratory on the 23rd February, 1961, to plan out experiments for the improvement of long staple Indian cottons which do not give the spinning performance expected of them.

After a thorough discussion, it was decided at this Conference to undertake work on the following lines viz., (i) Development studies on the long staple Indian cottons are to be carried out at PIRRCOM centres at Surat, Sirsa and Coimbatore in collaboration with the Technological Laboratory, (ii) Study of place effect on the quality should be made by examining samples of 170-Co2 cotton grown at six different places in the States of Maharashtra, Gujarat and Mysore with a view to correlating the observed differences with the agro-climatic factors and (iii) Physiological studies on the cotton fibre development should be made at PIRRCOM centre in New Delhi.

This work is being done by Dr. Betrabet.

(b) *X-ray angle.*—Work on this problem was started with fibres collected separately from side and chalazal regions of the seeds of 170-Co2 cotton from two extreme stages of growth—30 days and 48 days—after flowering. X-ray photographs were taken on these two samples for both the regions, but as measurements could not be carried out due to photo-densitometer being out of order, work on this problem was temporarily suspended. If X-ray pattern exhibits any significant difference between the extreme stages of growth, further determinations at the intermediate stages will be carried out.

This work is being done by Shri Jai Prakash.

(c) *Degree of polymerisation.*—The values for the degree of polymerisation of two cotton samples, viz., Jayadhar at 9 stages of growth and Laxmi at 6 stages were determined during this period. For another cotton, viz., Vijalpa 2087 also samples from 6 stages were taken up for investigation. The results obtained so far showed a progressive increase in the D.P. value with the development of bolls.

Further work on this problem is in progress and is being done by Shri S. N. Pandey.

8. *Study of fibres from different regions of the seed.*

(a) *X-ray angle and bundle strength.*—X-ray photographs for both side and chalazal region fibres were taken on 10 more cottons during this period, thus raising the total number of cottons tested so far to 21. Bundle strength was also determined for these cottons. The results showed that in conformity with earlier observations, the fibres of the side region were stronger than those of chalazal region.

This work is being done by Shri Jai Prakash.

(b) *Fibre-maturity.*—The work was carried out on the same lines as stated in the last-Annual Report. Six cottons were tested for maturity of side-region as well as chalazal-region fibres. The results of maturity values for 10 cottons (including five tested in the last year) showed that side-region fibres had higher maturity than chalazal-region fibres.

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

(c) *Degree of Polymerisation.*—Fibres from the side and chalazal regions of the seeds were separately extracted with hot benzene in a soxlet apparatus to remove all waxy substance and then extracted with water. Degree of polymerisation values were determined for these samples. Thus few cottons were tested during the period under review. It was noticed in all the cases that the D.P. value for the fibres of the side region was higher than that for those of the chalazal region.

Further tests are in progress and are being done by Shri S. N. Pandey.

9. *X-ray studies on the relationships between the structural features and the physical properties of cotton.*—During the period under consideration, X-ray photographs on 55 more cottons were taken thus raising the total number of samples under study to 120. The measurement of X-ray angle on most of these cottons could not be done, as the photodensitometer was out of order for most of the time and is still under repair. It is proposed to include a few more varieties of *barbadense* species before starting the analysis of the data.

This work is being done by Shri Jai Prakash.

Standardisation of X-ray technique.—The fabrication of the experimental tensioning device was completed during this period. It is proposed to start the preliminary investigation on the changes in X-ray angle with respect to the stress applied.

This is being done by Shri Jai Prakash.

10. *Convolution angle and bundle strength.* As envisaged last year, this problem was extended to include the cottons representing all the ranges of strength in each species, with a view to finding out whether or not there are any inter-species differences in the relationship between strength and convolution angle. In all 70 cottons have been tested so far, which include 18 cottons, mostly *barbadense*, tested during the period under review. With the testing of a few American *hirsutum* cottons, the present study will be concluded and the results analysed.

Birefringence.—New Ortholux polarising microscope with an arrangement of thermo-regulation on the stage for temperatures from 20° to 80°C has been acquired recently. The instrument is being standardised and an exhaustive study on the birefringent properties of various cellulosic fibres and chemically modified fibrous cotton is proposed to be undertaken.

This work is being done by Dr. Betrabet.

Fibre reversals and bundle strength.—In continuation of study on the effect of structural imperfections like reversals, on the fibre strength, two more cottons were examined.

This work is being done by Dr. Betrabet.

Structural properties of some cellulosic fibres. Technique to separate ultimate cells from fibrous strands of bast fibres as well as methods to determine their length, diameter and strength were standardised and three bast fibres have been tested so far. Effect of sodium hydroxide of various concentrations on the swelling behaviour of these cellulosic fibres is being studied.

This work is being done by Dr. Betrabet with the assistance of Shri G. G. Phadnis.

11. *Effect of neutron irradiation on cotton.*—Several attempts were made to get suitable water leak proof containers for keeping the cotton samples under several feet of water for irradiation with neutrons, but no success could be achieved, so far in this regard. A polythene tube container plugged at both ends with ebonite threaded caps and weighted by a lead weight at one end was sent to the Reactor Superintendent for experimental purposes but due to the fear of radio-active contamination of both the lead and the ebonite, he advised that pure aluminium blocks may be used in place of the above materials. Accordingly, steps are being taken to procure the same and work on this problem will be taken up after suitable containers are designed.

This work is being done by Shri Jai Prakash.

12. *The comparison of Stelometer value* (1/8″ *gauge length*) *with intrinsic strength as measured on single fibres at* 1/8″ *gauge length.*—The work was continued on the same lines as stated in the last Annual Report. The Pressley-strength index at zero gauge length was determined for Giza-30 and Jayadhar and also fibre-weight for Jayadhar. The fibre-weight determination for Giza-30 remains to be carried out.

The important findings from the results of 20 cottons, including Jayadhar, are given below:

(1) Approximately, 50 per cent of single-fibre-strength (1/8″ gauge length) was realized in bundle-strength (1/8″ gauge length).

(2) The ratio of bundle-strength (1/8″ gauge length) to corresponding bundle-strength at zero-gauge length, gave higher values for long fine cottons than for short coarse cottons.

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

13. *Comparison of different methods of measuring fibre maturity.*—

(i) A paper on the performance of the cotton grader has been sent for publication.

This work was done by Dr. V. Sundaram.

(ii) With a view to studying the relative performance of various methods of measuring fibre maturity such as the caustic soda method, the polarised light me thcd

the Cotton Grader, air flow methods etc., a comprehensive programme was drawn up. Initially a few of the methods of measuring fibre maturity were standardised. Later more than 125 cottons belonging to different botanical species and covering a wide range in maturity were selected and their maturity values were determined, by different methods. A preliminary statistical analysis was carried out to study some aspects of their comparative performance. It was found that all the different measures under study are correlated with each other to a very high but different extent. The relation existing between these measures for each of the main species is also being investigated under the guidance of Shri Harirao Navkal.

This work is being done by Shri K. N. Seshan.

14. *Stress-strain studies of cotton using the Instron Tensile Tester.*

Bundle strength at various gauge lengths to determine the strength gradient for different Indian cottons. As stated in the last Annual Report, the investigation was continued and the remaining bundle strength tests on 14 cottons at 1 mm. gauge length were also completed on Instron during this period. After normalising the bundle strength values at zero gauge length to a common denominator, 100, it was observed that the bundle strength values at 4 mm. gauge length for the 22 cottons tested in this investigation, ranged from 38 to 65, thus showing a considerable variation in the fall of bundle strength with gauge length.

As the intensity and occurrence of structural imperfections and morphological factors are known to affect the fall in strength with gauge length, convolution angle and number of reversals were also determined for these cottons with a view to ascertaining their relationship with single fibre strength and bundle strength at various gauge lengths. Further, since cottons belonging to *hirsutum* and *barbadense* species seemed to possess larger number of reversals per cm., this study was extended to include a few more cottons belonging to these species. So far, these studies have been completed on about 25 cottons and a few more are under examination.

Single fibre strength determination at 1 cm. gauge length was also carried out for these cottons, by testing 100-fibres in each case, in order to determine the transmission coefficient of strength and extension from single fibres through bundles of fibres and single thread to yarn lea. As this transmission coefficient for some of the cottons exhibited quite a large variation, attempts are being made to investigate the factors, if any, responsible for this behaviour.

It was also observed during single fibre strength tests that some cottons showed a very large variation in strength and extension from fibre to fibre and it was considered desirable to examine the point of break under polarised light. So far, about 13 cottons have been thus examined but the fibres breaking at reversals and those breaking between reversals do not seem to show any systematic differences as regards strength and extension values are concerned. A few more cottons have been selected for this examination after which the results would be thoroughly scrutinized.

This work is being done by Shri Jai Prakash.

Comparative study of different instruments to test the bundle strength of cotton fibres in relation to Pressley tester. In continuation of the work described in the last annual report, nine more cottons were tested for bundle strength on Scott Tester (IP-4 model). From the comparative results of bundle strength tests in different instruments it is observed that all the instruments do not give the same bundle strength values although they can grade the cottons in the same order. Pressley instrument using Stelometer vice and the technique of combing both the ends of the fibre tuft to remove short fibres, gave the highest bundle strength in case of all cottons while Scott tester recorded the lowest values. A critical examination is now being made to account for these differences in strength values with different instruments.

This is being done by Shri Jai Prakash.

15. *Effect of simplification of sample preparation on micronnaire test results.* The main conclusions of this investigation were reported in last year's Annual Report. During the period under review, a paper was written up incorporating the findings and the same is being sent for publication.

This work was done by Shri Jai Prakash.

16. *Investigation to see whether separate micronnaire scales are necessary for different botanical species of cotton in order to get a better estimate of fibre weight per unit length.*—During the period under review, a few more cottons belonging to each species were tested for fibre weight by the counting method, micronnaire value and fibre maturity thus bringing up the total number of cottons tested for all the species together to about 140. The results for cottons belonging to *arboreum*, *herbaceum* and *hirsutum* cottons were found to fall in line with those reported last year. The data on 35 cottons belonging to *barbadense species* are being analysed.

This work is being done by Shri Jai Prakash.

17. *Effect of swelling agents on structural and mechanical properties of cotton.* The design of the attachment to fit Instron tensile tester for treating cotton samples with swelling agents at different stretches was finalised, but due to pressure of other work in the workshop, this fabrication could not be completed. After it is fabricated, work on this problem will be taken up.

18. *Nickerson-Hunter Colorimeter tests.*

(a) *Effect of storage.* The reflectance percentage (Rd) and degree of yellowness b, of the eight samples, that were stored in the conditioned and the unconditioned rooms from June, 1959, were determined with the Colorimeter, both before and after the monsoon of 1960. Reflectance percentage of the cottons was found to be considerably lowered after a storage of $1\frac{1}{2}$ years. Cottons stored in unconditioned room showed, in general, a greater decrease in Rd value than the cottons stored in conditioned room. The samples from both rooms showed considerable

yellowing, the extent of the change in this case being greater for samples stored in conditioned room. It was also noted that the extent of yellowing was related to the copper reduction values of the samples prior to storage. The mean fibre length and fibre length irregularity percentage, however, did not show any change due to the storage.

Another set of eight samples were chosen last year and stored as before in two lots before the onset of monsoon, one in the conditioned room and another in the unconditioned room and similar tests were carried out on these samples also, both before and after monsoon. This work will be continued for a few more seasons.

(b) *Trade Varieties.* It was stated in the last report that the testing procedure with the Nickerson Colorimeter was standardised. Using this method, samples of trade varieties tested in the Laboratory were examined in the Colorimeter and the values of reflectance and yellowness of each sample were recorded for purposes of information. The question of incorporating these in the Trade Varieties Bulletin of the Laboratory will be considered after the colour chart of Indian grade standards is finalised, as proposed in the following:

(c) *Colour chart of Indian Grade standards.* It is proposed to prepare a colour chart of the Indian grade standards with the Nickerson Colorimeter so that the instrument could be used as an aid in grading Indian cottons and this work will be carried out in collaboration with the East India Cotton Association, as approved by the Indian Central Cotton Committee. Arrangements have been made to undertake these studies at the Cotton Exchange Building of the Association at Sewree.

At the same time, a quantitative study of the influence of different factors such as colour, amount and type of foreign matter etc. on the grade of cotton is also proposed to be made.

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

19. *Standardisation of Digital Fibrograph.*—Digital Fibrograph which is a direct reading push button type of electronic instrument used for the determination of length parameters of cotton samples, was recently acquired by the Laboratory. As the instrument was found giving a very unsteady performance besides occasional drift of the length counter, the instrument was thoroughly examined and the defects were rectified.

In order to determine the error of single observation and to fix up the minimum number of replicate tests to be done for getting a desired accuracy, five cotton samples covering a range of mean length from 0.65 inch to 1.38 inch were chosen and they are being tested by five observers each taking five replicate tests for each cotton. The work is in progress and is being done by Shri Jai Prakash.

20. *Study of variation of Pressley strength index between seeds of the same strain and the relationship between strength and embryo-weight.*—Seeds obtained by Prof. Harland during his visit to India, were tested at the Laboratory for weight

per unit length, maturity coefficient, Pressley strength index, weights of embryo, seed-coat, seed with fuzz and seed without-fuzz. The following conclusions were drawn from these results:—

1. The coefficient of variation for the Pressley Strength Index (P.S.I.) is found to vary from 4 to 12 per cent with a mean value round about 7.
2. The seed weight, the embryo weight and the weight of the seed without fuzz are highly correlated with each other between the seeds of the same cotton, from which it can be concluded that in any such study of interrelationship, the embryo weight can be substituted by the weight of the seed. This conclusion is very useful as it saves a great deal of time to weigh seeds instead of embryo.
3. The relationship between P.S.I. and seed-weight or P.S.I. and embryo weight although significant in some cases, requires further confirmation as the number of seeds tested in some of the varieties is very low.
4. Similarly for M.C.U. 2, P.S.I. is fully associated with the seed or embryo weight in the case of seed within a lock.
5. The correlation coefficient between maturity coefficient and seed weight although found to be non-significant (.69) in the case of Bangalore 2 because the seeds were only few, it is worth pursuing further for some more varieties taking more seeds.
6. P.S.I. and fineness are correlated with each other in the case of one *hirsutum* strain and this suggests the possibility of getting some interesting results if a well-planned experiment is carried out.

This work was done by Shri Harirao Navkal.

C. Fibre Properties and Yarn Characteristics

21. *Variation of fibre weight of single fibre in relation to yarn irregularity. (Balance for weighing single fibres)*—The fabrication of the balance was completed and the balance was calibrated by using short lengths of continuous fllament yarns of known denier. Fibres cut to $\frac{3}{4}''$ length could be conveniently weighed by the balance and, it was found that by weighing about 300 fibres the coefficient of variation of fibre weight could be obtained with reasonable accuracy. Using this balance, the variability of weight fineness was determined for three cottons during this period. Each of these weighed fibres was tested for strength in order to find out how much variability in strength of a cotton is accounted for by variability in fineness.

Further work is in progress and is being done by Shri N. Balasubramanian.

22. *Effect of fibre properties on yarn evenness.*—Studies on the relationship between irregularity of 20s and 40s yarn and fibre characters of the cotton from which they have been spun have shown that only fibre length variation is significantly

related to yarn irregularity. The absence of any association between yarn irregularity and fibre fineness would mean that this fibre character has little influence on the number of sub-slivers into which a fibrous strand divides itself during drafting —a finding which is at variance with the views of Foster *et al.* This matter was, therefore, pursued further by determining the regression coefficient of added irregularity at a frame upon draft and relating it with fibre fineness. For this purpose, rovings of nearly the same hank number were prepared from six cottons, belonging to coarse, medium and fine groups. Each of the rovings were then spun into yarns by employing five different drafts at the ring frame ranging from 2 to 10. Measurement of irregularity of the rovings and yarns would enable the determination of the regression coefficient of added variance upon draft for each cotton. Irregularity tests have been completed for three cottons and further work is in progress and is being done by Shri N. Balasubramanian.

23. *Studies on lustre behaviour of cotton fibres and yarns.*—It was stated in the last annual report that the fabrication of electronic part of the lustremeter was in progress. This was completed during the period under review and in addition, the fabrication of the optical set up of the instrument was also completed. Further, in order to facilitate and quicken the process of the preparation of samples for lustre examination, special types of sample holders, both for fibres and yarn, were designed.

Later, 10 samples of raw cotton were chosen for the standardization of the instrument and to determine the number of tests required for getting a certain desired accuracy. It was found that if two tests were carried out for each sample, results upto 5 per cent accuracy could be obtained at 95 per cent confidence limits. Further work is in progress and is being done by Shri Jai Prakash with the assistance of Shri P. G. Oka.

24. *Relationship between fibre-properties and spinning value for extra long staple cottons, 1.1/16″ and above.*—Mention was made in the last Report that the Standing Expert Committee to examine the work of extra-long staple cotton schemes had decided that the relationship between the fibre-properties and spinning value in respect of these cottons should be worked out at the Laboratory. Accordingly, correlation coefficients were worked out and a short note on the same was prepared and sent to the Indian Central Cotton Committee for circularisation to the Cotton Breeders. The regression equation based on the available results given by $Y = 67.2X_1 - 240.7X_2 + 100.4X_3 + 7.3X_4 - 119.5$, where Y=highest standard count, X_1=mean fibre-length (in.), X_2=mean fibre-weight per inch (10^{-6} oz.), X_3=maturity coefficient and X_4=Pressley strength index lb/mg. may be utilised for purposes of prediction.

The limitation of this equation should, however, be borne in mind. The present results have been obtained from a number of crosses. The new strains may be derived from crossed material of entirely different parentage. Hence, it is possible that the above equation may not be completely applicable to the new strains.

This work was done by Shri V. Venkataraman.

25. *Regression coefficients between fibre-properties and spinning value on tractwise basis.*—The Special Sub-Committee to discuss the question of low spinning quality of long staple cottons had recommended that regression coefficients should be worked out on tractwise basis for the various fibre-characters and spinning value from the data available at the Laboratory and that the derived regression equations should be made available to the Cotton Breeders for their guidance. Accordingly, data for each tract were collected. It was, however, found that as the maturity coefficient and Pressley strength index determinations were being made on all agricultural samples only for the last one or two seasons, the data available for each tract were rather small for applying statistical analysis. Hence, more data are being collected and as soon as sufficient results are available for each tract, they will be analysed and the regression equations worked out.

This work is being done by Shri V. Venkataraman.

D. Spinning and Yarn Characteristics

26. *Standards for yarn evenness with the Uster Evenness Tester.*—A note was written on the basis of the results of this investigation and submitted for publication.

A study is also undertaken for standardising the method of evaluating the appearance grade of a yarn, by comparison with graded photographic standards. For this purpose, eight samples of 20s yarns were chosen and independent assessments of grade were made by four observers, by observing 10 boards for each sample. It is proposed to test a few more yarn samples before analysing the results.

Further work is in progress and is being done by Shri N. Balasubramanian.

27. *Study of the evenness of material in different stages with different systems of processing.*—The work was continued on the same lines as stated in the previous report. During the period under review, 20 more yarn samples, spun by (1) the ordinary system of processing and (2) by using double roving and casablanca apron system of drafting at the ring frame, were tested for evenness by the Uster Evenness Tester bringing the total number of samples studied for this work to 35. The fibre length variation of these samples was determined by Balls Sorter tests. Analysis of results showed that the extent of improvement in regularity obtained by using apron system of drafting is related to the coefficient of fibre length variation of the cotton—greater improvement being obtained for cottons with higher length variability.

In order to see whether similar improvement in yarn regularity could be obtained by feeding single inter instead of double roving, two yarns spun by (1) ordinary system of processing and (2) by using inter as the back stuff and Casablanca apron system of drafting at the ring-frame, were tested for evenness by the Uster Evenness tester. Yarns spun by the latter system were found to be considerably superior

to yarns spun by the former system in respect of short term regularity. Tests on long term variations of the yarns are also being made.

Further work is in progress and is being done by Shri N. Balasubramanian.

28. *Effect of distribution of draft at the speed frames on the evenness of the product.*—This investigation is undertaken to ascertain how far the draft distribution between the different speed frames is critical in affecting the regularity of the final product. For this purpose, five inters were prepared by varying the drafts at the slubber from 2.2 to 8.4 and that at Inter from 8.4 to 2.2, but maintaining the total draft the same. The irregularity of each of the inters was then determined with the Uster Evenness tester. Tests on three cottons showed that although the irregularity was least with the middle drafts, the difference in irregularity between the five inters was not much striking.

It is proposed to extend this investigation to a total draft of about 30 in the two machines Slubber and Inter.

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

29. *Relationship between yarn mass per unit length irregularity and yarn strength irregularity.*—During this period, the strength irregularity of six more yarns were determined by the Scott tester and the mass per unit length irregularity of the yarns by the Uster Evenness tester. The fibre length variations of these cottons were also determined. The results of this investigation will be analysed to determine the influence of fibre properties on these two measures of yarn irregularity. The work is in progress and is being done by Shri N. Balasubramanian.

30. *Variance-length curve studies.*—Variance length curve of one more yarn sample was determined by cutting pieces of different lengths and weighing them as described earlier. The variance length curve of this yarn was also determined with the Uster Evenness tester by the 'inert' test method. On plotting the results of this as well as the previous sample, it was found that there was close agreement between the curves obtained by the two methods.

This work is being done by Shri N. Balasubramanian.

31. *Combing of good quality Indian cotton.*—As indicated in the last report, a bulletin on the combing of Indian and African (Kampala) cottons was published during the period under review. From this, it has been established that the spinning quality of some of the good quality Indian cotton can be considerably upgraded by combing and the textile industry of India is taking full advantage of these findings. It is further proposed to comb three Indian cottons namely 134-Co2 M, I.S.C. 67 and L.L. 54, to find out their response to this treatment. Along with them one East African Cotton B.P. 52 will also be processed for comparison.

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

32. *Miniature Spinning plant for spinning micro-samples.*—The work on the fabrication of a ring frame of eight spindles fitted with O.M. Super High draft System was continued during the period under review. Some of the parts were prepared in the Laboratory workshop and further fabrication is in progress. Inspite of several handicaps, the work is being expedited in view of the urgency of meeting the pressing demand for miniature spinning plants from the trade, textile industry and PIRRCOM stations.

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

33. *Variation in yarn quality at different portions of the ring bobbin.*—As envisaged in the last annual report, a paper incorporating the results obtained in this investigation has now been written up.

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

34. *Comparison of the quality of yarns produced from single inter on the Casablanca High Drafting System against the normal Laboratory practice of spinning the yarn from single roving on the three roller drafting system.*—It was previously reported that by using double roving in the casablanca high draft spinning frame the yarn spun was much superior to the one spun with single roving and the three roller spinning frame. The latter method is the one used at present and after the modernisation of the Laboratory, it would be necessary to employ the high draft system. In order to maintain continuity and to see how far the present results could be reproduced in the new system, it was decided to eliminate the roving frame and to feed a single inter on to the casablanca high draft spinning frame and to compare the results obtained with those from the present three roller drafting system. In all, 60 samples have so far been tested by both the methods and the results obtained show a close agreement between the two sets of values. This finding would help to replace the present system of processing with the new simpler system without causing any break of the link with the previous results.

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

35. *Comparison of strength and extension-values given by different types of single thread tester with those obtained by ballistic tester.*—During this period, single thread strength tests on five more samples of 30s count were completed on Instron Tester. Thus, in all 20 samples of 20s count and 17 samples of 30s count have been tested on Scott Tester, Goodbrand Single thread strength tester, ballistic tester and Instron. The results are being analysed.

This work is being done by Shri Jai Prakash.

36. *Effect of different processing treatments on the spinning quality of M.A.5.*—This investigation consisted of a series of three types of spinning experiments on M.A.5 cotton. A paper on this investigation has now been written up after exhaustive statistical analysis of the data.

This work was supervised by Shri Harirao Navkal.

E. Chemical Problems

37. *Evaluation of D.P. values of Indian cottons by different methods.*—Work on this problem was continued during this year. Cupriethylene was used as the cellulose solvent and a Cannon Fenske Viscometer series 100, was used for the determination of the viscosity values. It was, however, found that the series 100 was not suitable for these samples and, therefore, it has been proposed to try series 200 and 300 for this work.

The cuprammonium method for the determination of viscosity using X-type tubes was continued. X-type tubes were locally obtained and were standardized and calibrated at the Laboratory. The following cottons have so far been tested, i.e., Vijalpa-2087, 0394 Buri, Vijay, Digvijay, Karunganni and Gaorani-6.

The work is in progress and is being done by Shri S. N. Pandey.

38. *Investigation on the mercerisability of Indian cottons.*—Mercerisation work on Sea Island Andrews cotton was completed last year and four Indian cottons were selected for further investigation. These samples have been spun and doubled. Mercerisation work on these samples will be taken up after getting the yarns bleached.

39. *Estimation of the pectin and wax content and their relation to fibre strength and moisture absorption.*—Investigation on this problem was taken up during this period. The wax estimation from cotton samples was done by chloroform and alcohol method. At the same time benzene extraction method was also used for comparison. It was found that latter method gave higher values for wax-content.

Pectin estimation was not done during this period because the spectrophotometer was out of order. Work on this problem is in progress and is being done by Shri S. N. Pandey.

40. *Studies in the chemical modification of cottons.*—It has been proposed to take up the work on this problem by treating the cotton with different reagents for decrystallization and study the properties of such products. Further work on some of the modified cottons such as oxy-celluloses will also be taken up.

41. *Study of the ash and mineral contents of Indian cottons.*—Investigation on this problem was taken up and the following standard cottons were studied during this year: Gaorani-12, Virnar, Jayadhar I & II, Laxmi, Digvijay, 320F, Surat-2087, Kalyan and Wagad. Detailed analysis of cotton-ash for determination of silica, sesquioxide, calcium, magnesium, potash and phosphorous etc. was carried out.

The work is in progress and is being done by Shri S. N. Pandey.

42. *Determination of the oil content of different varieties of cotton seeds.*—During the year, 202 seed samples were tested for their oil content and reports were sent to the breeders concerned.

Samples of Andrews cotton treated with different fertilizers and grown both at Trichur and at Mangalore, showed that the treatment of cattle manure + phosphorus + potassium yielded slightly higher oil percentage in both the places.

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

F. Miscellaneous

43. *Commercial Grading of Cotton.*—The testing assistants recruited under this scheme were given a thorough training and thereafter they were detailed for testing the samples received for this investigation. 196 samples, received under this scheme, were tested for mean fibre length, bundle strength, swollen hair diameter, maturity, micronnaire value, Shirley analyser loss and yarn strength after micro-spinning. The data were classified and tabulated according to the details supplied by the Cotton Superintendent, Surat and sent to the Agricultural Marketing Directorate for statistical analysis.

This work was done by Sarvashri Jai Prakash, V. V. Gupte and S. Samson.

44. *Reduction of neps in neppy Indian cottons.*—Single plant produce (1959-60 season) of 50 plants of each variety viz., 134-Co2M, I.S.C. 67 and M.C.U.2 cottons, together with control representing the general crop of the year were tested for neps, mean fibre length, maturity, ginning percentage, incidence of immature and damaged ovules etc.

Plant to plant variation was large for all the properties examined, especially for neppiness and maturity. Range of neps per gm. of lint in 134-Co2M was 53 to 660, control having 148. In I.S.C.-67 the range was from 60 to 535, control having 345 and in M.C.U.2 it was from 36 to 210, control having 78. Seeds selected of plants showing low neppiness were sent for propagation during 1960-61 season and the tests on the selections of 134-Co2.M and I.S.C.-67 are in progress.

This is being done by Dr. Betrabet.

45. *Study of the effects of different agronomic treatments on fibre-properties.*

(a) *Effect of different frequencies of irrigation and manurial trials.*—As stated in the last report, the agronomic experiment was carried out on two cottons, LL-54 and 320-F, grown at Faridkot, combining three frequencies of irrigation and four levels of nitrogen with four replications for each treatment. The samples from the different treatments were tested for seed-weight, lint weight and ginning percentage, fibre-length and bundle strength at zero gauge length by Stelometer. The combined statistical analysis of the results of two seasons was done, during this period. Most of the properties were not affected by any of the treatments. However, lint weight and mean fibre-length showed a tendency to increase with increasing amounts of irrigation. The effect of season was, however, appreciable on fibre-properties. The data for yield per acre indicated that two varieties LL 54 and 320-F

reacted differently towards irrigation while higher nitrogen dose increased the yield per acre in both cases. Further tests on the same lines were completed on 48 samples of LL 54 of 1959-60 season.

A paper based on the results of two seasons was read before 20th Conference of the Senior Assistants (Technological) held on the 16th December, 1960.

This work which was done by Shri T. V. Krishnan is being continued by Shri V. G. Munshi.

(b) *Effect of differential irrigation (different frequencies of irrigation) and levels of nitrogen.*—As stated in the last report, these tests pertain to samples of 320F grown at Faridkot, combining three frequencies of irrigation, three levels of nitrogen with three replications which were studied for the properties such as lint-weight, seed-weight, ginning percentage, mean fibre-length and Stelometer-value (zero-gauge length).

Further, 81 samples of 1959-60 season were tested for the above mentioned properties during the present period.

The combined statistical analysis of two seasons was carried out during the period under review. The analysis showed that the fibre properties were not affected by any of the treatments except that the lint weight showed a tendency to increase with increasing amounts of irrigation. Five irrigations seemed to be more beneficial.

This work which was done by Shri T. V. Krishnan is being continued by Shri V. G. Munshi.

(c) *Effect of alpha-naphthalene acetic acid.*—This investigation was made on 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. They were tested for seed-weight, lint weight, ginning percentage, mean fibre length, fibre fineness and fibre maturity by micronnaire. Based on the results of first year samples, it was stated in the last report that application of alpha-naphthalene acetic acid did not produce any significant effect on fibre-properties. Analysis of second year's data showd the same trend.

56 samples of the 1959-60 season were tested for all properties except micronnaire fineness and maturity during the present period.

This work which was done by Shri T. V. Krishnan is being continued by Shri V. G. Munshi.

(d) *Fertilizer experiments at Dharwar.*

(i) *NP experiment*: (1958-59 season). The design of the experiment is randomized block having four replications with four doses of nitrogen and four doses of phosphate and the cotton was Laxmi. 64 samples of this experiment were tested for the upper-half-mean by Fibrograph. The micronnaire value was measured for

30 samples. The other properties such as maturity-index and bundle-strength (zero gauge-length) will be determined on these samples.

(ii) *NPK experiment*: The layout is in randomized block having three replications with three doses of nitrogen, three doses of phosphate and three doses of potash.

108 samples of this experiment were tested for the upper-half-mean by Fibrograph. The micronnaire value was determined for 28 samples. The other properties such as maturity-index and bundle-strength at zero gauge-length will be determined on these samples.

This work is being done by Shri V. G. Munshi.

46. *Effect of changes in the condition of growth.*—Investigation on the possible differences in the X-ray angle of cottons grown at Srivilliputtur in summer and at Coimbatore in winter was continued on P 216F, 0484A, M.C.U.2 and M.C.U.1 cottons. A further set of nine cottons belonging to the 1960 season was also examined for X-ray angle and bundle strength, thus raising the total number of cottons tested under this investigation so far to 15. It is proposed to continue this work for at least two more seasons on the same set of cottons as were grown in 1960.

47. *The skein strength of the yarn (fine counts) in the metric system.*—Mention was made in the last Report that the work was extended to counts above 40s, to fine counts such as 60s, 70s and 80s. The work on this problem was completed during the period under review. A short note on the findings was written up and sent for publication in the Indian Cotton Growing Review. In this case also, it was found that the value obtained for Yarn Strength Index was for all practical purposes equal to the count-strength product, so that the new measure called the Yarn Strength Index can be recommended for universal adoption.

This information has been communicated to the Indian Standards Institution with the request that they may take up measures for adopting the new Index universally, as it would considerably facilitate the change-over to the metric system.

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". An outline of the chief items is, however, given below:—

A Technological Leaflet on pre-cleaning and ginning tests on Vijalpa cotton was published and the pre-cleaning and ginning tests on 134-Co2-M cotton were completed and the samples are being sent for spinning, yarn, fibre and other tests.

About 350 small samples obtained from agronomic experiments and other agricultural centres were ginned in the Laboratory gin and their ginning percentages determined by the Ginning Percentage Balance.

For ginning of Sea Island Andrews cotton grown in various States, two factories consisting of single roller single action gins in Kerala State, two factories with double roller gins in Mysore State, and one double roller gin at the Cotton Research Station in Andhra Pradesh were utilized. Necessary adjustment and settings of gins required for this cotton were done under the supervision and guidance of the Engineering Assistant (Ginning). The entire produce of the Sea Island cotton grown in these States was ginned in the above factories.

The Engineering Assistant (Ginning) also attended to the ginning of Hybrid cotton grown in Gujarat State where single roller gins were converted to single action for the purpose, which were more suited for this cotton.

The services of the Engineering Assistant (Ginning) were also given to Orissa State for the improvement in the ginning efficiency of the existing old gins in Orissa State which are in use for ginning of cotton grown in that State.

The fabrication of an Extractor was continued and a few parts like doffer plates, beater cylinder pins etc. were prepared and the positioning of rollers and cylinders etc. on the frame work is in progress. Substantial progress in the fabrication in the above machine could not be made due to heavy pressure of ginning work both at the Laboratory and at out-stations during the current year.

In accordance with the decision of the Indian Central Cotton Committee, the fabrication of the Laboratory gin has been entrusted to a local firm to whom necessary instructions are being given by the Engineering Assistant in order to ensure their proper working.

VI. PUBLICATIONS

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

VII. SUMMARY

This Report gives an account of the work carried out at the Laboratory during the year 1960-61. 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.

Tests made at the laboratory.—The total number of samples received for all types of tests during the year was 6,229 as against 5,357 received last year recording an increase of 16 per cent. The number of samples tested was 5,393 as against 4,955 last year registering an increase of 9 per cent.

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 3,890 as against 3,645 in the previous year recording an increase of 7 per cent. The number of samples for micro-spinning tests alone rose from 2,216 to 2,638 registering an increase of as much as 19 per cent. 3,651 samples were tested for the Agricultural Departments during the year as against 3,436 showing an increase of 6 per cent. The testing work mainly related to the evaluation of the quality of new strains and improved varieties and reports on them proved of great 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 very briefly summarised below.

1. Tests carried out on Deviraj under rain-fed and irrigated conditions in Saurashtra area indicated that though the rainfed samples gave better spinning value than the corresponding irrigated samples in most cases in the 1958-59 season, no such difference was observed in the 1959-60 season.

2. 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.

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

4. Samples of Sea Island Andrews from six centres each in Kerala and Mysore States were tested and reported. Similarly a sample from Andhra Pradesh was also tested and reported. Mill tests were also carried out on a few of them. The mill had reported that the 1959-60 samples from Kerala were suitable for spinning 100s warp under mill working conditions after combing to the extent of 25 per cent. A sample from Rauni (Patiala) was also received for tests. It compared quite favourably with its Kerala counterpart.

5. Results of tests on all samples of extra long staple varieties, 1 1/16″ and above, raised in the 1959-60 season in all States are given in this Report to help the Breeders in drawing material for use in their Breeding programme.

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. These publications proved quite useful to the cotton trade and the textile industry.

The Testing House of the Laboratory received 1,882 samples for various types of tests as against 1,517 last year recording an increase of over 24 per cent. Tests on some of them were of a special nature such as samples from lap, sliver, precombed material, specially combed material etc. for fibre length tests, effects, if any, on properties of cotton by the use of E.D.C.T. vapours for fumigation etc.

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

A. Investigations on ginning.

1. A Technological Leaflet (No. 66) on the pre-cleaning and ginning tests on Vijalpa variety was published. The precleaning and ginning tests on 134-Co2M variety were completed and fibre, spinning and other tests will be carried out on its samples.

2. A paper on the formation of neps during ginning embodying the results obtained for this investigation was sent for publication in the Indian Cotton Growing Review.

3. Replies have been received from 324 out of 350 Factories to the Questionnaire issued by the Laboratory for the economic and technical survey of the existing gins in India carried out on random sample basis. The data so far obtained were being analysed.

4. Good progress was made in the fabrication of a small size extractor for removing immature locks and hulls from the seed cotton before ginning.

B. Investigations on fibre-properties

5. Data were collected regarding the power consumed in ginning and work required to be done for rupturing the fibres in case of some varieties tested earlier for work of pulling per fibre. It was found that the proportion of broken fibres was negligible in a properly set gin as compared to those pulled out from the seed. These observations are being incorporated in the paper on this problem under preparation.

6. A paper on the study of the variation of fibre-length within and between seeds of the same strain was published during the period. The investigation on the variation in bundle strength between seeds of the same strain was also completed. A paper on the study of the variation of fibre-maturity from single seeds in relation to seed and embryo weights was sent for publication.

7. A study of the properties, such as degree of thickening, convolution angle, reversals, X-ray angle, D.P. value, etc., from the different regions of seeds of Vijalpa cotton extracted from bolls at various stages of development from 30 days to 57 days for two seasons, 1958-59 and 1959-60, was continued. Similar studies on 170-Co.2 were concluded during the period.

8. The fabrication of an experimental tensioning device for the standardisation of X-ray technique was completed and preliminary investigation on the changes in X-ray angle with respect to the stress applied is being made.

9. For X-ray studies on the relationships between the structural features and the physical properties of cotton, 120 X-ray photographs have so far been taken. The study is in progress.

10. The new Ortholux polarising microscope recently acquired by the Laboratory was being standardised for an exhaustive study on the birefringent properties of various cellulosic fibres and chemically modified fibrous cotton.

11. The technique to separate ultimate cells from fibrous strands of bast fibres and methods to determine their length, diameter and strength were standardised and three bast fibres were tested.

12. Work was continued on the comparison of stelometer value (1/8″ gauge) with intrinsic strength as measured on single fibres at the same gauge.

13. A paper on the performance of the Cotton Grader for measuring fibre-maturity has been sent for publication.

14. A comprehensive programme with a view to study the relative performance of the various methods of measuring fibre-maturity has been drawn up and tests are in progress.

15. Elaborate tests were in progress for the study of bundle strength at various gauge lengths to determine the strength gradient for different cottons using the Instron Tensile tester. A comparative study of different instruments to test the bundle strength of cotton fibres in relation to Pressley strength tester is also in progress.

16. A paper was written up on the findings of the investigation for the simplification of sample preparation on micronnaire test results which is being sent for publication.

17. In order to study the effect of swelling agents on structural and mechanical properties of cotton, a design of the attachment to fit Instron tensile tester for treating cotton samples with swelling agents at different stretches was finalised and its fabrication is in progress.

18. The study of the effect of storage in conditioned and unconditioned atmosphere during monsoon on the reflectance percentage, degree of yellowness and fibre-properties was continued during the period.

19. The Digital Fibrograph, which is a direct reading push button type of electronic instrument for the determination of length parameters of cotton samples, recently acquired by the Laboratory was put to test. The work is in progress.

C. Fibre Properties and Yarn Characteristics.

20. The fabrication of a cantilever balance for weighing single fibres in order to study the variation of fibre-weight of a single fibre in relation to yarn irregularity was completed and it was calibrated. Further work is in progress.

21. A lustre-meter which is compact, convenient and capable of recording values at various degrees of reflection was fabricated and standardised. Tests on it are in progress. Special types of sample holders, both for fibres and yarns, were also designed to facilitate and quicken the process of sample preparation for lustre examination.

22. A short note on the relationship between fibre-properties and spinning value for extra long staple cottons, 1 1/16″ and above was prepared and sent to the Indian Central Cotton Committee for circularisation to the Breeders for their guidance.

D. Spinning and Yarn characteristics.

23. A note on the basis of the results of the investigation on standards for yarn evenness with the Uster Evenness Tester was prepared and sent for publication. A study was also undertaken for standardising the method of evaluating the appearance grade of a yarn by comparison with graded photographic standards.

24. The work on the study of the evenness of material in different stages with different systems of processing was continued during the period. A study on the effect of distribution of draft at the speed frames on the evenness of the product was also being made.

25. The relationship that existed between yarn mass per unit length irregularity and yarn strength irregularity was being investigated. Variance-length curve studies with the Uster Evenness Tester by the 'inert' test method were also being made.

26. The work on the fabrication of a ring frame of eight spindles fitted with O.M. super high draft system was continued during the period.

27. Comparative tests were carried out on the present 3-roller system of spinning and on Casablanca high draft system by feeding a single inter and eliminating the roving frame. It was found that there was a close agreement between the two sets of values.

28. The investigation on the comparison of strength and extension values given by different types of single thread tester with those obtained by ballistic tester was continued during the period.

E. Chemical Problems

29. Work on the evaluation of D.P. values of Indian cottons by different methods was continued.

30. The investigation on the mercerisability of Indian cottons was being made on four Indian cottons.

31. The problem of the estimation of the pectin and wax contents in cotton and their relation to fibre-strength and moisture absorption was being studied.

32. Oil contents for 202 seed samples were determined during the period and reports sent to the respective Breeders.

F. Miscellaneous

33. 196 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.

34. Tests for the reduction of neps in neppy Indian cottons were continued during the period.

35. The study of the effects of different agronomic treatments comprising different frequencies of irrigation, intensities of irrigation, manurial treatments and hormone treatments for 1959-60 season was made. Samples belonging to the fertiliser experiments of 1958-59 season at Dharwar were also tested. The study of the effect of changes in conditions of growth such as locality, summer and winter crops etc. was also made.

36. The work on the skein strength of the yarn in the metric system was extended to fine counts such as 60s, 70s and 80s and completed. A short note on the findings was written up and sent for publication.

(iv) *Other Activities*

1. A Conference of Cotton Breeders, Agronomist, Physiologists and Technologists was held at the Laboratory on 23-2-1961 at the instance of the writer to plan out experiments for the improvement of long staple Indian cottons which do not give spinning performance expected of them.

2. The Senior Assistants (Technological) working at the various Breeding stations attended the biennial refresher course at the Laboratory in December, 1960. The 20th Conference of the Research Staff of the Laboratory and the Senior Assistants (Technological) and the Cotton Specialist, Maharashtra Government was held on the 16th and 17th December, 1960.

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.	Shri Satwant Singh	Member, Indian Central Cotton Committee.
2.	Shri S. C. Malhotra	M/s. Killick Industries Ltd., Bombay.

3.	Mr. Kasymov	Soviet Cotton Expert.
4.	Shri V. Shankar	President, Indian Central Cotton Committee.
5.	Mr. Abdul Hadi Ismail Ghani	Director General, Agricultural Research & Projects, Government of Iraq.
6.	Dr. J. S. Patel	Agricultural Commissioner with the Government of India.

(ii) *Staff*—(a) *Officers.*

Shri V. V. Gupte, Spinning Master, proceeded on leave from 28th March, 1961 to 17th June, 1961.

Shri Jai Prakash, Senior Research Officer, proceeded on leave from 9th November to 23rd December, 1960.

Dr. S. M. Betrabet, Senior Research Officer, was granted earned leave for 41 days with effect from 24th October, 1960.

Shri V. Venkataraman, Junior Research Officer (Statistics) was on leave for 45 days with effect from the 8th December, 1960.

Shri S. N. Pandey, Junior Research Officer, proceeded on leave from 16th January to 20th January 1961 and again from 15th May to 3rd June 1961.

Shri K. G. Deo, Superintendent (Testing House) was granted 34 day's leave with effect from the 28th November, 1960.

Shri J. F. Quodras, Administrative Officer, was granted 39 day's earned leave with effect from 9th May, 1961.

Shri V. G. Munshi, Junior Research Officer, proceeded on leave from 9th to 12th May, 1961 and again from 29th May to 23rd June, 1961.

(b) *Establishment*

Shri R. D. Patwardhan, Junior Clerk, was promoted as Senior Clerk in the Office of the Secretary, Indian Central Cotton Committee, Bombay, with effect from 2nd August, 1960, and, in his place, Shri N. S. Velhal was appointed as a Junior Clerk.

A new post of leave reservist in the Senior Clerk's cadre was created at the Laboratory and it was filled up by the promotion of Shri D. P. Naidu, Junior Clerk, with effect from the 25th November, 1960. In his place Shri J. X. D. Rodrigo was appointed as a Junior Clerk.

Shri N. S. Gidathkar was appointed as Second Spinning Assistant with effect from 20th June, 1960, vice Shri M. S. Bhawsar, promoted as First Spinning Assistant. Both Sarvashri Gidathkar and Bhawsar resigned their posts at the Laboratory in February and March 1961 respectively. In the place of Shri Bhawsar, Shri Shankarnarayan, 2nd Spinning Assistant, was promoted as Officiating First Spinning Assistant with effect from the 1st March, 1961. Shri K. S. Bhyrappa was appointed as Second Spinning Assistant with effect from 19th April, 1961, vice Shri N. S. Gidathkar resigned. The post of 2nd Spinning Assistant rendered vacant by the promotion of Shri Shankarnarayan remains unfilled due to non-availability of suitable candidate to fill up the post.

Shri P. V. Thomas was appointed as Officiating Stenographer with effect from 2nd December, 1960, vice Shri T. S. Narayan proceeded on leave and subsequently resigned.

Shri S. S. Malik, Statistical Assistant in the office of the Secretary, Indian Central Cotton Committee, Bombay, was appointed as Senior Assistant (Statistical) with effect from 1st December, 1960, vice Shri A. P. Bambardekar resigned.

Kumari K. M. Advani and Shri N. Venkataramu were appointed as Junior Assistants (Testing) with effect from 2nd August, 1960, vice Sarvashri N. C. Chiplonkar and M. S. Sitaram transferred to Indore and Dharwar respectively as Senior Assistants (Technological).

Shri B. M. Petkar was appointed as Junior Assistant (Testing) with effect from 5th December, 1960 vice Shri R. Dwarkanath transferred as Senior Assistant (Technological), Nandyal.

A new post of Senior Assistant (Technological) at Rajasthan was created and Shri P. N. Elayathu, Junior Assistant (Testing) was appointed to this post and was relieved from the Laboratory on the afternoon of 13th January, 1961. In his place, Shri A. K. Anthony, Senior Clerk in the office of the Secretary, Indian Central Cotton Committee, Bombay, was appointed as Junior Assistant (Testing) with effect from 1st February, 1961.

Shri S. Srinivasan, Junior Assistant (Testing) was appointed as Junior Assistant (Statistical) with effect from 24th October 1960, vice Kumari S. P. Gupte resigned.

The scheme for Commercial Grading of cotton, financed by the Directorate of Marketing and Inspection, Ministry of Food and Agriculture, was undertaken at the Laboratory from the 4th July, 1960. Four temporary posts of Junior Assistants (Testing) provided for in the Scheme were filled up by direct recruitment.

The period of deputation of Dr. V. Sundaram, Senior Research Officer, who was selected for advanced training in Textile Technology at the Manchester College of Science and Technology under the Colombo Plan was extended by about eight

months from September, 1960 to enable him to undergo further training at the Leeds University.

(iii) *Training*

(1) As in the past, the following students were selected for training in the elements of spinning and methods of testing fibres, yarn and cloth and application of statistical methods to textiles for a period of six months commencing from the 27th June, 1960.

1. Shri S. M. Gujarathi	(The Agricultural Produce Market Committee, Chopda).
2. Shri L. N. V. Natrajan	(The Sree Meenakshi Mills Ltd., Madurai.)
3. Shri A. B. Patel	(The Arvind Mills Ltd., Ahmedabad).
4. Shri V. S. Bhonsle	(The Kamla Mills Ltd., Bombay).
5. Shri G. M. Chittiappa	(Shree Shankar Textile Mills Ltd., Davangere).
6. Shri A. N. Halwai	(The Dawn Mills Co. Ltd., Bombay).

They completed the training on the 28th December, 1960.

(2) Shri D. N. Puri, a post-graduate student of the Indian Agricultural Research Institute, Delhi, who was admitted at this Laboratory in March, 1960, for carrying out the technological portion of the programme of his research studies, completed his work at the Laboratory on 22nd August, 1960.

(3) Shri V. C. Majupuria and Shri N. G. Deshpande, Police Officers from Madhya Pradesh Government were given a short training in this Laboratory for a period of one month from the 2nd January, 1961, in the examination and identification of fibres.

(4) Shri W. T. Butany, Geneticist (Cotton), Indian Agricultural Research Institute, New Delhi, was deputed to the Laboratory for a few days for getting himself acquainted with the various techniques in laboratory testing of cotton and for personally carrying out certain tests on a few samples of cotton brought by him.

(5) Mr. Tarik Abdul-Jabbar Tabrah, a Technical Assistant in the office of the Director-General of Agricultural Research of the Iraqi Government underwent a course of training in cotton technology at the Laboratory for a period of three months (November 1959 to January 1960).

(6) Shri S. N. Pandey, Junior Research Officer, was deputed for training in Chemical methods of testing cotton and cellulose at the Department of Chemical Technology of the University of Bombay for a period of about 2 months from the 1st March, 1961.

(iv) Additions to the laboratory equipments during the period under review are given below:—

(1) Oscillograph

(2) No. 18 Yarn Testing Machine for leas.

(3) A Leitz polarising Microscope

(4) Model 183 Digital Fibrograph.

(5) Pressley Strength Tester.

(6) AVO Electronic Test Meter.

(v) *Other activities*

(1) *Staff Research Council*:—Eight meetings of the Staff Research Council were held during the period under review. Programme of work of the Laboratory and progress made on research problems were discussed in some of these meetings. Three subjects, viz., (1) Transformation of cotton into fibrous cellulose derivatives by Dr. Betrabet and (2) Soil fertility with particular reference to cotton growing by Shri S. N. Pandey and (3) Materials for the publication "Cotton Atlas" were discussed at these meetings.

(2) *Conference*:—A conference of Cotton Breeders, Agronomists, Physiologists and Technologists was held at the Laboratory on 23rd February 1961 at the instance of the writer to plan out experiments for the improvement of long staple Indian cottons which do not give spinning performance expected of them. After a thorough discussion, the members agreed to undertake work on the following lines, viz., (1) development studies on the long staple cottons to be carried out at the PIRRCOM centres at Surat, Sirsa and Coimbatore (2) study of the place effect on the quality of 170-Co2 grown in Gujarat, Maharashtra and Mysore and (3) physiological studies at PIRRCOM centre in New Delhi. Arrangements are being made to carry out these projects.

(3) *Refresher course and Conference*:—The Senior Assistants (Technological) working at the various cotton breeding stations attended the biennial refresher course at the Laboratory in December 1960. The 20th Conference of the Research Staff of the Laboratory and the Senior Assistants (Technological) and the Cotton Specialist of the Maharashtra Government was held on the 16th and 17th December 1960. Several useful subjects brought forward by the Senior Assistants and Research Staff of the Laboratory were discussed.

(vi) *Exhibitions*

The A. N. Stapling apparatus, ginning percentage balance, stelometer, instrument for measuring the toughness of leaf veins, baer sorter patterns and halo-cards prepared by the Laboratory were displayed at the Cotton Show arranged by the

Indian Central Cotton Committee in connection with their meetings held in August, 1960 and February, 1961.

(vii) *Fabrication*

Several instruments were fabricated locally, tested and supplied to various organisations during the year. Of these, mention may be made of the following instruments:—

1.	Ginning percentage balance	4
2.	A. N. Apparatus	1
3.	Halo length discs	65

(viii) *Library*:—A fresh catalogue of books was prepared. The subjects were re-classified in a more modern and elegant manner, the classification being based on decimal system. The number of books in the Library at the beginning of the year was 1559. 63 books were added during the year bringing the total to 1622. The number of bound volumes at the end of the year was 1460. The Laboratory is getting as many as 59 important scientific journals dealing with textile and allied subjects. Of these, 42 are subscribed and the other 17 are on exchange or free basis.

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*st March*, 1961:—Details regarding the staff, the number of samples tested during the year and the nature of tests carried out are given below. It may be mentioned in this connection that the 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 (Tech.)	Junior Assistant (Tech.)	Fibre length	Fibre weight	Fibre maturity	Strenght index
Abohar	Shri Om Prakash Bansal[1]	..	344	335	330	294[2]
Achalpur	Shri L. R. Jambunathan	..	367	251	164	243[3]
Bulandshahr	Shri M. Radhakrishnan	..	536[4]	372	21	525[5]
Coimbatore	Shri K.V.N. Nayar	Shri S. K. Iyer	707[6]	626	543	631
Dharwar	Shri M. S. Sitaram	Shri Y. R. Yardi Shri T. G. Shankaranarayanan	873[7]	873	50	558[8]
Indore	Shri N. C. Chiplunkar	Shri N. B. Joshi Shri B. S. Thakur[9]	429[10]	429	380	224
Nanded	Shri W. R. Sharma	..	310	310	117	132[11]
Nandyal	Shri R. Dwarkanath[12]	..	221	..	10	..
Rajasthan	Shri P. N. Elayathu[13]	..	14	14	..	..
Surat	Shri M. U. Parmar	Shri R. G. Sankalia Shri K. R. Desai Shri S. M. Gandhi[14]	1126[15]	1080	838	616[5]
Trichur	Shri K. S. Marar[16]	..	453	245	441	698[17]

1 Consequent on the transfer of Shri N. Geo Paul to Technological Laboratory, Matunga, as Senior Assistant (Testing), Shri Om Prakash Bansal was promoted to that post from 16th May, 1960 and the post of Junior Assistant (Technological) is lying vacant.

2 Only six breaks were taken in each case on Pressley tester.

3 In case of 51 samples, only two breaks were taken while for the remaining, 6 breaks were taken on Pressley tester. In addition, 20 samples were tested both for yield and ginning percentage.

4 339 samples were tested on A. N. Stapling apparatus adopting the usual procedure (except in case of 93 samples where only two tufts were tested). Of the remaining, 25 samples were tested on Baer Sorter and others on Balls Sorter. Fibre length irregularity percentage was also calculated for 94 samples. In addition, ginning percentage was also determined on 104 samples and lint index and seed weight for 32 samples.

5 Tested on Stelometer by taking breaks in each case.

6 Fibre length irregularity percentage was also determined for 472 samples.

7 Fibre length irregularity percentage was also determined in case of 153 samples.

8 In case of 520 samples, only five breaks were taken while for the remaining 38 samples, 10 breaks were taken.

9 Shri B. S. Thakur was appointed to the post of Junior Assistant Technological) for three months and Shri N. B. Joshi was appointed in place of Shri W. R. Sharma with effect from 22nd July, 1960.

10 Fibre length irregularity was also determined in case of 370 samples.

1. Abohar

Strains 1/59-P-1 and 1/59-P-2 from length pool experiment of 1959 crop have shown good promise with their mean lengths being 1.25 and 1.20 in., fibre weight 0.109 and 0.099 $\times 10^{-6}$ oz/in., maturity 60 and 66 per cent and Pressley Strength index 7.8 and 8.3 lbs/mg. respectively. Strain A 136 has also recorded a good combination of fibre properties (mean length 1.12 in., fibre weight 0.104 $\times 10^{-6}$ oz./in., maturity 74 per cent and Pressley Strength index 9.4 lbs/mg). Some of the AC and AS strains from Hansi have given mean length about one inch, combined with very high maturity (about 90 per cent), very good Pressley Strength index (about 9 lbs/mg) and good fineness.

In view of somewhat contradictory results obtained in the correlation coefficients between halo-length and Pressley index from last two years' data, the investigation was continued for one more year. It is reported this year that the correlation is significant only for plants within varieties while both between varieties and between seeds within plants, it is not significant. In order to arrive at some definite conclusions, the Senior Assistant (Technological) has been asked to work out the pooled correlations for the last three years. Regarding the problem on the probable relationship of lint index and ginning outturn with fibre properties, the Senior Assistant (Technological) has been asked to work out the correlation coefficients between these characters separately for three years in order to enable study of the variation of this association from year to year. He has also been asked to work out the pooled values of correlations to come to some general conclusion.

The Senior Assistant (Technological) attended the Refresher Course and also participated in the 20th Conference of the Senior Assistants (Technological) and Senior Officers of the Technological Laboratory, Matunga during the period from 14th to 20th December, 1960.

2. Achalpur

Some of the strains from replicated progeny row trials of American cotton breeding schemes showed a good combination of fibre properties with length well

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11 In case of 92 samples, only five breaks were taken while for the remaining 10 breaks were taken

12 This is a newly opened cotton breeding station and Shri R. Dwarkanath, who was Junior Assistant (Testing) at the Technological Laboratory, took charge there as Senior Assistant (Technological) on 13th June , 1960.

13 This is also a newly started cotton breeding station and Shri P. N. Elayathu who was Junior Assistant (Testing) at the Technological Laboratory, took charge there as Senior Assistant (Technological) on 23rd January, 1961.

14 Shri S. M. Gandhi who is Agricultural Assistant, worked at the Laboratory from 9th June 1960, and after he was given training, he continued to work at the Laboratory of the Senior Assistant.

15 Fibre length irregularity was also calculated for 114 samples.

16 After 31st March 1961, Shri K. S. Marar, has joined the Technological Laboratory, Matunga, as Head Assistant (Testing) because of the closure of the Technological Station at Trichur.

17 In case of 454 samples, six tufts were broken and in the case of the remaining nine tufts were broken.

exceeding 1.1 inch and good fineness and strength but in all cases, the maturity was extremely poor. Quite a few of the selections of *deshi* strain from Akola have given a mean fibre length about an inch with medium fineness and good strength, but maturity was rather poor. Selections 3073 and 3091 from F4 crosses, have given a good combination of fibre properties (mean length about an inch, fineness less than 0.150×10^{-6} oz/in., strength above 8 lbs/mg., and maturity above 60 per cent). On the whole, samples from various places suffered from poor fibre development and the maturity is very low. This has been attributed to adverse season.

Results collected for three years on the investigation on the relationship between embryo weight on the one hand and the Pressley strength index, maturity and seed weight on the other were statistically analysed. The conclusions emerging from the combined analysis indicate that the correlation coefficient between embryo weight and Pressley strength index are negative but non-significant for both *arboreum* and *hirsutum* cottons. The pooled correlation coefficient between embryo weight and maturity coefficient shows a highly significant relationship (correlations + 0.318 and + 0.327 for *arboreums* and *hirsutums* respectively), although from year to year there was a marked variation in the degree of association. As expected, the very close relation between embryo weight and seed weight was also evident from pooled data for three years.

The investigation regarding the influence of different inter-pick intervals (from 1 to 5 weeks varying at an interval of one week) on the quality, ginning percentage and yield of strain 0394 showed that none of these was significantly affected.

Regarding the place effect study, further work done during this year included fibre weight determination for 36 samples of *arboreum* cottons (3 cottons, 4 places and 3 replications) and fibre length, fibre weight and strength on 27 samples of *hirsutum* cottons (3 cottons, 3 places and 3 replications). The general conclusions arrived at by the statistical analysis show that in both the species of cottons, the place effect is non-significant for all the fibre properties determined and also place variety interaction is non-significant.

The Senior Assistant (Technological) attended the 20th Conference of the Senior Assistants (Technological) and Senior Officers of the Technological Laboratory, Matunga and also participated in the Refresher's Course held there. He presented a paper entitled "Correlation studies between embryo weight on the one hand and Pressley fibre strength, fibre maturity and seed weight on the other".

3. Bulandshahr

Among the *desi* cottons, U.P. No. 1 (which has now been renamed as Raniben) has conclusively proved its superiority in Mill tests, and has now been recommended for replacing 35/1. Two more strains, 197-3 × 35/1 (1) and [(197-3 × C 520)

× 197-3] × C 520(8) spinning 22s and 28s counts are in Mill test stage. Of the earlier generations, hybrid selections are available having mean fibre length values upto 0.95 in.

Among the American cottons, M4/58 has shown superiority over 216F in Mill tests; a segregate of 100F × CO4 B-40 with mean fibre length of 1.01 in., has proved clearly superior to 216F in micro-spinning tests. The Punjab American strains have been stated to show great adaptability to Western U.P. conditions.

Regarding the effect of rainfall on the yield and quality of 35/1 cotton, some calculations for secular change in the cotton quality and rainfall distribution values and the evaluation of regression coefficients had been done. It is, however, felt that as the results show a large variation from cotton to cotton, the conclusions arrived at may not be of great practical utility to breeders for drawing any general conclusions.

The investigation on the variation of qualitative and quantitative characters of cotton with sowing dates was continued on the same eight varieties of cotton as last year for two other flowering dates (23rd and 29th August). The conclusion drawn from the combined analysis of last as well as this year's results indicated that higher ginning percentage of the early sown cottons is mainly due to the remote effect of the exclusive environment available to it between the two sowing dates.

The Senior Assistant (Technological) attended the 20th Conference of Senior Assistants (Technological) and Senior Officers of the Technological Laboratory, Matunga and also participated in the Refresher's Course held there. He presented the following papers at the time of the Conference:—

(1) A preliminary note on the design of an instrument for the rapid estimation of cotton fibre fineness.

(2) Report on the investigation into the causes of higher ginning percentage of early sown cottons in U.P.

4. Coimbatore

A few strains evolved at Srivilliputhur have given mean fibre length round about 1.20 in., with fibres more uniform in length, comparatively more mature and also stronger than the control M.C.U. 2. Strains EL 192 from main trial, EL 395 from preliminary trials and EL 500 and EL 613 from progeny row trials have an alround combination of very good fibre properties. From the *arboreum* strains although a number of selections were longer in mean fibre length than the control K2 and K6, practically, none was much superior in strength and fineness compared to K6. Some selections from compact family block were better than K6, strain 0417 needing special mention. As many as five strains from Set I and II of progeny row trials of Karunganni scheme at Koilpatty, have recorded pressley strength greater than 10 lbs/mg.

The study on the breeder's problem regarding the causes of bad boll opening of M.C.U. 2 cotton at Rajapalayam and at Srivilliputhur was continued on the same lines as last year and it is found from the analysis of data that the mean variance due to treatment is not significant at both the centres except for fibre length irregularity percentage which is significant at Rajapalaym centre. Last year, the treatment effect was found to be significant for maturity coefficient at Rajapalayam and for fibre weight at Srivilliputhur.

From district trials conducted at 14 places under Karunganni scheme, strain 9705-C has been found in general to be a better performer although its maturity value is somewhat low.

The Senior Assistant (Technological) has shown the statistical significance of a new method of selection for uniformity of fibre length for Madras *hirsutum* type cottons by determining cumulative totals of distribution percentages below 5/8″, 6/8″ and 7/8″ group lengths of Balls Sorter and working out the correlations with fibre length irregularity percentage. It is concluded that selection of material based on weight of group lengths upto 5/8″ is a good criterion of quick selection of cotton samples for length uniformity.

The Senior Assistant (Technological) attended the 20th Conference of the Senior Assistants (Technological) and Senior Officers of the Laboratory at the Technological Laboratory and participated also in the Refresher's Course. He contributed the following papers at the Conference: (1) A note on the statistical significance of a new method of selection for uniformity of fibre length with special reference to Madras G. *hirsutum* types and (2) A preliminary study of the fibre properties of wild cotton hybrids with special reference to G. *arboreum* and *anomalum* crosses and their back-crosses.

5. Dharwar

Some of the selections from various trials have been found better than Jayadhar in ginning percentage and mean fibre length although compared to last year, there is a general decline in mean fibre length and fineness. Several crossings of M.A. 5 with well known American strains gave an increase of 2 to 25 per cent in Pressley Strength, although there was a decline of 6 to 15 per cent in mean length compared to last year. Their fibre length irregularity was also very high. Samples of M.A. 5 from district trials gave a very poor performance as compared to those from Mandya Breeding Station. Strain 5778 from Hagari, and 6959 and 5122 from Raichur have given better performance than their respective controls.

The investigation on the effect of foliar application of urea, superphosphate and potassium sulphate on fibre properties of Jayadhar cottons for last three years has shown that mean fibre length and fibre strength are not affected by foliar application. In case of mean fibre weight per inch also, there was no significant effect

for two years 1957-58 and 1958-59, although in 1959-60, the treatments have given a significant effect.

The Senior Assistant (Technological) attended the 20th Conference of the Senior Assistants and Senior Officers of the Technological Laboratory, Matunga and also participated in the Refresher's Course. He presented a short note entitled "The effect of foliar treatment on fibre quality of Jayadhar cotton" at the Conference.

6. Indore

A few selections (B 59-1597, B 59-1601 and B 59-1668) from Badnawar have recorded mean length above 1.10 in., fibre weight about 0.1×10^{-6} oz/in., Pressley strength about 8 lbs/mg., and maturity about 60 per cent. Compared to last year, the samples from Badnawar station have shown a decline in maturity percentage and strength while the *desi* strains from Khargone have given a comparatively better performance. Some American strains from Khargone have given very good maturity although strength is comparatively lower than last year. C.T.I. strain tried at Khandwa has not given as good performance as when grown in Badnawar (the length was hardly more than an inch and strength and maturity were also not quite satisfactory).

Data for rainfall and fibre properties regarding the problem on the effect of environmental conditions on fibre properties of *desi* cotton have been collected and the same are being analysed by employing Fisher's method of fitting polynomials.

The Senior Assistant (Technological) attended the Refresher's Course and 20th Conference of the Technological Assistants at the Technological Laboratory, Matunga in December, 1960, and presented the following three papers:

(i) Study of the effect of different seed rates and spacings on the fibre properties of *desi* cotton, Bhoj

(ii) Study of the effect of different new fertilizers on the fibre properties of *desi* cotton, Bhoj.

(iii) Differential response on the fibre properties of three *desi* and three American cottons with increasing doses of ammonium sulphate in four levels of nitrogen viz., 0, 30, 60 and 90 lbs/acre.

7. Nanded

Some single plant selections of Indo-American varieties 170-Co2, I.S.C. 67 and 134-Co2 at Nanded, have given mean fibre length above 1.30 in, and also surprisingly high strength (above 9 lbs/mg in some cases) but the maturity was in general very poor. Several single plant selections of Gaorani and its crosses with Virnar have given mean fibre length above 1.00 inch and possess medium fineness. Selec-

tion 5405-16 combines good ginning percentage (41.9 per cent) with quality and is the best of all. Buri 147 has proved superior to Buri 0394 as regards quality of fibres. Four *arboreum* strains from Parbhani (7275, 7526, 7259 and 6821) have recorded a mean length of about 0.95 inch with fineness about 0.150×10^{-6} oz/in., and the estimated count from them was found to be 45 or above. Buri 147 from Badnapur has recorded a mean length of 1.06 in. and fibre weight 0.133×10^{-6} oz/in. although the maturity was somewhat poor.

Regarding the investigation on 'effect of green manure on quality and agronomic characters of cotton', the results of samples belonging to 1957-58 and 1958-59 seasons are presented for each of the four manurial treatments including the control. The statistical analysis of the data is not given.

The Senior Assistant (Technological) attended the Refresher's Course at the Technological Laboratory for a period of a fortnight from 14th December to the 27th December, 1960 and also participated in the 20th Conference of the Senior Assistants (Technological) and Senior officer of the Laboratory. For about another fortnight (from 28th December 1960 to the 9th January, 1961), he was also given training in statistical methods at the Technological Laboratory.

8. Nandyal

The Technological Station at Nandyal was established only during the course of last year, when the Senior Assistant (Technological) joined duty there on the 13th June, 1960. As the station was not fully equipped with all the necessary testing instruments, the tests done during the year were mainly confined to mean fibre length determination.

From the various bulk yield trials at Nanded, a good range from 0.88 to 1.06 in. was found in the mean-fibre length. Under agronomic trials, 32 samples of N14 of 1959-60 season with seven combination treatments of N 30, P 30 and K 30 and one control with four replications were tested for mean fibre-length and ginning percentage, but the results are not properly reported nor the statistical analysis tables given to draw any inference.

Some samples from Narasaraopet, Adoni and Mudhol were also tested and are given in the report.

The Senior Assistant (Technological) attended the Refresher's Course at the Technological Laboratory, Matunga for a period of one fortnight during December 1960 and also participated in the 20th Conference of the Technological Assistants and Senior Officers of the Laboratory.

9. Rajasthan

This is also a newly started station and the Senior Assistant (Technological) took charge of his duties there only on the 23rd January, 1961. Being a new station,

it took quite some time to equip the Laboratory with necessary furniture and in setting up and calibrating the instruments supplied by the Technological Laboratory. During this period, the Senior Assistant (Technological) has carried out the determination of mean fibre length and fibre weight per unit length on only 14 samples.

10. Surat

From the *herbaceum* cotton breeding scheme, the performance of most of the strains was poor compared to last year. The maturity was, in general, quite unsatisfactory. From the Indo-American Cotton Scheme, some quality strains (e.g. N.C. types, H.B. types and B.C. 68 types) from last year's produce have given a good range in chief fibre properties. Selections of 170-Co2 and I.S.C.-67 from different varietal trials did not show any improvement in quality over the respective controls. Samples from Talod have given very low maturity, mostly lying between 28 and 40 per cent. From district trials of 2087, Digvijay, Vijay and Culture 92 at various places at Broach, the last one was found to surpass others in mean fibre length and fineness. Some selections at Viramgam and also a few selections from Cross 15 from Bavla were found better than Kalyan in mean fibre length and fineness. Several selections from the crosses of C.J. 73 with W-31, W-81, 2164 and 2146 have recorded mean length about 0.95 in. and fibre weight from 0.153 to 0.184 $\times$ 10^{-6} oz/in. The testing of samples from Khandesh has been discontinued after bifurcation of the State.

In order to see the performance of I.S.C.-67 with a view to replace 170-Co.2 and 134-Co2-M which are both susceptible to black arm and jassids, samples belonging to these three Indo-American Strains were collected from various places in Gujarat and Maharashtra States. It was found from the analysis of data that on the whole, I.S.C.-67 was quite promising. Its performance for consistent behaviour is to be studied.

The investigation of fibre properties in relation to soil and climatic conditions was continued on the same four varieties 115, 198, 2087 and Digvijay as last year and the material grown at 13 different places was collected. The testing work is being continued.

The Senior Assistant (Technological) attended the Refresher's Course at the Technological Laboratory, Matunga, for a period of one fortnight during December 1960 and also participated in the 20th Conference of Senior Assistants (Technological) and senior officers of the Laboratory. He submitted a note on the "performance of the new strain I.S.C.67 in district trials".

11. Trichur

The work of selection of single plants on the basis of high Pressley strength, ginning percentage etc. was continued on the same lines as last year. Several high yielding single plants indicated further scope of selection for Pressley strength.

Single plant selections from Mangalore varied in mean fibre length from 1.20 to 1.38 in. and they contained 60 to 80 per cent mature fibres and had 7.0 units or more pressley strength index. Some of the promising selections were sown at Mandya to study their performance under irrigation and where the rainfall is of the order of 30″ per annum.

Seeds from Trichur, Nilambur and Coorg were sown in Trichur. The fibre properties, however, practically remained unchanged irrespective of the source of the seed. Mulching trials were carried out on cottons grown in Trichur and Mangalore. There were three treatments viz., No mulching, mulching after 21 days from sowing and mulching in August-September. While samples grown at Trichur showed an increase in mean fibre-length with mulching 21 days after sowing, there was no such effect at Mangalore. Also no other fibre property was affected.

In a picking trial, six different pickings at an interval of one week were tried on early sown Andrews cotton under irrigation at Mandya. Except for last two pickings, where mean fibre length and maturity were found appreciably reduced, there was no other perceptible effect.

Samples of Andrews cotton collected from Bhadravathy from the fortnightly planting trials did not show any effect on fibre properties. However, compared to Andrews cotton grown at Mandya, Bhadravathy samples possessed somewhat shorter fibres and were also relatively more immature and weaker.

From the investigation on the effect of different nitrogen, phosphate and potash manurial combinations on the fibre properties of Andrews cotton grown at Trichur and Mangalore, it is concluded in a broad way that while under Trichur conditions, addition of K contributes to better length, fibre weight and fibre maturity, at Mangalore farm, generally, addition of phosphatic manure alone of in combination with nitrogen and potash contributes to better length, fibre weight and maturity.

The investigation on the effect of date of sowing-cum-spacing-cum-manurial trials on the fibre properties of Andrews cotton grown at Trichur and Mangalore farms, showed that none of the chief fibre properties is affected by these treatments.

The Senior Assistant (Technological) attended the Refresher's Course for a period of one fortnight in December, 1960 at the Technological Laboratory, Matunga and also attended the 20th Conference of Technological Assistants and Senior Officers of the Laboratory. He presented a paper entitled "Variation in Fibre properties of Andrews cotton due to the application of nitrogen, phosphate and potash alone or in combination with organic manure" during the Conference.

The post of Technological Assistant, Trichur has now been abolished with the year ending 31st March, 1961.

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. 103. Combing of Indian and African (Kampala cottons) by V. V. Gupte and R. L. N. Iyengar.

(ii) Technological Bulletin Series A, No. 104. Technological Reports on Standard Indian Cottons, 1960, by R.L.N. Iyengar.

(iii) Technological Bulletin Series A, No. 105. Technological Reports on Trade Varieties of Indian Cottons, 1960, by R. L. N. Iyengar.

II. Technological Bulletin Series 'B'.

(i) Technological Bulletin Series B, No. 74. Effect of certain group lengths of fibres on single thread strength of 20s cotton yarn by A. N. Gulati and R. L. N. Iyengar.

(ii) Technological Bulletin Series B, No. 75. Study of the variation of fibre length within and between seeds of the same strain by T. V. Krishnan and R. L. N. Iyengar.

(iii) Technological Bulletin Series B, No. 76. Moisture Regain of Raw cotton, cotton yarn and cotton fabric at 65 per cent R. H. and 80°F by R. L. N. Iyengar and Jai Prakash.

(iv) Technological Bulletin Series B, No. 77. A study of the relationship of yarn-irregularity with fibre properties and its effect on yarn strength by N. Balasubramanian and R. L. N. Iyengar.

(v) Technological Bulletin Series B, No. 78. Standardisation of metric skein strength for Indian cottons by Harirao Navkal.

III. Technological Leaflets

(i) Technological Leaflet No. 67. Cotton requirements of the Indian Textile Industry—How far it is possible to meet them by R. L. N. Iyengar.

(ii) Technological Leaflet No. 68. A study of the Mysore cottons from the Technological angle by R. L. N. Iyengar and Harirao Navkal.

(iii) Technological Leaflet No. 69. Upgrading of long staple Indian cottons by V. V. Gupte and R. L. N. Iyengar.

(iv) Technological Leaflet No. 70. 'Ramie Fibre'. Its production and utilisation by R. L. N. Iyengar and K. S. Bhujang.

IV. Articles & Papers

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

(i) Study of the variation of fibre length within and between seeds of the same strain by T. V. Krishnan and R. L. N. Iyengar, I.C.G.R. Sept. 1960 (B. No. 75).

(ii) Cotton requirements of Indian Textile Industry. How far it is possible to meet them by R. L. N. Iyengar, I.C.G.R. Sept. 1960.

(iii) Standardisation of Metric skein strength for Indian cottons by Harirao Navkal, I.C.G.R., Nov. 1960.

(iv) Upgrading of long staple Indian cottons by V. V. Gupte and R. L. N. Iyengar, Jan. 1961.

(v) A note on the possibilities of growing long staple cottons under irrigation on the Tungabhadra Project area at Dhadesugur by H. R. Nayak, I.C.G.R., March, 1961.

(vi) X-ray diffraction technique as an aid for assessing fibre quality in cotton breeding work by V. Sundaram, I.C.G.R., March, 1961.

The following papers were sent for publication in the I.C.G.R.

(1) Studies on the mixings of Indian cottons with special reference to their fibre properties by V. V. Gupte and R. L. N. Iyengar.

(2) The skein strength of yarn (fine counts) in metric system by V. V. Gupte and R. L. N. Iyengar.

(3) A study of the variation of fibre maturity at different regions of the seed surface and of its variation from seed to seed in relation to the seed weight by Jai Prakash and R. L. N. Iyengar.

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

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

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

(iii) 'Cotton Fibre Weight Distribution' letter to the Editor by R. L. N. Iyengar, T. R. J., Feb. 1961.

(iv) Ramie fibre; Its production and utilization in India by R. L. N. Iyengar & K. S. Bhujang. Research & Industry, Vol. 6, No. 4, April 1961 (Leaflet No. 70).

The following paper was written up and sent to the Indian Central Cotton Committee for approval of the Editorial Sub-Committee for publication as Technological Bulletin Series B.

A comparative study of the visual assessment of yarn irregularity with the Uster evenness tests results by N. Balasubramanian, V. V. Gupte and R. L. N. Iyengar.

V. Technological Circular Nos. 1158 to 1200 as per list given below:—

Technological Circular No.	*Title*	*Date of publication*
1158	Fibre and Spinning Test Report (No. 5878) on sample of Gaorani cotton 1959-60.	June, 1960
1159	Fibre and Spinning Test Report (No 5879) on sample of 170-Co2 (Anjar) cotton 1959-60.	June, 1960
1160	Fibre and Spinning Test Report (No. 5880) on sample of 320F Punjab American cotton 1959-60.	June, 1960
1161	Fibre and Spinning Test Report (No. 5881) on sample of Virnar (West Khandesh) cotton 1959-60.	June, 1960
1162	Fibre and Spinning Test Report (No. 5883) on sample of L.S.S. cotton, 1959-60.	June, 1960
1163	Fibre and Spinning Test Report (No. 5922) on sample of Digvijay (Kapadvanj) cotton, 1959-60.	July, 1960
1164	Fibre and Spinning Test Report (No. 5923) on sample of Digvijay (Dabhoi) cotton, 1959-60.	July, 1960
1165	Fibre and Spinning Test Report (No. 5924) on sample of Daulat (Hingoli) cotton 1959-60.	July, 1960
1166	Fibre and Spinning Test Report (No. 5925) on sample of Buri 147 (Amraoti) cotton 1959-60.	July, 1960
1167	Fibre and Spinning Test Report (No. 5926) on sample of Bengal Deshi (Jagraon) cotton, 1959-60.	July, 1960
1168	Fibre and Spinning Test Report (No. 5955) on sample of Bengal Deshi (Ganganagar) cotton, 1959-60.	Aug., 1960
1169	Fibre and Spinning Test Report (No. 5956) on sample of Vijay (Palej) cotton 1959-60.	Aug., 1960

Technological Circular No.	*Title*	*Date of publication*
1170	Fibre and Spinning Test Report (No. 5957) on sample of Vijay (Cambay) cotton 1959-60.	Aug., 1960
1171	Fibre and Spinning Test Report (No. 5958) on sample of Surat cotton, 1959-60.	Aug., 1960
1172	Fibre and Spinning Test Report (No. 5959) on sample of Rajpipla cotton, 1959-60.	Aug., 1960
1173	Fibre and Spinning Test Report (No. 5960) on sample of Navsari cotton, 1959-60.	Aug., 1960
1174	Fibre and Spinning Test Report (No. 5976) on sample of K.6 (Pandyan) cotton 1959-60	Aug., 1960
1175	Technological Report on sample of Virnar (197-3) cotton, 1959.	Sept., 1960
1176	Technological Report on samples of Vijalpa (2087) cotton, 1959-60.	Sept., 1960
1177	Fibre and Spinning Test Report (No. 5999) on sample of M.C.U. 1 (Coimbatore) cotton, 1959-60.	Sept., 1960
1178	Fibre and Spinning Test Report (No. 6000) on sample of 9030G (Coimbatore) cotton, 1959-60.	Sept., 1960
1179	Fibre and Spinning Test Report (No. 6001) on sample of Cambodia- Co2 (Tirupur) cotton, 1959-60.	Sept., 1960
1180	Fibre and Spinning Test Report (No. 6008) on sample of Tinnevelly cotton, 1959-60.	Sept., 1960
1181	Fibre and Spinning Test Report (No. 6044) on sample of Jayadhar (Bagalkot) cotton, 1959-60.	Oct., 1960
1182	Fibre and Spinning Test Report (No. 6045) on sample of Westerns cotton, 1959-60.	Oct., 1960
1183	Fibre and Spinning Test Report (No. 6046) on sample of Karungani 2 (Sattur) cotton, 1959-60.	Oct., 1960
1184	Fibre and Spinning Test Report (No. 6055) on sample of Karungani 5 (Coimbatore) cotton, 1959-60.	Nov., 1960
1185	Technological Report on Laxmi (9-3) cotton, 1959-60.	Nov., 1960

Technological Circular No.	*Title*	*Date of publication*
1186	Technological Report on Jayadhar cotton 1959-60.	Nov., 1960
1187	Technological Report on Digvijay cotton 1959-60.	Dec., 1960
1188	Technological Report on Gaorani 6 cotton 1959-60.	Jan., 1961
1189	Fibre and Spinning Test Report (No. 6135) on sample of Jayadhar (Hubli) cotton 1959-60.	Jan., 1961
1190	Fibre and Spinning Test Report (No. 6140) on sample of Wagad (Saurashtra) cotton 1959-60.	Jan., 1961
1191	Fibre and Spinning Test Report (No. 6141) on sample of Laxmi (Gadag) cotton 1959-60.	Jan., 1961
1192	Fibre and Spinning Test Report (No. 6142) on sample of 170-Co2 (Nagar) cotton 1959-60.	Jan., 1961
1193	Fibre and Spinning Test Report (No. 6143) on sample of A.R.B.P. 52 cotton 1960.	Jan., 1961
1194	Fibre and Spinning Test Report (No. 6144) on sample of A.R. Busoga cotton, 1960.	Jan., 1961
1195	Fibre and Spinning Test Report (No. 6145) on sample of A.R. Jinja cotton, 1960.	Jan., 1961
1196	Fibre and Spinning Test Report (No. 6146) on sample of 134-Co2-M cotton, 1959-60.	Feb., 1961
1197	Fibre and Spinning Test Report (No. 6158) on sample of 170-Co2 (Manavadar) cotton 1959-60.	April, 1961
1198	Fibre and Spinning Test Report (No. 6189) on sample of M.C.U. 2 (Summer) cotton, 1960.	April, 1961
1199	Fibre and Spinning Test Report (No. 6214) on sample of Central line 47/10 cotton, 1960.	April, 1961
1200	Fibre and Spinning Test Report (No. 6217) on sample of Mawanza cotton, 1960.	April, 1961

Summaries of Technological Bulletins No. 74 to 78 are given below.

Technological Bulletin Series B, No. 74.

EFFECT OF CERTAIN GROUP-LENGTHS GF FIBERS ON SINGLE THREAD STRENGTH GP 20S COTTON YARN.

The effect of different length groups on yarn strength has been studied, by (i) colouring the fibres of each length group distinctively, (ii) removing in turn a length grade from a sample, and (iii) adding in certain proportion fibres of certain length groups to the staple. The results obtained from micro samples weighing 3-5 gms and spun into 20s yarns from Co2 and 1027 A.L.F. cottons lead to the following conclusions:—

(a) Fibres upon 23 mm group (21-25 mm) generally only break when a yarn piece breaks in single thread strength test. Fibres of this length group and of longer length are, therefore, considered important contributors to yarn strength.

(b) Statistical evidence shows that (i) frequency distributions of single thread strength data follow similar pattern as the length distributions determined with the help of a Baer Sorter, and (ii) the single thread strength is highly correlated with the per cent of long fibres in the staple. This is not only true of the experimental samples, but also holds good in the case of standard Indian cottons of two to six seasons.

(c) Subsidiary experiments carried out on coarser and finer counts than 20s (of five different cottons) confirm that 23 mm length is the critical length group upto which slippage occurs on one side and breakage on the other; and that more long fibres break when a fine count yarn is tested than a coarse yarn at normal twist. The latter finding does not appear to hold good when the different counts are spun from the same cotton such as Co2 and 1027 A.L.F. In the latter cotton fibre breakage appeared to extend even to 18 mm length group though only to a very small extent.

(d) This finding receives support from the published data, which also show that C.S.P. of (i) mixtures of cottons, (ii) mixtures of cotton and staple fibre, and (iii) combed cotton yarns, depends largely on the percentage of long hairs in the raw material.

(e) Three practical uses of the finding are suggested, viz., (i) a criterion for the cotton breeder when selecting a superior strain from among strains of practically similar mean length; (ii) a criterion for the mill-technician to adjudge the spinning performance of a mixing on the basis of long fibres and fineness; (iii) an indication to the technologist to work up suitable regression equations to determine the quantities of superior cottons and inferior cottons necessary to obtain the stipulated results of yarn strength from mixings.

Technological Bulletin Series B, No. 75.

STUDY OF THE VARIATION OF FIBRE LENGTH WITHIN AND BETWEEN SEEDS OF THE SAME STRAIN

The following conclusions were drawn from this investigation.

(1) The coefficient of variation of fibre-length on a single seed was found to vary considerably both within a variety and between varieties. The variation within seed in all the varieties ranged from 14 to 30 per cent.

(2) The mean coefficient of variation of fibre-length within a seed varied from 17.4 to 24.8 per cent with a mean of 20.7 per cent. On the other hand, the coefficient of variation of the same between seeds ranged from 4.9 to 10.4 per cent with a mean of 7.8 per cent. This shows clearly that the predominant contributing factor of the variation present in cotton fibres is mainly due to variation existing in a single seed.

(3) Although no categorical statement could be made as regards within and between seeds variation in relation to the different species, higher values were generally associated with G. *hirsutum* varieties and lower ones with G. *herbaceum*.

(4) Within a variety, uniformity of length was associated with higher mean length; lint weight and seed weight and to some extent with higher ginning percentage of the single seed.

(5) The wide range of the within-seed variation existing between seeds of a variety, offers good scope for selection for this attribute.

(6) The positive association of fibre length uniformity with mean fibre length as well as lint weight and seed weight is also very helpful as breeding for greater uniformity of fibre length could go hand in hand with improvement of other desirable characters.

(7) A simple method for testing uniformity of fibres, which could be adopted in breeding work is suggested in the paper.

Technological Bulletin Series B, No. 76.

MOISTURE REGAIN OF RAW COTTON, COTTON YARN AND COTTON FABRIC AT 65 PER CENT R.H. AND 80°F.

1. Mean moisture regain percentage for raw cotton was found to be 8.35 per cent., which agrees fairly well with 8.5 per cent normally used for raw cotton. However, after cleaning the cotton with Shirley Analyser the mean regain was

reduced to 7.82 per cent. This reduction is due either to comparatively higher hygroscopicity of the trash or to some of the trash dropping down from the uncleaned cotton on account of the air draught in the Brabender Tester.

2. The variance of moisture regain percentage between cottons was found to be significant for uncleaned cotton while it became non-significant after cleaning with the Shirley Analyser, thus showing that the trash content of the raw cottons is responsible for the variability observed between cottons. This is further confirmed by the highly significant correlation coefficient of + .593 obtained between the difference of moisture regain values before and after cleaning and trash content.

3. The moisture regain percentage was not in any way affected by the fineness of cotton.

4. In the case of yarn also, the effect of fineness of count was found to be negligible on moisture regain percentage while the effect of treatment (i.e., grey, bleached, dyed and ply, etc. was found to be comparatively higher although statistically nonsignificant.

5. In the case of fabrics, the structure of the fabric (canvas, drill, coating, etc.) was found to have practically no effect on moisture regain percentage, which corroborates similar conclusions drawn above with regard to the effect of fineness of cotton and of fineness of count of yarn. Perhaps the effects of fineness of cotton, count of yarn and structure of cloth are restricted to only the rate at which moisture absorption takes place, but final moisture regain percentages may not be affected by them provided sufficient time is allowed for the sample to attain equilibrium stage.

6. The effect of treatment (i.e., grey, bleached, dyed, etc.) on the moisture regain percentage of fabric was found to be significant, but after desizing, the variation due to treatment was reduced, although still significant at a slightly lower level.

7. The effect of desizing on the mean value of moisture regain percentage has been found to be practically nil, the respective value of moisture regain percentage being 7.58 and 7.62 for before and after desized states. However, as mentioned above, the effect of desizing is definitely marked in reducing the variability in moisture regain percentage due to treatments. The higher variability due to treatments in the original sample of the fabrics appears to be due to the variable size material and content of different samples.

8. The grand mean values of moisture regain percentages determined at the standard R.H. 65 $\pm$ 2 per cent and 80 $\pm$ 2°F. after conditioning the samples for a minimum period of 48 hours after bringing them to this stage from a lower humidity level in each case were found to be 8.35 percent for raw cotton and 7.82 per cent after it was cleaned in the Shirley Analyser. It was 7.66 and 7.60 per cent for yarn and cloth respectively.

Now, coming to the question of correcting the invoice weight for moisture regain percentage, it would be apparent from this investigation that raw cotton denotes a higher value for moisture regain than cleaned cotton, yarn or fabric. Although the difference is not very marked yet it exists and is probably due to the presence of trash, etc., in the raw cotton. The value 8.35 per cent found here in case of raw cotton being very near the internationally accepted value of 8.5 per cent., it would be logical to retain the latter to be added to the dry weight of raw cotton. Similarly, the value of moisture regain percentage to be added to the dry weight of yarn and fabric appears to be 7.6 per cent or 7.5 per cent, if rounded to half a per cent. This value of 7.5 per cent is also in quite close conformity with the mean values calculated from the range of variation quoted by Textile World Year Book and Catalog.

To sum up, it can be stated that while the international figure of 8.5 per cent is quite acceptable in case of Indian raw cottons, 7.5 per cent appears to be a more justifiable figure to be added to the dry weight, in the case of yarns and fabrics manufactured in India.

Technological Bulletin Series B, No. 77.

A STUDY OF THE RELATIONSHIP OF YARN IRREGULARITY WITH FIBRE PROPERTIES AND ITS EFFECT ON YARN STRENGTH

The following conclusions were drawn from the results of this investigation.

(i) Cotton yarn irregularity was considerably influenced by the properties of the fibres from which it was spun. Among the fibre properties studied, the coefficient of fibre length variation contributed most to irregularity of yarns.

(ii) The coefficient of length variation as determined from number-length distribution was correlated with yarn irregularity only to the same extent as the coefficient determined from weight-length distribution. This means that from the point of predicting yarn irregularity not much advantage is gained by determining the number-length distribution instead of the usual weight-length distribution.

(iii) Excess irregularity was found to be better correlated with the coefficient of fibre length variation than the mean deviation percentage in the case of both 20s and 40s yarns.

(iv) No relationship was found between yarn irregularity and mean fibre length in the case of 20s yarn. For 40s yarn, however there was a significant positive correlation between yarn irregularity and mean fibre length. This correlation must however be treated with caution as it is only just significant and as it is based on a small number of samples.

(v) No significant correlation was found between yarn irregularity and fibre fineness, for both 20s and 40s yarn, within the range of fineness employed in the present investigation. This does not lend support to the view that the size of sub-slivers, of which a fibrous strand is composed of, is influenced greatly by the fineness of the fibre.

(vi) It is possible to predict yarn irregularity from fibre properties with a standard error of the estimate of 3-6 per cent for 20s and 40s yarns.

(vii) Yarn strength was affected significantly by yarn irregularity i.e. irregularity causes the yarn to be much weaker than a regular yarn of the same count. Cottons with higher coefficient of fibre length variation produce more irregular and hence weaker yarns.

Technological Bulletin Series B, No. 78.

STANDARDISATION OF METRIC SKEIN STRENGTH FOR INDIAN COTTONS

The spinning quality of a cotton is being denoted at the Technological Laboratory by the highest standard counts. Due to the introduction of the metric system, the fineness of a yarn now indicated by the count has to be expressed in tex number which is the weight in grams of a kilometer of yarn. A new measure of tenacity has also to be introduced in place of the count-strength product. For this purpose, the Laboratory has recommended the Yarn Strength Index defined as the quantity obtained by dividing the metric skein strength in grams by the linear density of single yarn in text units, the skein being prepared by winding 100 times round a wrap reel having a girth of a meter. The metric counter-part of highest standard counts, is defined as finenest standard tex. Equations have been given in the paper connecting the metric skein strength and lea strength, and count-strength product and yarn-strength index. These equations have been used to set up strength standards for yarns having tex values from 42 to 12 from which the finest standard tex is determined. By applying suitable corrections, mill standards for various tex numbers could be calculated from the existing mill standards for various counts.

APPENDIX III

Scientific and Technical staff of the Technological Laboratory as on the 31st May, 1961.

	Designation	*Name*
1.	Director	Dr. R. L. N. Iyengar, D.Sc., F.T.I.
2.	Spinning Master	Shri V. V. Gupte, B.Sc., B.Sc. Tech. (Manch.)
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.), A.T.I.
8.	—do—	,, V. G. Munshi, M.Sc.
9.	—do—	,, S. N. Pandey M.Sc.
10.	Supdt., Testing House	,, K. G. Deo
11.	—do— (Offg.)	,, H. R. Nayak
12.	Head Asst. (Testing (offg.)	,, K. S. Marar, B.A. LLB.
13	—do—	,, V. N. Modak, B.Sc.
14.	Senior Assistant (Testing)	,, P. S. Sambamurthy
15.	—do—	,, R. G. Panvalkar, B.Sc.
16.	—do—	,, P. V. Nachane, B.Sc.
17.	—do—	,, S. Samson, B.Sc., LL.B.
18.	—do—	,, S. B. Mogre, M.Sc.
19.	—do—	,, P. D. Vakil
20.	—do—	,, N. Geo Paul, B.Sc.
21.	—do—	,, C. A. S. Iyer, B.Sc.
22.	—do—	,, S. Ramanathan
23.	Chemical Assistant	Kum. Indira G. Bhatt, M.Sc.
24.	Junior Assistant (Testing)	Shri 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.)
28.	—do—	Shri G. G. Phadnis, B. Sc.
29.	—do—	,, M. S. Savant, B.Sc.

	Designation	*Name*
30.	—do—	,, M. G. Rege, B.Sc.
31.	—do—	,, M. N. Uponi, B.Sc.
32.	Junior Assistant (Testing)	Smt. K. L. Datar, B.Sc.
33.	—do—	Shri A. N. Balan, B. Sc.
34.	—do—	,, V. M. Kamath, B.Sc.
35.	—do—	,, S. R. Ganatra, B.Sc.
36.	—do—	,, A. W. Shringarpure, B.Sc.
37.	—do—	,, E. S. Abraham, B.Sc.
38.	—do—	,, A. V. Ravindranathan, B.Sc.
39.	—do—	,, C. V. Raman, B.A.
40.	—do—	,, Seshadri Srinivasan, B. Sc.
41.	—do—	,, R. Narayanan, B.Sc.
42.	—do—	,, A. Rajagopalan, B.Sc.
43.	—do—	,, A. V. Ukidve, B.Sc.
44.	—do—	,, K. S. Shama Rao, B.Sc.
45.	—do—	,, N. Venkataramu, B.Sc.
46.	—do—	Kum.K. M. Advani, B.Sc.
47.	—do—	Shri B. M. Petkar, B.Sc.
48.	—do—	,, K. R. Kamath, B.Sc.
49.	—do—	,, A. K. Anthony, B.Sc.
50.	—do—	Kum. K. G. Tawkar, B.Sc.(Hons.)
51.	Senior Asstt. (Stat.)	Shri K. Venkateshwaran, B.A.
52.	—do—	,, S. S. Malik, M.A. (Maths.), M.A. (Stat.)
53.	Junior Asst. (Stat.)	,, S. G. Nair, B.Sc.,LL.B.
54.	—do—	,, S. Srinivasan, M.Sc.
55.	Eng. Asst. (Ginning)	,, D. G. Shete, L.M.E.
56.	Eng. Asstt. (Electrical)	,, H. V. Tamhankar, L.M.E., L.E.E
57.	1st. Spg. Asstt. (Offg.)	,, S. A. Shankaranarayan, B. Sc. (Text.)
58.	2nd Spg. Asstt.	,, K. S. Bhyrappa, L.T.M.
59.	Draughtsman	,, Y. N. Tendulkar.
60.	Turner	,, M. Mastan Shaikh
61.	Mechanic	,, P. V. Shridhankar.

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