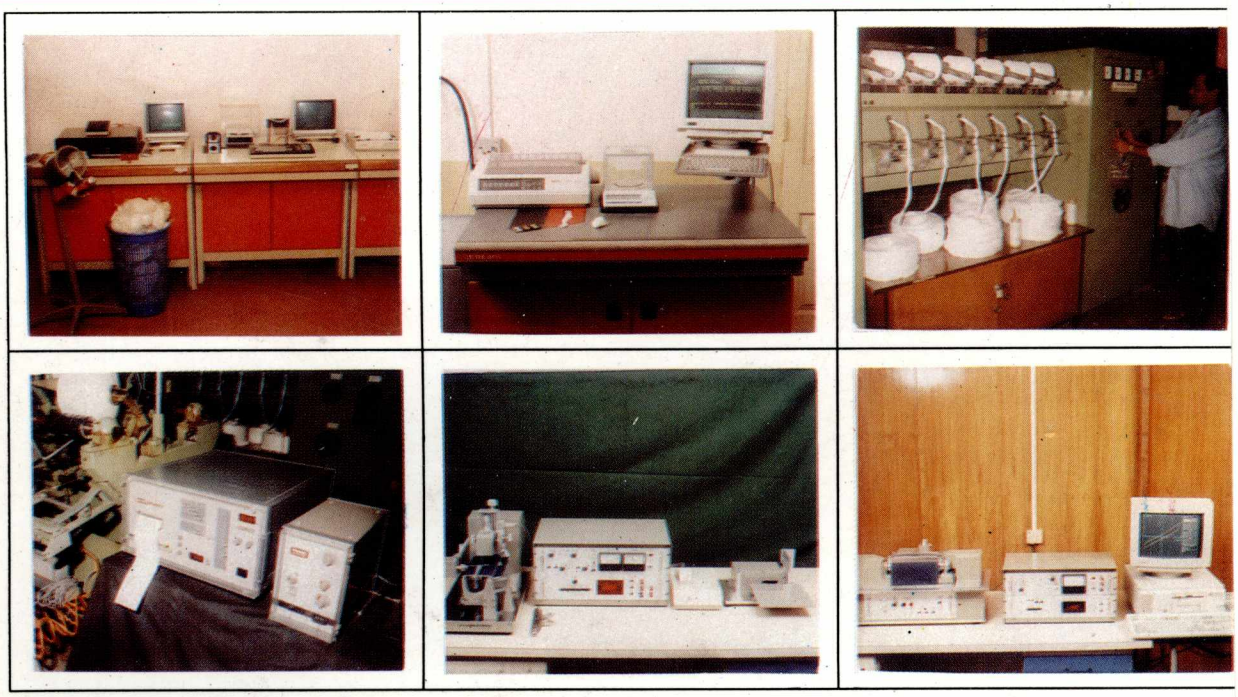
CIRCOT
ANNUAL REPORT
1997-98



भाकृअनुप
ICAR

Central Institute for Research on Cotton Technology
(Indian Council of Agricultural Research)
Adenwala Road, Matunga, Mumbai 400 019

CIRCOT

ANNUAL REPORT

1997-98

Central Institute for Research on Cotton Technology

Indian Council of Agricultural Research

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Preface

I am glad to present the 74th Annual report of CIRCOT pertaining to the year 1997-98. Although I had desired to bring out this report before the end of June in accordance with ICAR suggestion, several events stood in the way of my compliance with the Council's directive.

CIRCOT had organised a two day national seminar on 24th & 25th of April this year in celebration of the 50th anniversary of India's Independence. Considerable effort and time had to be devoted to organising the seminar as well as for bringing out a book on 50 years' research at CIRCOT released on the inaugural day.

The Quinquennial Review Team (QRT) of CIRCOT had to complete its deliberations and prepare the report on an early date. Project based budgeting had to be introduced for the first time as per the ICAR directive. This year the Council had prescribed a format for the Annual Report in a bid to reduce the diversity in the presentation style and in the range of information furnished in the reports from different Institutes. Additional efforts were needed to bring the manuscript already prepared into the ICAR format.

All the above activities had exerted pressure on the available human resource causing delay in the publication of the Annual Report of 1997-98. It will be our endeavour to ensure that from next year onwards, the CIRCOT Annual Report is released in the month of June.

Dr.K.R.Krishna Iyer
Director

Executive Summary

This is the Seventy-fourth Annual Report of CIRCOT covering the period April 1, 1997 to March 31, 1998.

Introduction : CIRCOT was established under the name of Technological Laboratory of the Indian Central Cotton Committee (ICCC) in the year 1924. In 1966 all the commodity committees including ICCC were abolished and ICAR took over the administrative control of CIRCOT and the name of the Laboratory was changed to Cotton Technological Research Laboratory. New mandates were formulated to intensify research and re-orient the activities of the Institute in consonance with the research priorities of ICAR. The Institute was renamed as Central Institute for Research on Cotton Techhnology (CIRCOT) on April 1, 1991.

At the headquarters about 2600 cotton samples from various breeding trials were evaluated, while at the Regional Quality Evaluation Units more than 15,000 samples from initial stages of trials were screened and evaluated. Continuing as the co-ordinating centre for technology under the AICCIP, the Institute screened over 2,000 samples of cotton for fibre properties and spinning potential.

The total number of books in the Institute library stands at 5021 and of bound volumes of journals at 6548. The recognition granted to CIRCOT by the Mumbai University as a post graduate Institution has been continued during this year as well.

Computer training course was conducted for users of ARIS Cell facility set up in ICAR institutes apart from separate in-house computer training progra-mmes arranged for the staff of CIRCOT.

Thirty-two projects were on-going during 1997-98 under different thrust areas.

One SRC meeting, one RAC meeting and three Management Committee meetings were held during the reporting period. QRT for CIRCOT for an eleven year period (1986-1996) prepared its draft report incorporating various recommendations.

CIRCOT conducted the following workshops, meetings, celebrations, etc in 1997-98 :

1. HVI Users' Meet sponsored by Zellweger Uster to discuss the results of a round test.

2. CIRCOT–User Group Meet organised to gather views of current and prospective users of already available CIRCOT testing facilities and those which are to be created.

3. Celebration of fifty years of India's Independence with various programmes.

4. A Workshop on Conventional Grading *vis-a-vis* Instrumental Grading.

Highlights of Research Results : In a study of cotton fibre properties in relation to their development period about 1000 flowers of the three varieties G.Cot.10, G.Cot.100 and G.Cot.Hyb.6 were tagged on different dates. Development period differed considerably for the bolls of the same variety. A margin of 9 to 16 days variation was noticed in the collected bolls. A similar trend was observed on another set of 1000 flowers of the three varieties that were tagged during late picking.

No adverse effect was observed on fibre qualities due to application of neem products in a study of the effect on fibre qualities and yield levels of cotton due to application of neem products. Several combinations of neem products and pesticides were attempted. Of these the one involving application of neem seed powder at the rate of 25 kg/ha at 30 DAS together with 0.035% Endosulfan 1t 60, 75, 90 & 105 DAS was found to be beneficial. All the treatments were found to significantly reduce the incidence of bollworms and consequent damage to green bolls leading to effective increase in seed cotton yield.

A study on improving fibre properties and yield potential of *arboreum* cottons by unconventional methods was undertaken at Cotton Research Station, Nanded, but the field trial was vitiated by a severe attack of aphids and thrips and consequent damage to the crops.

Under a study on the effect of drip irrigation on yield and quality of cotton, the variety G.Cot.Hyb.6 was grown with three IW/CPE ratios of 0.4,0.6 and 0.8. In addition to these alternate furrow irrigation and flood irrigation treatments were also carried out. The samples were analysed for yield, G.P., seed index and lint index. Testing of fibre quality parameters is in progress.

The data on length parameters determined by Comb sorter, HVI and AFIS on 36 varieties of cotton were statistically analysed under a study of comparison of short fibre estimates of cotton by different methods. The correlation analysis showed that all the length parameters were significantly related. It was found that the mean fibre length and effective length values from AFIS weight distribution can be accepted as equivalent to the same length measures obtained from Comb sorter. As the short

fibre content values (SFC) measured from Comb sorter and AFIS are highly and significantly correlated, the SFC values can be predicted from AFIS staple diagram quite accurately.

A power operated gin machine called CLOY Gin working on the principle of McCarthy gin was designed. The machine consists of a chrome leather roller, fixed knife and a moving knife. The capacity of the machine is about 8 kg. *kapas* per hour. It has been licensed to a Nagpur firm for manufacture. Several pieces have been sold.

In a study on seed coat fragments in germplasm lines of *G.hirsutum,* experiments on 62 samples were completed and SCF% was determined for all the samples. Visual inspection of the seeds indicated that SCF% increases with the fuzziness, seed size and ginning percentage.

Trials on single roller laboratory model gin amply demonstrated that SCF% can be reduced by as much as 77% if the roller speed is reduced to 76 rpm from the normal speed of 90-110 rpm. To incorporate the speed reduction in a double roller gin, the gear box has been redesigned. Experiments with the modified roller gin are under way.

Scanning electron microscopy was done on the spliced zones of polyester-cotton blended open end yarn spun to 45s count containing various percentages of polyester and cotton. In 50/50 PC blended yarns wrapper fibres were seen in the spliced zone and good mingling of the fibres were observed. The thick places in the yarn could be reduced by optimising splicer settings with increased strength and elongation retention. In the case of 33/67 P/C blend yarn, the spliced zone showed mingling of fibres from both ends of the joint. The mingling of fibres is quite good and hence elongation and strength retention is quite high. On the other hand, fibres run parallel and are highly twisted without mingling in the case of 67/33 P/C blend leading to reduced strength and elongation retention values. In the case of 100% polyester yarn, the splicing zone is small with randomly oriented fibres causing thick places and loose windings leading to poor appearance of the yarn.

To study the design modifications on pneumatic splicer for improved splicing action, the pneumatic circuit of the splicer was modified so as to intensify the initial blast pressure as well as to carry out various mechanical actions at a faster rate. In the modified design, supply to the blast chamber was made independent and coupled with a modular FRL unit. Pure cotton and polyester-cotton (67:33) blended yarns were subjected to splicing trials with optimised settings of various machine parameters. The results indicated improved retention of splice strength.

In a study of structure-property relationships in textile materials it was

revealed that very little difference exists in the fine structure of fibres from coloured cotton and their white counterparts. Some small variations in the absorbances of the bands at 1610-1660 cm-1 range were noticed.

Methods for dyeing cotton with natural dyes like lac and berberine were standardised last year. Large scale dyeing of lac and berberine was successfully carried out on knitted fabrics during the year under report. In the two trials conducted for lac, pretreatment involving chitosan gave a faint violet colour to the fabric while pretreatment with amino compound gave reddish violet shade. Both fabrics had good washfastness. In the trial with berberine the dyed material was bright yellow in colour and had fairly good washfastness. Dyeing techniques of cotton yarns and fabrics with manjith have been standardised.

Work on development of antibacterial finishing of cotton fabrics employing electron beam curing has yielded encouraging results. Fabric samples treated with 5% zinc acetate + 9% acetic acid + 9% hydrogen peroxide, dried and cured and subjected to 75 washings showed total antibacterial performance with 85% strength retention. The samples treated with 8% - 12% zinc acetate and 12% acetic acid and laundered for 100 wash cycles have shown 100% antibacterial performance for *S.aureus* and *K. pneumoniae*. The trial conducted at BARC on fabric samples with 5% and 7% zinc acetate + 9% acetic acid and cured with electron beam at 2.0 mr dose exhibited antibacterial activity. *S.aureus* and *K. pneumoniae* samples with 7% zinc acetate and 9% acetic acid and 10% zinc acetate and 12% acetic acid irradiated at dosage of 1.0 mr also showed adequate antimocrobial property. However a dosage of 0.5 mr for curing was found to be inadequate.

To study the effect of chemical processing on dyeing of knitted fabrics, two types of pretreatments namely (i) bleaching without scouring and (ii) scouring and bleaching, were used. The pretreated fabrics were dyed with reactive dyes. Single jersey fabrics exhibited higher dye uptake as compared to double jersey fabrics. Directly bleached fabrics showed higher colour strength compared to scoured-bleached fabrics. To study the effect of enzyme, one set of pretreated fabrics was treated with enzyme cellulase and then dyed while the other set of fabrics was treated with the enzyme after pretreatment and dyeing. Both the treatments decreased the surface roughness of the fabrics.

In the continued study on dyeing of cotton in the fibre form, ten more varieties were subjected to experiments in an effort to assess varietal differences in response to dyeing.. A scale up trial with 1 kg sample was also conducted on five different varieties of cotton. Significant colour strength variation among different varieties was observed. The relationship

between maturity of fibres, micronaire value and the colour strength was also examined.

The study on preparation of pulp and paper from crop residues after processing through anaerobic digestion was continued this year also and efforts are being made to carry out scale-up trials. The possibility of preparing paper from tendu leaf cuttings available in abundance in bidi industries was explored. The trials have shown that the leaf cuttings can be biologically softened and recycled to form good quality papers retaining the original aroma of the leaves.

In a study on the utilisation of cellulose for deinking of waste paper pulp for paper making it was observed that addition of sisal pulp or guargum to the enzymatically deinked pulp enhanced the strength properties of the recycled paper. Scale-up trials to deink 1 kg and 5 kg newspaper waste were also successfully conducted.

It has been established that the microbial consortium maintained at CIRCOT works well at low temperatures in the production of biogas from cellulosic wastes. Bench scale studies have clearly indicated that the process works as efficiently at 15°C as at room temperature (25°C - 30°C). The consortium was multiplied and adequate quantity supplied to UAS, Dharwad for trial during the winter of 1997. The cultures were inoculated in cow dung based biogas plant of KVIC design. The preliminary trials have shown encouraging results.

For microbial evaluation of protein hydrolysates (peptones) from cottonseed meal, the cottonseed meal peptones were incorporated in appropriate media for the production of cellulase and amylase by *Penicillium funiculosum* and *Bacillus subtilis*159 respectively. It was observed that highly active cellulase and amylase can be obtained from cottonseed meal peptones from most varieties except Suvin and DCH.32. By and large *desi* varieties responded well for cellulase and amylase production.

During the period under report, eighteen fabrics prepared with 100% polyester in the warp with the weft made of either viscose, cotton or polyester were selected to measurement of low-stress mechanical properties employing Kawabata Evaluation System for a study on the objective evaluation of handle, comfort and durability of apparel fabrics. Rise in the polyester content in the fabric diminished the primary handle values like fullness and anti-drape stiffness while stiffness and crispness decreased with polyester content upto 60-80% and showed improvement with further increase in polyester. It was noted that heat-setting improves handle and that optimum handle properties could be brought about in polyester fabrics by heat setting in the temperature range of 140°-160°C for a short duration of 1-2 min.

In a study on the effect of yarn structure on the dyeing behaviour of cotton and polyester blended yarns/fabrics air-jet and ring yarns of 60s and 40s count prepared from pure polyester as well as 65/35 polyester cotton were obtained from SITRA, Coimbatore. Ring and rotor spun yarns of 45s count consisting of 100% polyester, 100% cotton and different blend compositions were spun at CIRCOT. The tensile and other properties of ring, rotor and air-jet yarns were determined as per standard methods. All yarn samples were identically knitted into single jersey fabrics.

In a study on the utilisation of cotton plant stalks and other crop residues for making pulp and paper through anaerobic digestion trials on cotton stalks have indicated that it is possible to prepare pulp directly without processing the chipped stalk through a refiner. The size of the chip has a direct bearing on the softening of the material. Systematic studies to process other cellulosic materials are under way.

Extension Activities : The Director and Scientists of CIRCOT continued as members of various committees of BIS for cotton and textile testing, and of advisory panels of BTRA and SITRA. Some of the key extension activities of CIRCOT during the period under report were the supply of accurate and reliable data on the quality aspects of cotton fibres, yarns and fabrics, consultancy services and publication of research results for the benefit of appropriate user groups. The Testing House received over 5700 samples which were tested and reports issued soon after. Training courses on cotton quality evaluation were conducted at the headquarters for 65 sponsored personnel in 11 batches. At GTC, Nagpur, 137 sponsored ginning personnel were trained and a sum of over Rs. 2.3 lakhs was received as training fees.

1

Introduction

This seventy-fourth Annual Report of the Central Institute for Research on Cotton Technology (CIRCOT), covers the period April 1, 1997 to March 31,1998.

CIRCOT was established by the Indian Central Cotton Committee (ICCC) in the year 1924 under the name of Technological Laboratory of ICCC. The objectives then were to undertake spinning tests on various cotton strains received from agricultural departments in the country and to test their spinning values. To carry out these activities, the Institute had established co-ordination with the departments of agriculture and agricultural universities located in major cotton producing tracts in the country. After the abolition of commodity committees including the ICCC, and the administrative control passed on to the Indian Council of Agricultural Research (ICAR) its name was changed to Cotton Technological Research Laboratory (CTRL). Since then the research activities were reoriented and strengthened towards increasing the production and quality of cottons in the country. Research on the better utilisation of cotton and cotton agro-wastes was recently accorded priority in order to make cotton cultivation more remunerative, and to promote self employment opportunities for rural people.

Realising the phenomenal increase in the research component, the Quinquennial Review Team (QRT) recommended changing the name of the Laboratory to Central Institute for Research on Cotton Technology (CIRCOT) and CTRL was rechristened as CIRCOT with effect from April 1, 1991.

Mandate

* To participate in cotton improvement research by evaluating the quality of new strains evolved by agricultural scientists in India and giving them the necessary technological inputs to produce cottons meeting the quality requirements of textile industry.

* To undertake basic and applied research in post harvest technology for improving the quality of cotton fibres and finished products.

* To maintain an update of quality and

performance of different varieties of cotton and by-products as well as of other ligno-cellulosic materials

* To undertake commercial testing of textile materials for the benefit of trade, industry and Government agencies and provide consultancy services.

* To develop new technologies for utilisation of cotton, cotton plant, agricultural and industrial processing wastes and strive for commercial exploitation of such technologies.

* To function as a national centre for education and training in cotton technology and related areas.

Past Achievements

* CIRCOT continued as the Co-ordinating Centre for technology under the AICCIP and contributed to the release of more than 100 new improved cotton varieties / hybrids during the last three decades.

* Lint samples from Germplasm material belonging to different species of cotton were collected from CICR, Nagpur and evaluated for quality characters.

* A Fibre Quality Index (FQI) was developed to assess the performance of cottons in spinning.

* Norms were developed for yarn strength irregularity parameters.

* Yarn faults were found to originate from three main sources : trash, fibre-fly and short fibre bunch. In a typical 40s combed yarn, 21% of the faults were found to be due to trash and 50% due to fibre-fly.

* Comparison of the performance of different testing instruments for measurement of important physical properties of fibres, yarns and fabrics were undertaken.

* Methods were standardised for estimating blend composition of (i) cotton-polyester and cotton-wool blends by infrared spectroscopy and (ii) cotton-jute, cotton-viscose and cotton-polyester by X-ray diffraction.

* Studies on physical properties like linear density, wall thickness, strength and circularity and of structural properties like crystallinity, and fibrillar orientation of cotton fibres at different stages of growth were undertaken and findings reported.

* The fibrillar orientation of different varieties and genetic species of cotton has been examined in detail and the differences in fibre strength have been established as being governed to a large extent by orientation differences.

* An enzymatic dissolution technique in combination with electron microscopy was demonstrated to assess the extent and location of crosslinking in cotton fibres.

* Crystalline aggregation of dye molecules in dyed cotton fibre was identified by electron microscopy.

* Characterisation of fibrillar orientation and crystallite orientation in cotton and the influence of morphological parameters on them were assessed.

* Detailed investigations on several natural cellulosic fibres other than cotton have provided a database for selection of these fibres for technological applications and have also served to highlight the potential of some of these fibres for new applications.

* A test method to determine yarn bundle strength in the place of lea test has been developed and because of the high reproducibility of the test results coupled with low variability, the new method requires only five tests to be done, as against about 60 tests by conventional lea test.

* Qualitative analysis and ranking of major inorganic elements in cotton plant parts have been completed using X-ray fluorescence spectroscopy, which had thrown light on the composition of processing dusts in textile mill atmosphere that cause mill fever among the workers.

* Standardisation of electron diffraction technique was done to determine structural parameters of cotton and modified cotton cellulose.

* Microcrystalline cellulose was prepared and characterised from pulp of agro-waste materials like cotton stalk and bagasse.

* Ginning techniques were standardised for small samples.

* Studies were undertaken on the performance of different types of precleaners, different types of gins and the influence of precleaning on ginning machine performance.

* An inclined type cotton cleaner has been designed and developed. The machine is found to effectively preclean *Kawadi* type of *kapas* and is capable of feeding 20 Double Roller Gins.

* A survey of the conditions of ginning factories of Punjab, Haryana, Rajasthan, Madhya Pradesh, Karnataka and Andhra Pradesh was conducted and reports were published and distributed to all agencies concerned.

* A study of popular cotton varieties

in respect of their propensity to give out seed coat fragments revealed that hybrids possess the highest proneness and *desi* varieties the least. Those belonging to *G.hirsutum* occupy an intermediate place.

* Blending of cotton with wool, jute and ramie was done on cotton machinery for producing yarns suitable for specific end-uses.

* Studies were undertaken on open-end spinning of cotton, cotton waste and blends of cotton with man-made fibres and appropriate processing conditions were suggested for adoption by mills.

* Migration of crosslinking reagents in cotton fabrics was exhaustively investigated.

* A new catalyst system for improved durable press properties of cotton fabric was developed.

* A highly active mixed catalyst system for production of DP cotton was evloved.

* The effect of gama ray irradiation on raw and chemically treated cotton cellulose was studied.

* A flame retardant finish to cellulose fabrics by phosphorylation was developed.

* A durable antibacterial finish was developed for cotton fabrics.

* Wax content of different varieties of Indian cottons was estimated.

* Several cotton varieties were identified as suitable for easy-care finishes.

* Coarse cotton varieties having high Micronaire value were identified to be ideally suitable for making absorbent cotton.

* Compositional study on protein, oil and gossypol content of Indian cottonseeds was carried out.

* The effect of place and environment on seed weight and oil content of cottonseeds was assessed.

* Relationship between oil, protein and gossypol in cottonseed kernels was studied in detail.

* Cottonseed oil was evaluated at each stage of production from the seed through refining, bleaching, hydrogenation, and deodourisation to produce vanaspati.

* The chemical composition of cottonseed protein and the fatty acid composition of Indian cottonseed oil were identified.

* Application of cellulase enzyme for desizing fabrics sized with tamarind kernel powder, and identification of *B.subtilis-159* for production of amylase suitable for desizing textiles sized with starch were carried out.

* Prawn shell waste has been successfully employed in controlling soil-borne fungal pathogens of cotton.

* A technology was developed for the preparation of particle boards and paper from cotton stalks. On a commercial scale, particle boards of size 6' x 3' x 12 mm with different surface finishes were prepared and their properties were found to conform to BIS specifications. The know-how has been transferred to a firm in the Co-operative Sector in Dharwad dist. of Karnataka.

* Pilot plant trials for the manufacture of writing and printing grade paper from cotton plant stalk were completed and this technology is shown to be economically viable for adoption by the small scale industry.

* Hard board samples of different densities have been prepared from cotton stalk and these boards were found to have all the desirable properties specified by BIS for various end uses. The properties of these boards were *on par* with those of boards made from eucalyptus and other hard wood materials.

* In a pilot plant trial, kraft paper using cotton plant stalk was prepared for making corrugated boxes for transport of fruits and vegetables. The corrugated boxes prepared were far superior in quality to conventional boxes.

* Preparation of super absorbents from starch and there applications as soil additive and wet end paper additive were tried out.

* Survey of delinting units in the states of Maharashtra, Andhra Pradesh and Karnataka was completed.

* The technology of biogas generation from textile mill waste (willow-dust) was developed and subsequently improved by adoption of a dry fermentation technique employing mixed microbial consortia. The gas production rate also has been improved to 600 cu. m/ton of willow dust and the methane content of the gas to 60%.

* The Standardised willow dust based biogas technology has been adopted for processing other solid cellulosic wastes such as bagasse and spent wheat bran for generation of biogas.

* By the process standardised at CIRCOT for growing edible Oyster mushrooms on cotton plant stalk, an yield level of 900 g/kg of material could be achieved with 3% nutrient supplementation.

* A biopulping process was standardised for cotton stalks and other cellulosic wastes for making pulp and paper.

* Preparation of protein hydrolysates from cotton meal was standardised.

* Enrichment of cattle feed has been attempted with microbial proteins.

* Training courses were conducted in over 100 batches for sponsored personnel from trade and industry as well as from ginning factories, in cotton testing and ginning.

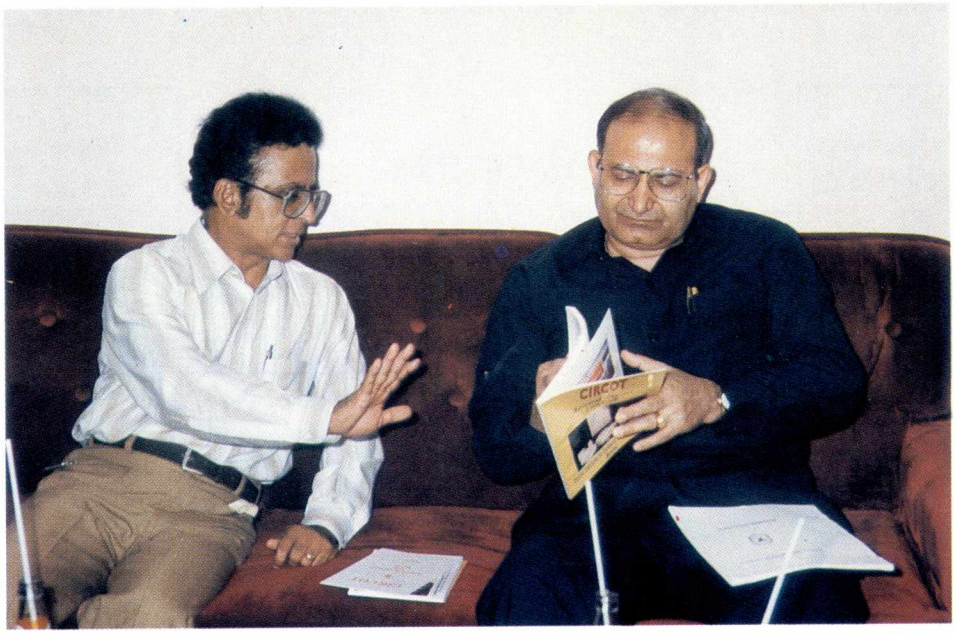
* Instruments developed include :

  - Laboratory Model Gin and different types of ginning percentage balances.
  - Inclinded type-Precleaner for *kapas*.
  - Three versions of Ginning Percentage Indicators.
  - *Kapas* Extractor for precleaning of seed cotton.
  - Halo Length Discs for estimating fibre length from seed cotton.
  - A.N. Stapling Aparatus for fibre length measurements.
  - Lint Opener for opening small samples of cotton for fibre tests.
  - Optical Scanning Instrument for measuring fibre length.
  - Boll Hardness Tester for measuring the hardness of boll rind.
  - A Mote Grooving Device for roller gins.
  - Foot operated Kisan Gin.
  - "CLOY" Gin.

Organisation

As could be seen from the organisational chart, Director heads the institute assisted by a team of senior scientists and technical officers. An Administrative Officer provides him assistance in general administration, while the Finance and Accounts Officer looks after matters concerned with accounts and audit of this Institute.

D.G. Visits CIRCOT

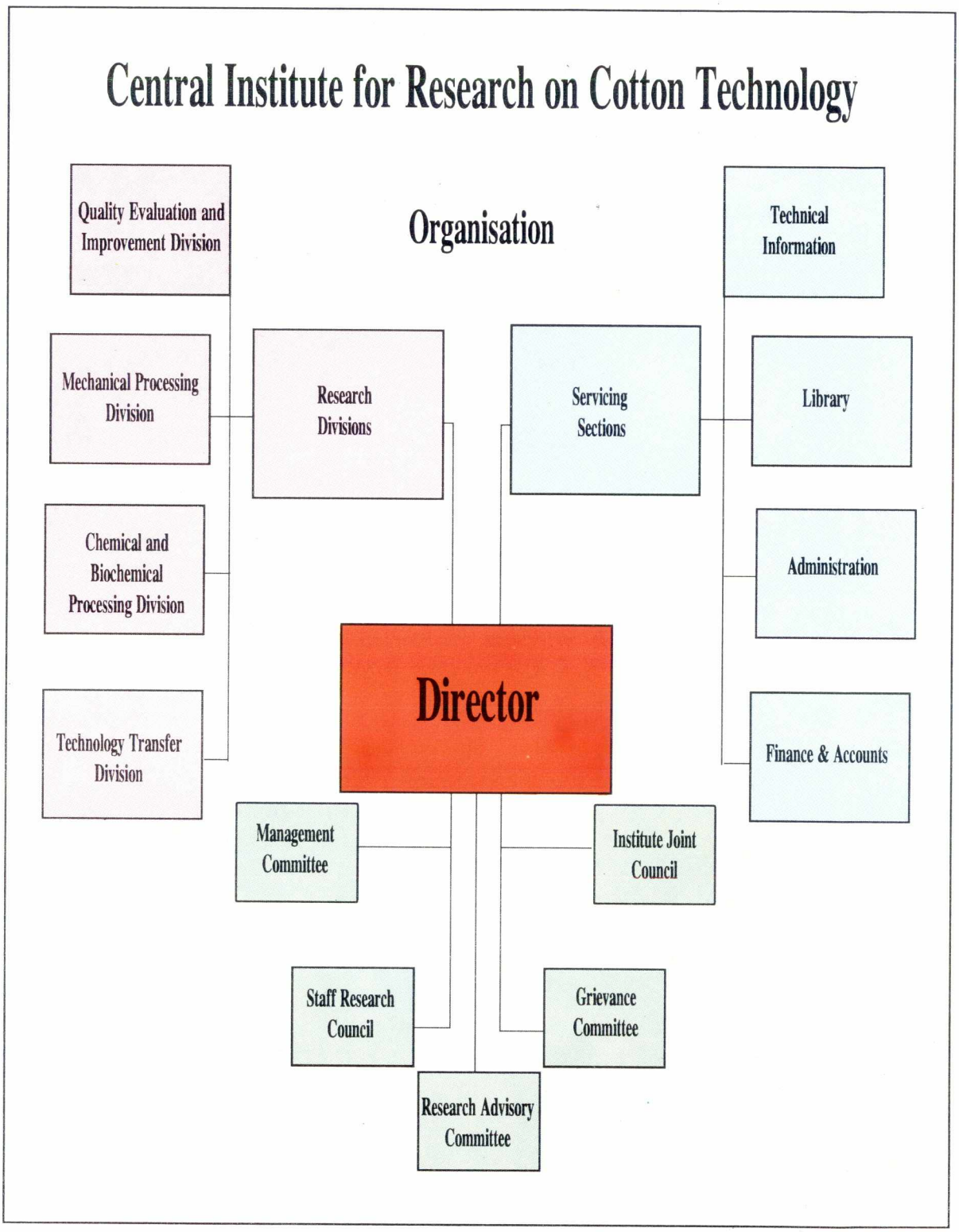


Dr. R.S. Paroda, D.G., ICAR, Glancing through the Publications of CIRCOT. Alongside is Dr. K.R.Krishna Iyer, Director, CIRCOT

D.G. Addressing CIRCOT Scientists

Central Institute for Research on Cotton Technology

Organisation



Financial Statement

Expenditure and Receipts of the Institute during 1997-98

A. Expenditure

Sl. No.	Head of Account	Expenditure	
		Non-Plan (Rs.)	Plan (Rs.)
1.	Establishment Charges	2,79,54,648.00	2,26,791.00
2.	Traveling Expenses	4,99,999.00	99,610.00
3.	Other Charges	29,48,136.00	1,58,38,014.00
	Total	3,14,02,783.00	1,61,64,415.00

B. Receipts

Sl. No.	Head of Account	Amount
1.	Analytical and Testing Fees	11,65,760.00
2.	Training	4,14,350.00
3.	Interest on TDR & STD	5,86,150.00
4.	Other receipts	10,03,394.00
	Total	31,69,654.00

Staff Position : As on March 31, 1998

Cadre	Sanctioned	In Position
Scientific	50	35
Technical	131	126
Administrative	49	49
Supporting + Canteen Staff	(78 + 1) = 79	80
Total	309	290

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Research Achievements

A brief account of the progress of research work and achievements during 1997-98 at CIRCOT and its regional units including the Ginning Training Centre at Nagpur, is given below :

THRUST AREA I : TECHNOLOGICAL RESEARCH FOR COTTON QUALITY EVALUATION AND IMPROVEMENT

This thrust area encompasses three distinct facets of technological research :

(a) Evaluation of the quality of cotton samples received from agricultural trials and the All India Co-ordinated Cotton Improvement Project (AICCIP).

(b) Tests on Standard and Trade Varieties of Indian Cottons.

(c) Research work done on specific agricultural and technological aspects relevant to cotton improvement efforts.

(a) Evaluation of the quality of cotton samples received from agricultural trials and the All India Co-ordinated Cotton Improvement Project (AICCIP)

A large number of cotton samples are being received every year for technological evaluation from trials conducted by the AICCIP, through Agricultural Universities and State Agricultural Departments. The number of samples received during 1997-98 for different tests from agricultural trials at the Headquarters has been given in Table 1 (a). The number of samples tested at each of the Regional Quality Evaluation Units of CIRCOT is presented in Table 1(b). Table 2 gives the number of cotton samples received and tested at CIRCOT for various quality parameters from different states.

The samples received were tested in the order of their receipt and test reports on them were sent soon after the tests were over. The test results on Trade Varieties and Standard Indian Cotton samples are reported in the form of periodical Technological circulars, and at the end of the year, these are compiled for the whole season and published as Technological Reports separately for Trade Varieties and Standard Varieties of Indian cottons.

All India Co-ordinated Cotton Improvement Project (AICCIP)

The ICAR launched the AICCIP, in April

TABLE 1(a) : NUMBER OF COTTON SAMPLES RECEIVED AT THE HEADQUARTERS OF CIRCOT DURING 1997-98

Type of test	Average for the quinquennium 1990-94	1995-96	1996-97	1997-98
Fibre and full spinning	239	102	82	–
Fibre and Microspinning	1898	1182	1168	–
Microspinning alone	56	–	–	1266
Full Spinning alone	–	–	–	46
Fibre test alone	392	365	574	2701
Mill test	11	–	–	–
Standard cottons	19	19	25	10
Trade varieties :				
— Lint	43	14	–	31
— Kapas	24	–	9	–
Technological Research	15	–	1	342
Miscellaneous	7	–	2	39*
Total	2704	1682	2561	4435

* Ginning %

TABLE 1 (b) : NUMBER OF COTTON SAMPLES TESTED AT THE REGIONAL QUALITY EVALUATION UNITS DURING 1997-98

Regional Quality Evaluation Units of CIRCOT	Quality Parameters				
	Fibre length (2.5% SL)	Fibre fineness	Fibre maturity	Fibre strength	Microspinning test
Akola	1425	899	865	902	–
Coimbatore	1058	1013	993	996	387
Dharwad	463	419	419	419	–
Guntur	768	728	728	556	–
Hisar	911	961	692	1000	–
Indore	849	849	849	849	–
Ludhiana	3588	1563	1563	1563	–
Nagpur	1577	1577	1559	1567	–
Nanded	643	643	643	643	–
Rahuri	574	574	574	574	–
Sirsa	761	761	761	761	–
Sriganganagar	1521	1521	1521	1521	–
Surat	9671	10845	10845	10273	12

TABLE 2 : NUMBER OF COTTON SAMPLES TESTED AT CIRCOT HEADQUARTERS UNDER AICCIP DURING 1997-98

State	Fibre and full spinning	Fibre and Micro spinning	Fibre tests alone	Total
Punjab	20(3)	150(19)	–	170(22)
Haryana	–	118(17)	–	118(17)
Rajasthan	7(1)	91(8)	–	98(9)
New Delhi	–	176(3)	87(1)	263(4)
Uttar Pradesh	6(1)	30(5)	–	36(6)
Gujarat	33(5)	83(4)	144(1)	260(10)
Maharashtra	5(2)	163(25)	123(12)	291(39)
Madhya Pradesh	5(1)	255(18)	–	260(19)
Karnataka	1(1)	442(32)	–	443(33)
Andhra Pradesh	13(2)	25(5)	–	38(7)
Tamil Nadu	3(1)	51(7)	–	54(8)
Total	**93(17)**	**1584(143)**	**354(14)**	**2031(174)**

Note : The numbers in brackets relate to reports issued.

1967 with a view to achieving closer collaboration between the scientists of various disciplines as well as bringing together agricultural universities, central institutes and state departments of agriculture for cotton improvement research. The main objective of this Project has been to look into the problems of production, productivity and quality of cotton with a multi-disciplinary approach. CIRCOT's contributions in this project is the testing of all the samples generated in various trials for fibre quality and spinning potential. Tests are conducted at the headquarters in Mumbai as well as in the 13 regional units dispersed throughout the country.

The breeding materials available with the cotton breeders of various States are systematically screened every year and only the promising materials are considered for further trials. Maintenance of *Germplasm* as well as Initial Evaluation Trials (IET) and Preliminary Varietal Trials (PVT) form the preliminary stages of screening while Co-ordinated Varietal Trial (CVT) and Full Spinning Trial, etc.

constitute the advanced trials under this project. Yield would be the main criterion in the Initial Evaluation Trial while both yield and quality are considered criteria for further selections. This is the 31st year of the AICCIP.

As the cotton growing and harvesting seasons differ widely from State to State, the breeding trials are conducted zone-wise. Thus, three zones are identified according to agro-climatic conditions. The North Zone comprises the States of Punjab, Haryana, Rajasthan, Uttar Pradesh and New Delhi, the Central Zone includes the States of Madhya Pradesh, Maharashtra and Gujarat, and South Zone covers the States of Andhra Pradesh, Karnataka and Tamil Nadu.

As many as 2031 cotton samples were screened for fibre properties and spinning potential during 1997-98 season. The test data on various breeding trials were presented at the Panel Meetings held at Hissar for North Zone and at Bhuvaneshwar for combined Central and South Zones, respectively. The work done under various breeding trials is summarised below:

North Zone

This zone is mainly known for its medium staple American *G. hirsutum* and short staple *G. arboreum* types of cottons. The main object of the trials is to identify strains superior to the existing varieties. Emphasis is also given to evolve strains of early maturing or short duration type with a view to making the field available for the second crop of food grains.

G.hirsutum Trials :

The Co-ordinated Varietal Trial (CVT) Br 04 for Normal Plant Type as well as early maturing Compact Type were conducted at Bhatinda, Faridkot, Hisar, Ludhiana, Mathura and Sriganganagar. Table 3 shows the ranges of 2.5% span length, Micronaire value and bundle tenacity at 3.2 mm gauge length along with spinning potential. The strains that had recorded encouraging spinning performance at different counts and at different locations are listed below as promising strains :

Location	*Count*	*Promising Strains*
Bhatinda	20s	F.1506, H.1123, F.1557
	30s	F.1537, Pusa 180, F.1695, Pusa 42-3-6
Faridkot	20s	F.1506, H.1123, RS.992, F.1470, Pusa 45-3-6, F.1767, RS 2013, Pusa 19-17, H.1185, F.1054, LH.15
Hisar	20s	F.1557, Pusa 180, RS 1098, RS 2000, LH.1832

- Contd.

Location	*Count*	*Promising Strains*
Ludhiana	20s	H.1123, RS 992, F.1255
	30s	LH.1587, LH.1640, LH.1832
	40s	LH.1587
Mathura	20s	RS.992
	30s	RS.810, F.1523
	40s	RS.1098, RS.2013, LH.1832, Pusa 19-17
Sriganganagar	20s	H.1170, H.1123, F.1255, RS.810
	30s	LH.1832

Samples pertaining to the Preliminary Varietal Trial (PVT), Br 03, received from Bhatinda, Faridkot, Hisar, Ludhiana, Mathura and Sriganganagar, were tested for physical properties and spinning potential. The promising strains both location-wise and count-wise are listed below:

Location	*Count*	*Promising Strains*
Bhatinda	30s	F.1638
Faridkot	20s	H.1134, F.1424, F.1528, F.1638
Hisar	20s	LH.1769, CA.1895
Ludhiana	30s	RS.464, LH.1769, F.1638
Mathura	40s	None
Sriganganagar	20s	RS.464, H.1134, RS.1045, F.1528

TABLE 3 : SUMMARY OF TEST RESULTS ON COTTON STRAINS UNDER CO-ORDINATED VARIETAL TRIALS (Br.04) IN NORTH ZONE

Location	No.of samples	Range of				Spinning Performance			Control Variety
		2.5% span Length (mm)	Micronaire value	Maturity	Bundle Tenacity (g/t) 3.2 mm gauge	Count	A	B	
1	2	3	4	5	6	7	8	9	10
Normal Plant Type (Br.04) (a)									
Bhatinda	5F	22.3 – 27.6	4.9 – 5.8	80 – 86	17.8 – 21.0	20s	3	–	–
						30s	1	–	–
Faridkot	7F	24.6 – 27.3	4.7 – 5.1	73 – 79	19.8 – 20.2	20s	5	2	F.846
						30s	2	2	F.846
Hisar	7M	24.1 – 26.1	4.4 – 5.1	69 – 84	18.2 – 19.6	20s	2	2	1098 B.N.
Ludhiana	8F	24.3 – 28.8	4.3 – 5.1	72 – 85	17.6 – 21.4	20s	3	–	–
						30s	3	5	Ht.1134,
						40s	2	–	F.846
									–
Mathura	6F	25.7 – 28.3	4.2 – 4.6	70 – 81	18.9 – 21.1	20s	1	–	–
						30s	3	1	Vikas, B.N.
						40s	1	1	Vikas, B.N.
Sriganganagar	7F	25.0 – 29.1	4.3 – 4.9	77 – 86	18.7 – 21.9	20s	5	5	B.N.
						30s	–	4	RST-9, B.N.

TABLE 3 : (CONTD.)

1	2	3	4	5	6	7	8	9	10
					Compact Plant Type Br 04 (b)				
Bhatinda	5M	21.7 – 27.2	4.5 – 4.9	77 – 86	16.9 – 22.2	30s	3	3	LH-900
Faridkot	9M	23.9 – 29.0	4.2 – 4.7	74 – 85	17.0 – 22.5	20s	5	4	F.1054, LH.1556
Hisar	5M	23.0 – 27.9	3.9 – 4.5	71 – 77	19.7 – 21.7	20s	4	4	1098
Ludhiana	8M	23.4 – 28.3	4.3 – 4.9	66 – 84	17.1 – 22.5	30s	2	2	LH.1556, F.1054
Mathura	6M	24.9 – 27.9	3.5 – 5.0	59 – 83	20.7 – 22.7	40s	4	4	Vikas
Sriganganagar	7M	23.8 – 27.6	4.4 – 5.2	74 – 81	18.2 – 22.5	30s	1	1	B.N., RST-9

F - *Full Spinning*
M - *Microspinning*
A - *No. of samples spinnable to selected count*
B - *No. of samples having spinning performance better than or* ***on par*** *with control*

Samples pertaining to Initial Evaluation Trial (IET), Br02 received from Ludhiana and were tested for physical properties of fibre and subjected to spinning trial for 30s count. The promising strains are given below :

Location	*Count*	*Promising Strains*
Ludhiana	30s	LH.1919, LH.1896

G.arboreum Trial :

The Co-ordinated Varietal Trial (CVT) Br.24 was conducted at Hisar, Ludhiana, Mathura and Sriganganagar. The object of this trial was to identify coarse short staple and high ginning out-turn varieties suitable for blending purposes in the place of existing varieties. The 2.5% span length of the strains tested under this trial ranged between 16.9 mm to 26.9 mm. The promising strains with Micronaire value 7.0 and above are listed below location-wise :

Location	*Promising Strains*
Hisar	RG.24
Ludhiana	RG.35, RG.83, CAD.4, LD.693, LD.702, LD.699, HD.324, RG.24, LD.694, LD.627
Mathura	RG.24
Sriganganagar	RG.235, RG.83, RG.53, CAD.4, LD.693, LD.702, HD.371, LD.699, HD.324, RG.24

Two sets of samples pertaining to Preliminary Varietal Trials (PVT) *viz.* Br 23(a) and Br 23(b), were received from Hisar, Ludhiana, Mathura, Sriganganagar. The following strains recorded Micronaire values of 7.0 and above at the locations indicated:

Location	*Promising Strains*
Hisar	HD.328, LD.716
Ludhiana	LD.717, HD.328, LD.716, RG.120, HD.364, CAD.366, LD.560
Mathura	None
Sriganganagar	HD.368, RG.135, RG.125, LD.717, LD.723, RG.133, HD.328, LD.716, RG.120, HD.364, LD.560, RG.132

Hybrid Trials :

The objective of this trial was to identify and cross breed the superior varieties with the existing varieties. The superiority is usually considered as against the yield and technological properties. The samples belonging to intra-*hirsutum* hybrid trial involving *G.hirsutum* x *G.hirsutum* crosses were received from Faridkot, Hisar, Ludhiana, Sirsa, Sriganganagar under Br05(a)I and from Sirsa under Br05(b). The promising strains are listed below both location-wise and count-wise.

Location	*Count*	*Promising Strains*
Br.05 (a) I		
Faridkot	30s	LHH.308
Hisar	20s	RajHH.25, LHH.347, HHH.217, SHH.4
Ludhiana	30s	LHH.347, LHH.308
Sirsa	30s	LHH.347, HHH.203
Sriganganagar	30s	None
Br.05 (b)		
Sirsa	40s	SNSCH.46, BOCH.6669

Samples from intra-*hirsutum* hybrid trial Br.05 (a) II were received from Faridkot, Hisar, Ludhiana, Sirsa, Sriganganagar and were subjected to evaluation of fibre properties and spinning potential. The promising strains at different locations are given below :

Location	*Count*	*Promising Strains*
Br.05 (a) II		
Faridkot	30s	LHH.230, LHH.318, CSHH. 84, LHH.731
Hisar	20s	SHH.18, HHH.220
Ludhiana	30s	LHH.230, LHH.318, CSHH.85
Sirsa	30s	LHH.318, CSHH. 84
Sriganganagar	30s	CSHH.85

Desi Hybrid Trials :

Lint samples from *desi* hybrid trial (Br25) were received from Hisar, Ludhiana and Sriganganagar. The promising strains, the Micronaire values of which were 7.0 and above are listed below :

Location	*Promising Strains*
Hisar	AAH.52
Ludhiana	—
Sriganganagar	AAH.242, AAH.4

Miscellaneous Trial :

Ten trials were conducted with different objectives. The details of these trials along with their locations and results are given below :

- In a miscellaneous trial involving

TABLE 4 : SUMMARY OF TEST RESULTS ON COTTON STRAINS UNDER CO-ORDINATED VARIETAL TRIALS (Br.04) IN THE CENTRAL ZONE

Location	No.of samples	Range of				Spinning Performance			Control Variety
		2.5% Span length (mm)	Micronaire value	Maturity	Bundle Tenacity (g/t) 3.2 mm gauge	Count	A	B	
1	2	3	4	5	6	7	8	9	10
Br.04(a) – Irrigated									
Padegaon	10	26.2 – 31.7	3.9 – 4.9	69 – 87	17.5 – 20.8	40s	1	–	–
Rahuri	5	25.3 – 28.3	3.7 – 4.6	67 – 76	19.1 – 21.3	30s	1	–	–
Surat	7	24.0 – 31.7	3.7 – 4.9	71 – 84	17.3 – 22.3	30s	3	3	LRA.5166
						40s	1	2	G.Cot.10
						50s	2	–	LRA.5166 G.Cot.10
Br.04(b) – Rainfed									
Akola	9	23.2 – 26.8	4.3 – 5.1	–	17.4 – 20.1	–	–	–	–
Badnawar	13	19.8 – 24.4	2.7 – 3.5	50 – 68	16.2 –19.5	20s	6	5	L.C
Indore	15	21.2 – 24.9	2.4 – 3.2	49 – 69	13.9 – 18.0	20s	13	7	Vikram, K-2(MB)
Khandwa	14	24.3 – 27.6	2.9 – 4.4	53 – 80	17.2 – 20.3	30s	7	8	L.C., KH.2160
Khandwa (95-96)	5	23.7 – 26.5	3.7 – 4.3	75 – 83	17.9 – 20.1	30s	4	–	–
Nanded	5	23.5 – 26.3	2.6 – 3.6	–	18.0 – 20.4	30s	2	–	–
Nanded (MKV)	6	22.1 – 24.6	3.4 – 4.5	64 – 77	17.6 – 20.6	20s	5	–	NH.452

different locations, F.505 and LH.1556 tried at Faridkot gave encouraging spinning performance at 30s count.

- In a miscellaneous trial consisting of H - series, viz. H.1212, H.1214 and H.1215 tried at Hisar gave cotton samples with good yarn strength for 20s count for the three cottons.
- Samples from a miscellaneous trial (CVT) at Hisar registered good CSP values for H.1212 and H.1170.
- In a miscellaneous trial (CHyT) at Hisar, it was found that as many as six varieties/cultures out of eight sent, were spinnable to 20s count with good yarn strength.
- In the miscellaneous trial for different locations at Kotakpura, the only encouraging value obtained was for LH.1556 at 30s count.
- In a miscellaneous trial (Common Adaptive Trial) conducted at Ludhiana, good yarn strength for 30s count was realised for as many as seven cotton varieties.
- In a miscellaneous trial conducted at IARI, New Delhi, out of 51 samples as many as 26 samples registered good CSP values for 50s count.
- In another miscellaneous trial at IARI, New Delhi, only one strain gave encouraging spinning potential for 60s count.
- In a trial (National trial) at Sirsa, only two cottons exhibited good spinning potential for 40s count.

Central Zone

This zone has the largest area under cotton cultivation. Although emphasis is given to improving the existing American type *(G.hirsutum)* cottons, sizable percentage of cottons from *G.arboreum* species is also under cultivation in this zone. For many years, hybrids such as H.4, H.6, H.8, JKHy.1, etc. were being cultivated in this zone. Attempts are now being made to identify early maturing hybrids without sacrificing the yield. As there is increase in demand for medium and superior medium categories of cottons, concerted efforts are also on to evolve *desi* hybrids. Trials are also conducted for the improvement of cottons from *G.herbaceum* species traditionally grown in some pockets of Gujarat state.

G.hirsutum Trial :

Co-ordinated Varietal Trial Br.04 was conducted at Padegaon, Rahuri, Surat under irrigated conditions and at Akola, Badnawar, Indore, Khandwa and Nanded under rainfed conditions. The ranges of 2.5% span length, Micronaire value, maturity and bundle strength along with their spinning potential have been compiled in Table 4.

The promising strains having good spinning along with location and the selected count are as follows :

Location	*Count*	*Promising Strains*
Br. 04 (a)		
Padegaon	40s	GT-1438
Rahuri	30s	RHC-0688
Surat	30s	GSHV-1500, GISC-86/58, CNH-1001
	40s	GISC-86/58
	50s	HLS-72-184
Br. 04 (b)		
Akola	—	—
Badnawar	20s	NH-514, GJHS-52, KH-101, JLH-1492, AKH-8828
Indore	20s	NH.452, JLH-1981, NA.514, G.3987, GJHS.452, KH.107, KH.103, KH.101, JLH.1492, NH.541, AKH.8828
Khandwa	30s	NH.452, JLH-1981, KH.103, KH.101, AKH.8828
Khandwa (95-96)	30s	CZH.459, CZH.460
Nanded	30s	JLH.1492, AKH.8828
Nanded (MKV)	20s	NH.545, NH.547, NH.549

Samples pertaining to Preliminary Varietal Trial, Br 03 were received from Rahuri under irrigated conditions and Akola, Amreli, Khandwa and Nanded under rainfed conditions. The following strains were found promising in respect of spinning performance at the selected counts and locations.

Location	*Count*	*Promising Strains*
Rahuri	30s	**Br. 03 (a) Irrigated** GS HV.60, CNH.1007, CJHS.47
Akola	—	**Br. 03 (a) Irrigated** —

Location	*Count*	*Promising Strains*
Amreli	30s	JLH.1594, JLH.1494, G.1562, KH.109
Khandwa	30s	JLH.1594, GTHV.1080, JLH.1494, KH.110, GISC.86/581, KH.109, CZH.357, CZH.358
Nanded	20s	NH.529, KH.110, KH.109, GTHV.1080
Nanded HKV	20s	NH.572, PH.92/281

The Initial Evaluation Trial, Br 02 was conducted at Rahuri under irrigated conditions and at Akola and Khandwa under rainfed conditions. The promising strains in respect of spinning performance at the selected counts and locations are listed below :

Location	*Count*	*Promising Strains*
Br. 02 (a) Irrigated		
Rahuri	—	—
Br. 02 (b) Rainfed		
Akola	30s	CNH-121, 30-I
Khandwa	30s	BHV-130, KH-106, AKH.8801, KH-111, CSHV-93/97, GTHV-3689, GT-2714, GVHV-110, AKH.8649, GJHV-217, GJHV-75, CNH-1009, JLH-1395, AKH.8627, AKH.9131, CNH-34, CNO-131, 30-I, KH-112, AKH.8740, CBR-3.

G.arboreum Trial :

The Coordinated Varietal Trial Br. 24 was conducted at Akola, Amreli, Indore, Khandwa and Nanded. The promising strains from spinning point of view are as follows :

Location	*Count*	*Promising Strains*
Akola	–	–
Amreli	20s	NA-336, CINA-306, KWA-8, NA-428, KWA-7, GAM-51, GAM-31, PA-255, PA-241, PA-262, PA-304, GAM-48, GJAV-5, GS-87-435
Indore	20s	NA-336, CINA-306, KWA-8, NDL-2463, AKA-8307, GAM-31, PA-255, PA-262, PA-304, JLA-1693
Khandwa	30s	–
	20s	NA-336, CINA-306, PA-296, KWA-8, NA-428, KWA-7, AKA-8307, KWA-11, CAM-31, PA-241, PA-255, PA-262, JLA-1693, GAM-48, GJAV-5
Nanded	20s	GAM-48, GAM-51, NA-428

Hybrid Trials :

The objective of this trial was to identify early maturing hybrids superior in yield and quality and to compare them with the existing local hybrids such as H.6, JKHy.1, etc. in Madhya Pradesh, Mahrashtra and Gujarat. The importance is also given to evolve *desi* hybrids in view of the demand for medium and superior medium staple categories.

The samples belonging to Br. 05 received from Akola, Indore, Khandwa, Nagpur, Nanded, Rahuri, Surat and were subjected to physical and spinning tests. The promising hybrids showing better spinning performance at selected counts are listed below along with locations :

Location	*Count*	*Promising Strains*
Br. 05 (a) - 1		
Nagpur	–	–
Rahuri	40s	VICHH-16

Location	*Count*	*Promising Strains*
Surat	30s	CSH-66
	40s	CSH-66, DHH-509
	50s	–
Br. 05 (a)-2		
Rahuri	40s	–
Br. 05 (b)-1		
Akola	–	–
Indore	20s	MBCH-555, CHH-101, WHH-1250, CSCH-1, WHH-1858, CHH-102, ACH-470, CHH-99, NBHH-2332, MECH-162
Indore	20s	PHH-321, GHH-506, GTHH-15, KDCHH-34, NHH-311, CTHH-30, SCHH-414, GBHH-7
Khandwa	30s	GTHH-15, NFHH-1290, NHH-311, RHH-0390, GTHH-30, KDCHH-34, SCH-414, GBHH-7
Khandwa	30s	CZHH-576, CZHH-581, CZHH-583
Nagpur	–	–
Nanded	40s	KDCHH-34
Nanded (MKV)	40s	CAHH-8, CAHH-99, CAHH-98
Br. 05 (b) - 2		
Akola	–	–
Nanded	40s	NHHHM-54, NHHHM-63, TBM-12, NHHM-58
Nagpur	–	–

Desi Hybrids :

Samples pertaining to *desi* hybrids Br. 25 were received from Akola and Indore. The promising strains which fared well in spinning performance at selected counts and locations are listed below :

Location	*Count*	*Promising Strains*
Akola	–	–
Indore	20s	AKDH-11, AKDH-16, AKDH-9, AKHD-17

Inter-specific hybrid trial Br. 15 (*G.hirsutum* x *G.barbadense*), was conducted at Anand, Badnawar, Padegaon and Surat and the samples were subjected to fibre and spinning tests. The promising strains are listed below, location-wise and count-wise.

Location	*Count*	*Promising Strains*
Anand	60s	NFHB-113, NHB-0387, NFHB-1010, NFHB-111, RHB-0388
Badnawar	50s	HCHB-60, NFHB-113, NFHB-113, NFHB-1010, GSHV-602, NFHB-111, DHB-105, RHB-0388, VICHB-904, SANDCOT-6
Padegeon	60s	GSHV-602, GAHV-202, BCHB-150, DHB-685, VCHB-102, HCHB-60, NFHB-113, DHB-105, RHB-0388, RHB-0387, NFHB-109, DCHB-165
Surat	60s	NFHB-113, NFHB-1010, GSHB-658, NFHB-111, SANDOCOT-6
	80s	NFHB-113, NFHB-1010, SANDOCOT-6

Evaluation of short duration, compact and dwarf type material, Br-52-2.

The study of short duration, compact and dwart type plants (*G.hirsutum*) has revealed distinct advantages in respect of yield over the normal type plants. Therefore such material was collected and subjected to fibre quality analysis as well as spinning tests. The promising strains listed, location-wise and count-wise, are as follows :

Location	*Count*	*Promising strains*
Akola	–	–
Khandwa	30s	KH-2244-17-2, NH-011, NH-043, CNH-1009, CNH-1008, KH-224, CDE-1, AKH-89-29, AKH-9116

Miscellaneous Trial **:**

Several miscellaneous trials with different objectives were experimented at different locations, the details of which are given below :

Akola : Fifteen samples of Hy-series were tried and most of the strains were medium staple with fine to average fineness and low to average strength.

In another miscellaneous trial, three well known varieties, *viz.* AKA-5,AKH-4 and AKA-8307 were subjected to full-scale spinning. While AKA-8307 was spinnable to 16s and 20s counts, AKA-5 & AKH-4 were spinnable to 20s count. Ginning percentage of all the three cottons was quite high AKA-5 : 41.0, AKH-4 : 39.7, AKA-8307 : 40.8.

Indore : Fifteen samples were experimented in HH-Hy-1 series and were subjected to tests for fibre properties and spinning potential. Spinning was done for 20s count. All the strains were found spinnable to 20s count. Three strains, HH-Hy-9, HH-Hy-10, HH-Hy-13 proved superior to the control variety, Vikram, while all the remaining 12 strains were far below the control, JKHy.1.

Junagadh : A set of ten samples was subjected to full-scale spinning for 12s, 16s, 20s, 30s and 40s counts. The promising strains the yarn strength of which were of the expected level in the selected counts are is listed below :

20s	GJHV-34, GJHV-52, GJAV-5
30s	GJHV-46

Ginning percentage of the above samples ranged from 30.0-37.7.

In another miscellaneous trial, of 41 samples with 2.5% span length ranging from 19.5 mm to 28.3 mm, Micronaire from 2.8 to 6.6, percent mature fibres from 61 to 86 and strength from 15.6 g/t to 21.5 g/t., were subjected to microspinning tests for two counts *viz.* 20s and 30s. The promising strains are listed below :

30s	GJHV-14, GJHV-46, GJHV-156

In the case of another eight samples of SEL- series tested along with G.Cot Hybrids, the 2.5% span length ranged from 23.8 mm to 32.0 mm. Micronaire value from 2.6 to 3.2, percent mature fibres from 48 to 58 and strength from 13.4 g/t to 23.4 g/t.

Khandwa : In a miscellaneous trial, Sarvottam, Maljari, Tapti, KH-2160 and Khândwa-3 cottons were subjected to full-scale spinning for selected counts from 16s to 40s. The promising strains, are shown below :

16s	Maljari
20s	Maljari, Khandwa-3
30s	Sarvottam, Tapti, KH-2160, Khandwa-3
40s	KH-2160

Nanded : Amongst three, EDM-NH series samples, EDM-NH-011 & EDM-NH-452 performed well at 40s count. In an intra-hirsutum hybrids trial, NHHy-10, NHHy-3, NHHy-4 exhibited promise at 30s count. In the 2A (I) trial, all the five cotton samples, *viz.* NA. 529, NA. 336, NA-377, PA-141, PA-183 performed well at 20s count.

The (2A) trial also gave good performance in 20s count in respect of all the five cotton samples, PA-262, NA-529, NA-398, NA-389 and PA-141.

Padegaon : In a multilocation Varietal trial, strains RHC-1190, RHC-1894, RHC-191 along with the variety LRA-5166 were found to spin at the selected count 40s.

The strains RHH-1394 and RHH-0987 as well as NHH-44 were found to spin at the selected count of 40s in the Hybrid trial.

Parbhani : Out of the two samples of NHH.54 and PHH.316, the latter alone was found spinnable at 30s and 40s counts in full-scale spinning.

Rahuri : The Y1 variety was sown in April and June months. June month sowing has shown better results in spinning at 16s and 20s counts, the April month sowing has shown satisfactory performance only at16s.

South Zone :

This zone comprises the States of Andhra Pradesh, Karnataka and Tamil Nadu and is known for its long and superior long staple cottons. Although cottons belonging to *G.hirsutum* species cover a large area, those belonging to other three species are also grown in some areas of this zone, in both irrigated and rainfed tracts. In addition, *intra-hirsutum* and inter-specific hybrid cottons are also cultivated on a large scale in this zone.

G.hirsutum Trials **:**

Coordinated Varietal Trials Br. 04 were conducted at Arabhavi, Raichur, Siruguppa, under irrigated conditions. A

separate trial was also conducted for dwarf and compact plant types at Arabhavi and Raichur also under irrigated conditons. The ranges and the mean values of 2.5% span length, Micronaire value, bundle strength and maturity along with assessment of spinning potential are incorporated in the Table 5. The following strains recorded satisfactory spinning performance at the locations and counts as given below :

Location	*Count*	*Promising Strains*
Br. 04 (a) Irrigated		
Arabhavi	30s	ICMF-23,JK-276-8-2, C-256-4,VRS-19
Raichur	30s	VRS-19,CNH-120MB, L.613, C-256-4,
Br. 04 (b) Dwarf and Compact type - Irrigated		
Arabhavi	30s	CDP-448, CCC-1, Anjali, RACC-41.
Raichur	30s	–

Preliminary Varietal Trial Br. 03 was conducted at Arabhavi, Raichur, under irrigated condition and at Siruguppa under rainfed conditions. The following strains recorded encouraging spinning performance at the locations and counts as shown below :

Location	*Count*	*Promising Strains*
Br. 03 (a)		
Arabhavi	–	–
Raichur	30s	RAH-100, ARB-8824, TCH-976, TCH-1025
Br. 03 (b)		
Siruguppa	30s	ARS-104, TCH-1028, RAH-111

Initial Evaluation Varietal Trial was conducted at Arabhavi, Raichur, Siruguppa. The same trial was experimented at Dharwad under rainfed conditions. The following strains have registered good spinning potential.

Location	*Count*	*Promising Strains*
Arabhavi	–	–
Raichur	30s	CWROK-165, BRS-23, TSH-313
Siruguppa	–	–

G.arboreum Trial **:**

Coordinated Varietal Trial of *G.arboreum*, Br. 24 was conducted at Dharwad under rainfed conditions. The following are the promising strains :

Location	*Count*	*Promising Strains*
Dharward	20s	CAM-31, PA-262, PA-304, GAM-48

G.herbaceum Trial **:**

Coordinated Varietal Trial of *G.arboreum* Br. 34 were conducted at Raichur under rainfed conditions and the following strains are identified as promising for 20s count.

Location	*Count*	*Promising Strains*
Raichur	20s	RAH-100, RAH-203

Hybrid Trials :

Intra-hirsutum hybrid trial Br 05(a) -1 *(G.hirsutum x G.hirsutum)* conventional type were conducted at Arabhavi, Raichur and Siruguppa under irrigated conditions while at Dharwad it was conducted in two sets under rainfed conditions. The following hybrids recorded satisfactory spinning performance.

Location	*Count*	*Promising Strains*
Br. 05 (a) - 1		
Arabhavi	30s	RAHH-150, DHH-543, Savita, DHH-12, DHH-542

Location	*Count*	*Promising Strains*
Raichur	30s	DHH-343, DHH-2, SCHH-2, AHH-133, CCHH-5, DHH-542, RAHH-200
Siruguppa	30s	CCHH-5, RAHH-150, DHH-543
Br. 05 (b) - 1 - Set I		
Dharwad	30s	DHH-529, BCHH-568, RAHH-5, RAHH-6, NDLHH-240, NSPHH- 1, RAHH-133, DHH-545, AH-133, DHH-26, RAHH-1, SCHH-2
Br. 05 (b) - 1 - Set II		
Dharwad	30s	ACH-100, PAC-136, SNSCH-46, HARITA-3, NIMBKAR-312, SANDOCOT-9, NARHH-9, SIMAHH-73, NAVKAR-9, SWETA-11, BCHH-6569, CHELMI-1, KDCHH-144, NBHH-1105, ARCHH-651, NBHH-1105, ARCHH-651, VICH-9, ACHH-2, KASTURI-18, NFHH-6210, EPCH-1, SAGAR-77

An *Intra-hirsutum* hybrid trial, (male sterile based trial) was conducted at Siruguppa, under irrigated conditions, while the same trial was conducted under rainfed conditions at Dharwad. The following hybrids have given satisfactory spinning performance:

Location	*Count*	*Promising Strains*
Br. 05 I		
Siruguppa	30s	RACHH-32, INHH-110, VCHH-32
Br. 05 (a) II - Set I		
Dharwad	40s	CAHH-8, ARCHH.1858, ACH.213, CAHH-89
Br. 05 (a) II - Set II		
Dharwad	40s	PSCH-101, MECH-163, ACH-429, PAC-135

TABLE 5 : SUMMARY OF TEST RESULTS ON COTTON STRAINS UNDER CO-ORDINATED VARIETAL TRIALS OF (Br.04) IN SOUTH ZONE

Location	No.of samples	Range of				Spinning Performance			Control Variety
		2.5% Span length (mm)	Micronaire value	Maturity	Bundle Tenacity (g/t) 3.2 mm gauge	Count	A	B	
1	2	3	4	5	6	7	8	9	10
Br. 04 (a)									
Arabhavi	12	24.1 – 31.9	3.0 – 3.9	53 – 75	19.2 – 23.6	30s	7	–	–
Raichur	3	27.8 – 33.3	2.9 – 4.0	67 – 79	21.0 – 24.2	30s	1	1	MCU.5, L.C.
Raichur	5	25.2 – 30.0	3.6 – 4.3	58 – 72	20.6 – 22.5	30s	4	1	LRA.5166
Siruguppa	5	21.5 – 28.0	3.3 – 4.4	65 – 74	17.3 – 20.2	30s	1	–	–
Br. 04 (a)									
Arabhavi	7	23.9 – 28.2	2.9 – 4.0	55 – 71	19.4 – 21.1	30s	4	–	–
Raichur	6	23.4 – 25.3	3.2 – 4.0	59 – 71	18.1 – 19.9	30s	–	–	Anjali

Desi Hybrid Trial : A desi hybrid trial Br. 25 was conducted at Dharwad under rainfed conditions. The following strains showed encouraging spinning performance at 20s count.

Location	*Count*	*Promising Strains*
Br. 25		
Dharwad	20s	AKDH-11, AKDH-16, AKDH-5, MDCH-23

Interspecific Hybrid Trial : Interspecific Hybrid Trial Br. 15, was conducted at Raichur, Siruguppa under irrigated conditions. The following strains have given the requisite yarn strength for the selected count and are listed below location-wise.

Location	*Count*	*Promising Strains*
Br. 15		
Raichur	60s	DHB-410, NFHB-109, DHB-290, DHB-435, RAHB-51, RAHB-77
Siruguppa	60s	DHB-290, RAHB-51, SIMA-HB-3, DHB-43, TCHB-810

Miscellaneous Trials :

Various miscellaneous trials with different objectives experimented at different locations are briefly described below.

Bellary : *Kapas* grading centre conducted experiments on Savita, H-6, H-420. While Savita gave encouraging spinning performance at 40s, H-6 has failed at 40s and H-420 has failed even at 30s.

Amongst the lots of 3,4,5,13 and 14 of DCH-32 from Bellary, none of the lots could be spun satisfactorily to 80s count.

Amongst the lots 2,7 and 12 of NHH-44 from Bellary, only lot No.12 could be spun satisfactorily at 40s count. Amongst the lots of AK-235, none was spinnable to 30s count.

Coimbatore : In the ST-Series of Coimbatore trial all the entries *viz.* ST-41-1, ST-46-2, ST-50-1, ST-50-3, 13-21-1, Elite-18 and B.K. have performed beyond the expected level at 100s count.

In the HLS-Series, only one variety, HLS-329-7325 has given good CSP at 40s count.

In the LRA-5166-A selections, LRA-5766-A8, LRA-5166-A-16, LRA-5166-A-22, LRA-5166-A-25, LRA-5166-A-45, LRA-5166-A-56, LRA-5166-A-61,LRA-5166-A-62,LRA-5166-A-66, LRA-5166-A-73, LRA-5166-A-74, LRA-5166-A-77 and LRA-5166-78 were spinnable to 40s count.

In similar experiements on LRA-5166 conducted at CICR selections 1,2,3,5,8,9,11,14,15,16,17,19,22 and 24 have registered encouraging spinning potential at 40s count.

In the Anjali Selections, Anjali-474, Anjali-74-1, Anjali-66-7-5, Anjali-BK, Anjali-Elite have given good yarn strength for 40s count.

In the T-7 series, T-7-16, T-7-32, and T-7-63 were found to be promising in the 40s count range.

Dharwad : In the miscellaneous trial of CC1-selections most of them have given promising CSP values.

Guntur : Six samples were experimented in the trial and samples were tested for performance in full spinning. The promising strains are given below countwise :

Count	*Variety*
30s	D2
40s	LAHH4 (95-96), LAHH4 (96-97)D2
50s	LAHH4 (95-96), LAHH4 (96-97)

Karimnagar : Amongst seven samples from Karimnagar, RCH-15, MECH-13 and LK-861 were found spinnable to 40s count. The Ginning percentage was good for of RCH-20 (35) RCH-2 (34-9), MECH-13 (37.1) and Somanath (34.8).

Raichur : In the miscellaneous Trial at Raichur only one sample RAHH-1 was studied and it was found to give satisfactorily spinning performance at 30s and 40s counts at full scale level spinning.

(b) Tests on Standard and Trade Varieties of Indian cottons

(i) Standard Indian Cottons : To assess seasonal fluctuations in the characteristics of Indian cottons and to gauge the comparative superiority of the newly evolved strains, a number of established varieties called Standard Cottons are tested every year. These varieties are grown in Government farms and cotton research stations under identical conditions. Extensive fibre and spinning

tests are regularly being done on such samples and the test results are published for information of cotton breeders and other research workers as early in the season as possible. During 1997-98, 25 cotton varieties have been tested.

(ii) Trade Varieties of Indian Cottons: Lint samples of fair average quality of the major Trade Varieties of Indian cottons are being obtained for each season through various organisations. Representative *Kapas* samples of these varieties are also procured from the State Departments of Agriculture. The fibre and the spinning test results, ginning percentage and other test results on each variety of cotton are being published for information of cotton trade and industry. During 1997-98, 10 trade varieties have been tested.

(c) Research Work Done on Specific Agricultural and Technological Aspects Relevant to Cotton Improvement Work.

STUDY OF COTTON FIBRE PROPERTIES IN RELATION TO THEIR DEVELOPMENT PERIOD

At the last RAC meeting it was suggested that both the parents, *viz.* G.Cot.100 and G.Cot.10 along with G.Cot.Hyb.6 may be included in the study. Thousand flowers were tagged for each of G.Cot.10, G.Cot.100 and G.Cot.Hyb.6 on 10-10-1997, 24-11-1997 and 14-10-1997, respectively. Field observations were regularly made and the fully opened bolls were collected as soon as they were found mature.

To study the performance of cotton from the late picking, 1000 flowers were tagged from each of the varieties G.Cot.10, G.Cot.100 and G.Cot.Hyb.6 on 5-12-1997, 23-12-1997 and 27-11-1997, respectively. In the first picking, the boll maturation periods were found to be 42 to 52 days for G.Cot.10, 49 to 58 days for G.Cot.100 and 48 to 59 days for G.Cot.Hyb.6. In the late picking, G.Cot.10 could retain only 4% of tagged flowers to give matured bolls. The period of maturation differed in all the three varieties in later picking also. The maturation periods were 42 to 57 days, 41 to 53 days and 49 to 64 days in G.Cot.10, G.Cot. 100 and G.Cot.Hyb.6, respectively. Tests for all the fibre properties including the colour of the cotton are in progress. Collection was done for every 2 or 3 days and there were 4 to 6 stages in each variety.

THE EFFECT ON FIBRE QUALITY AND YIELD LEVELS OF COTTON DUE TO APPLICATION OF NEEM PRODUCTS

A field trial with three replications and ten treatments was conducted at Nanded. The treatment details are as follows :

Sowing of NHH-44 cotton was done on July 3, 1997, at Agricultural School, Nanded, having a gross plot size of 7.2 x 6.0 m^2. Crushed powder of dried neem seeds was applied through soil at 30 and 60 days after sowing (DAS).

TREATMENTS :

T1 - NSP 25 kg/ha at 30 DAS + 5% NSE at 50, 60, 70, 80, 90 and 100 DAS
(6 sprays at 10 days interval)

T2 - NSP 50 kg/ha at 30 DAS + 5% NSE at 50, 60, 70, 80, 90 and 100 DAS
(6 sprays at 10 days interval)

T3 - NSP 25 kg/ha at 30 & 60 DAS + 5% NSE at 60, 70, 80, 90 and 100 DAS
(6 sprays at 10 days interval)

T4 - NSP 25 kg/ha at 30 DAS + 0.035% endosulfan at 60,75, 90 & 105, DAS
(4 sprays at 15 days interval)

T5 - NSP 50 kg/ha at 60 DAS + 0.035% endosulfan at 60,75, 90 & 105, DAS
(4 sprays at 15 days interval)

T6 - Endosulfan 0.07% at 60, 75, 90 & 105 DAS + Mechanical Collection of bollworms larvae.

T7 - Neem cake 25 kg/ha at 30 DAS + 5% NSE + Mechanical Collection of bollworms larvae.

T8 - Neem cake 50 kg/ha at 30 DAS + 0.035% endosulfan at 60, 75, 90 and 105 DAS.
(Days after sowing).

T9 - Recommended plant protection measures (R.P.P.)

T10 - Control (No treatment)

The neem seed extract was used for spraying in respective plots. Larvae of bollworms were collected from treatment No.6, at weekly intervals. Recommended spray was given in treatment No.9. Observations were recorded on 5 randomly selected plants from each plot.

The fibre properties, percentage of Boll damage and yield levels for various treatments are given in Table 6.

Soil Application of Neem Seed Powder (NSP) by ring method and 6 sprays of 5% NSE (Neem Seed Extract) at 10 days interval starting from 50 days after sowing (DAS) showed significant improvement in *kapas* yield as compared to control and recorded yield levels *at par* with control treated with traditional insecticides i.e. 0.07% Endosulfan (T6 to T9).

In general, no adverse effect was observed on fibre qualities due to application of neem products. Treatment T4 and T6 recorded better technological performance coupled with promising yield level followed by treatments T5 and T9. The rest of the treatments recorded performance *on par* with the control.

All the treatments were found to reduce the incidence of bollworms and consequent damage to greenbolls and thereby increase the net seed cotton yield. All the treatments were found significantly superior to the control with respect to yield. Amongst the treatments, T6

TABLE 6 : EFFECT ON COTTON FIBRE PROPERTIES AND YIELD LEVELS DUE TO APPLICATION OF NEEM PRODUCTS ON NHH. 44

Treatment	2.5% S.L. (mm)	Fine-ness (µg/inch)	MC	Tenacity at 3.2 mm g/tex	Boll damage (%)			Yield (kg/ha)
					Green	Picked	Locule	
T1	22.3	3.8	0.70	15.9	17.41	23.97	22.52	1067
T2	22.7	4.2	0.74	16.6	16.32	23.56	23.06	932
T3	22.2	3.8	0.70	15.6	15.47	23.27	20.75	983
T4	23.0	4.0	0.73	16.8	19.46	26.62	23.45	1183
T5	22.5	4.1	0.72	16.8	16.85	23.71	23.70	1095
T6	22.4	4.1	0.73	16.4	15.28	26.74	22.72	1196
T7	23.2	4.2	0.73	16.5	14.32	26.30	23.49	990
T8	22.7	3.8	0.71	16.5	16.19	26.81	22.35	1086
T9	23.0	4.1	0.74	16.7	17.93	24.75	21.65	1161
T10	22.1	4.1	0.73	15.8	23.74	32.58	26.90	456
SE ±	0.25	0.07	0.02	0.17	0.65	1.79	1.99	77
CD at 5%	NS	NS	NS	NS	1.93	5.33	NS	228

recorded highest yield (1196 kg/ha) followed by treatment T4 and T9.

IMPROVING FIBRE PROPERTIES AND YIELD POTENTIAL OF ARBOREUM COTTONS BY UN-CONVENTIONAL METHODS

During 1997-98 season, sowing of selected lines was done on July 5, 1997 at the Cotton Research Station, Nanded, in three replications. After that, there was stress period from July 10, 1997 to July 27, 1997. Crop growth was stunted due to soil-moisture stress. Again during the terminal phase of rainy season, excess rainfall was received in the months of September and October. Rainfall distribution was unequal. During the crop growing phase, stress followed by

excessive rains favoured the outbreak of American bollworm causing 70% to 80% damage to fruiting bodies. The infestation of bacterial blight was also severe.

During early stage of crop growth, dry spell favoured multiplication of aphids and thrips; these pests also caused significant crop damage. Project work was abandoned. Tests will be conducted during 1998-99.

EFFECT OF DRIP IRRIGATION ON YIELD AND QUALITY OF COTTON

The variety G.Cot.Hyb.6 was grown under drip irrigation in a randomised block design with four replications in a plot of 3.6 x 0.5 m.

As per the suggestion of last RAC the following treatments were taken up.

1. Treatment (T-1) – 0. 4 IW/CPE
2. Treatment (T-2) – 0. 6 IW/CPE
3. Treatment (T-3) – 0. 8 IW/CPE
4. Treatment (T-4) – Alternate furrow irrigation
5. Treatment (T-5) – Flood irrigation

Seed cotton was collected in two pickings. All the 40 samples collected from different treatments in four replications were tested for seed cotton yield, G.P., S.I., and L.I %. The testing work for quality parameters is in progress.

COMPARISON OF SHORT FIBRE ESTIMATES OF COTTON BY DIFFERENT METHODS

The mean fibre length (MFL) and short fibre content (SFC %) by Comb Sorter, 2.5% span length (SL) and short fibre content (SF%) by HVI, mean fibre length (ML), upper quartile length (UQL) and Short fibre content (SF% by AFIS (by number and weight) were determined on 36 varieties of cotton. All the data were statistically analysed. Grader's staple length values available for 28 cottons were also included in the analysis. Effective length and SFC were arrived at from the AFIS staple diagrams by geometrical constructions similar to those employed for analysis of array diagram obtained by Comb Sorter method.

Statistical analysis showed that all the length parameters were significantly correlated (Table 7). Further, t-test for the difference between paired values was done in order to identify those which gave the least difference so that the prediction would be accurate. It was found that mean fibre length and effective length values determined from Comb Sorter and AFIS weight distribution agree very well, as the difference between the pairs of values is statistically non-significant (Fig.1). This shows that length values by weight distribution obtained from AFIS can be accepted as equivalent to mean fibre length and effective length from Comb Sorter. This result is very significant insofar as it permits the use of AFIS test results in place of data from Comb Sorter method which demands skill in preparing uniform fibre array and involves considerable time. AFIS, on the other

TABLE 7 : CORRELATION COEFFICIENTS BETWEEN FIBRE LENGTH MEASURES

	Comb Sorter MFL	Comb Sorter EL	2.5% Span Length	AFIS MFL(n)	AFIS EL(n)	AFIS MFL(w)	AFIS UQL(w)	AFIS EL(w)	Staple Length
CS-MFL	1	0.976**	0.983**	0.949**	0.979**	0.980**	0.976**	0.971**	0.845**
CS-EL	0.976**	1	0.982**	0.923**	0.978**	0.974**	0.984**	0.985**	0.829**
2.5%SL	0.983**	0.982**	1	0.943**	0.984**	0.982**	0.988**	0.986**	0.832**
AFIS-MFL(n)	0.949**	0.923**	0.943**	1	0.950**	0.980**	0.952**	0.938**	0.861**
AFIS-EL(n)	0.979**	0.978**	0.984**	0.950**	1	0.988**	0.991**	0.990**	0.821**
AFIS-MFL(w)	0.980**	0.974**	0.982**	0.980**	0.988**	1	0.992**	0.986**	0.868**
AFIS-UQL(w)	0.976**	0.984**	0.988**	0.952**	0.991**	0.992**	1	0.998**	0.865**
AFIS-EL(w)	0.971**	0.985**	0.986**	0.938**	0.990**	0.986**	0.988**	1	0.860**
Staple Length	0.845**	0.829**	0.832**	0.861**	0.821**	0.868**	0.865**	0.860**	1

MFL - mean fibre length *EL - effective length* *(n) - by number* *(w) - by weight*

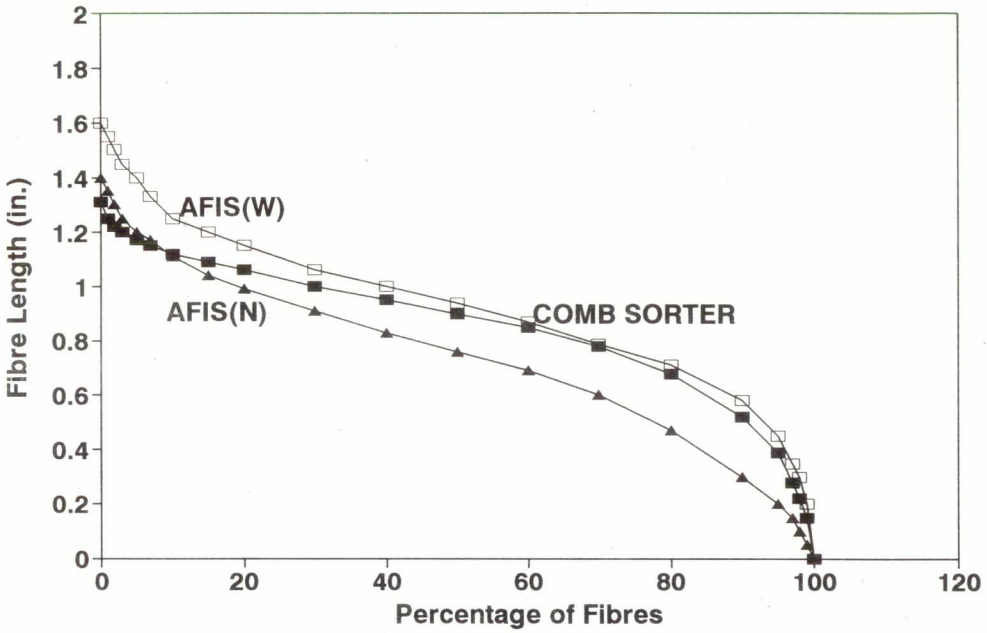


Figure 1. Fibre Length Distribution Diagrams by AFIS and Comb Sorter

hand, does not involve any operator skill and gives results in a few minutes.

The short fibre content (SFC) determined by various methods was also analysed statistically (Table 8). It is found that the SFC estimates from Comb Sorter and AFIS weight distribution diagram are highly and significantly correlated (0.900). Hence the SFC values can be predicted from AFIS staple diagram quite accurately.

THRUST AREA II : POST HARVEST TECHNOLOGY OF COTTON

IMPROVEMENT IN PROCESSING TECHNIQUE OF MICRO-SPINNING FOR SMALL LINT SAMPLES

Due to non-availability of apron attachment for ring spinning, further work of spinning some more samples could not be done. Though the order for this attachment was placed long ago only very recently this was procured and installation completed. Extension of one more year has been obtained for testing some more samples.

DEVELOPMENT OF CIRCOT LAGHU OTAI YANTRA (CLOY GIN)

A power operated gin machine called CLOY Gin working on the principle of Macarthy gin was designed. The machine consists of a chrome leather roller, fixed knife and a moving knife. The capacity of the machine is about 8 kg. *kapas* per hr.

TABLE 8 : CORRELATION COEFFICIENTS BETWEEN DIFFERENT MEASURES OF SHORT FIBRE CONTENT

	Comb Sorter SFC	HVI SF%	AFIS SF%(n)	AFIS SFC(n)	AFIS SF%(w)	AFIS SFC(w)
Comb Sorter (SFC)	1	- 0.472*	0.300	0.883 **	- 0.029	0.900 **
HVI-SF%	- 0.472	1	0.484 *	- 0.548 **	0.782 **	- 0.409 *
AFIS-SF% (n)	0.300	0.484 *	1	0.337	0.903 **	0.415
AFIS-SFC (n)	0.883 **	- 0.548 **	0.337	1	- 0.063	0.922 **
AFIS-SF% (w)	- 0.029	0.782 **	0.903 **	- 0.063	1	0.063
AFIS-SFC (w)	0.900 **	- 0.409 *	0.415	0.922 **	0.063	1

SFC - Short fibre content (%) by geometrical construction *SF% - short fibre content (<12.7 mm)*

The performance of the machine was evaluated by ginning like NHH. 44, Savita, G.Cot.11, DCH.32, Abadhita, Sharada, KK.119, Suman, G.Cot. 11 and LRA 5166. Since the overall performance of the machine was very good, it has been accepted by user groups. Licence for manufacture has been given to a fabricator in Nagpur. About 20 gins have been sold so far.

SEED COAT FRAGMENTS IN GERMPLASM LINES OF G.HIRSUTUM

The SCF % in respect of all the germplasm lines received from CICR has been evaluated. Results on 62 samples are given in Table 9. The SCF % showed variation from a practically negligible amount in MCU-5VT to a maximum of 6 % in Savita. It may be mentioned that the procedure adopted for estimation of SCF % was modified as follows :

The samples were ginned and the lint was cleaned using Shirley Opener. From the lint so derived, SCF % was determined by the method standardised at CIRCOT. The following conclusions are drawn from the experiment:

(i) Varieties/hybrids with fuzzy seeds tend to give higher SCF %

(ii) The larger among the fuzzy seeds have a tendency to give higher SCF %.

TABLE 9 : SCF % IN DIFFERENT COTTON VARIETIES

Sl. No.	NAME	SCF %
1	PUSA-31-CC	0.00
2	I.B.A.-LYY	0.00
3	MCU-5 VT	0.00
4	ORISSA 57	0.00
5	MAR 2476	0.01
6	IC 1832	0.02
7	JK 260	0.03
8	B-56-181	0.03
9	MCU-7	0.06
10	JK-344	0.09
11	TXOR SC-78	0.10
12	B-58-1290	0.13
13	G.AGETI	0.14
14	AKH-081	0.14
15	DEVIRAJ	0.18
16	G.COT.12	0.20
17	CICR-HH-1	0.20
18	G-21-17-619	0.20
19	PKV-081	0.26
20	NHH-44	0.29
21	VIKRAM	0.30
22	H-8	0.30
23	PH-93	0.35
24	NARMADA	0.32
25	PKV-HY-2	0.37
26	PKV-053	0.37
27	G-Cot-14	0.37
28	SUMAN	0.37
29	KHANDWA-3	0.39
30	KHANDWA-2	0.40
31	GUJARAT 67	0.41
32	MAR - 717	0.42
33	EMPIRE	0.45

Sl. No.	NAME	SCF %
34	VG-1765	0.48
35	PKV-0804	052
36	MECH 9	0.55
37	F-414	0.56
38	JKHY-1	0.57
39	UPAC-7 (17)	0.60
40	G-COT-10	0.62
41	PKV-0802	0.65
42	DHB-105	0.67
43	AK-27-lyc	0.75
44	SRT-1	0.77
45	HY-6	0.81
46	LH-1194	0.98
47	LAXMI	1.13
48	LH-886	1.19
49	H-777	1.30
50	AHH-468	1.42
51	LRA-5166	1.44
52	JK-285	1.50
53	AV-3649	1. 57
54	H-4	1.63
55	LH-900	1.92
56	DCH-32	1.95
57	F-505	2.27
58	ABADHITA	2.32
59	DHY.286	3.30
60	SHARADA	3.33
61	H-655-C	4.20
62	SAVITA	6.00

(iii) Between two varieties which are equally fuzzy and large, the ones with higher G.P. are likely to give higher SCF % too. These conclusions are drawn from visual observations.

STUDY OF THE EFFECT OF DIFFERENT MACHINE PARAMETERS ON THE INCIDENCE OF SEED COAT FRAGMENTS

Based on the successful demonstration of the reducing incidence of SCF in 12 samples by an average of 77 % when the roller gin speed was brought down to 76 rpm from the normal speed of 110 rpm, an attempt was made to incorporate some changes in a DR gin to reduce the SCF. The gear box was redesigned to separate the drives of the rollers and the beater so that the roller speed could be controlled without affecting the beating frequency. One DR gin manufacturer was contacted to effect the desired changes in the gear box. The required changes have been incorporated in a commercial sized gin. Initial tests have shown that the machine is working well with the changes thus made. Experiments on the DR gin will commence very soon.

SCANNING ELECTRON MICROSCOPY ON SPLICE JOINTS OF COTTON AND BLENDED YARNS

Scanning electron microscopy was done on the splice zones of P/C blended Open End yarn spun to 45s count containing various percentages of polyester and cotton. Yarn segments containing the splice zones were mounted on specimen stub and coated with Au/Pd in a sputter coater. The SEM study was made by scanning a long length of the yarn and

recording the micrographs maintaining the continuity of the yarn. After printing, all micrographs were joined end to end to get a complete picture of the scanned yarn segment containing the splice zone. The following observations have been made from the SEM micrographs.

Spliced yarn 50/50 P/C blend : Wrapper fibres are seen in the splice zone. Good mingling of both the types of fibres seems to occur at the splice zone. Wrappers may give rise to thick places. Yarn may break at these places due to slippage during weaving. The thick places can be reduced by optimising splicer settings with increased RSS & RSE. The present setting gave percent RSS and RSE values at 79.6 % and 83.3 % respectively.

Spliced yarn of 33/67 P/C blend : The splice zones showed mingling of fibres from both ends of the joint. At some places, bunches of fibres form loose wrappers around the yarn. Where the length of splice zone is large, the yarn appearance will become poor. However, the mingling of fibres is quite high and hence elongation and strength retention is quite high. The RSS and RSE values for 33/67 P/C spliced yarn are 80.5 % and 85.6 % respectively. These values are higher than those of 50 / 50 PC spliced yarn.

Spliced yarn of 67/33 P/C blend : At the two ends of the spliced region of yarn, the fibres run parallel and are highly twisted without mingling. This may be due to lower air pressure applied to untwist the broken ends than what is required for individualising the fibres. Both ends of yarn get entangled due to reverse twist during splicing. Since the two broken ends of the yarn run parallel with slight twist, the RSS and RSE values are considerably reduced. The RSS and RSE values are 57.4 % and 68.3 % respectively which are lower compared to those for 33/ 67 PC spliced yarn.

Spliced yarn of 45s count (100 % Polyester) : The splice zone is small. The fibres are randomely oriented causing thick places and loose winding. Interlacing of fibres was clearly seen. At one end of the splice zone, bunching of fibres was seen.This bunching is due to air pressure. The appearance of yarn has been poor because of thick places. Bunches of fibres form helical wrappers which hold the core fibres tightly thereby retaining the strength and elongation. The RSS and RSE values for 100 % polyester spliced yarn were 85.2% and 80.0%, respectively.

DESIGN MODIFICATIONS ON PNEUMATIC SPLICER FOR IMPROVED SPLICING ACTION

In an earlier report on the project, it was stated that low pressure splicing with

the optimized settings of the various machine variables produced splices with better quality. Since the supply of compressed air in the splicing unit is done from a single source, lowering down of the overall splicing pressure caused reduction in the intensity of the initial blast pressure. In order to intensify the initial blast pressure, even when working at a low pressure for getting the benefit of better quality of splices, some modifications were introduced in the pneumatic circuit of the existing splicing equipment:

The air supply was divided into two parts by incorporating a two-way valve. While one line was sent directly to the splicing chamber, the other line was restricted mainly to effect various mechanical actions such as yarn crossing, clamping and scissoring action. The second line was also utilized for collection of cut ends after scissoring. Now, in the first line a loop was introduced housing a modular FRL unit.

Instead of using water, which will otherwise corrode the splicing chamber due to rust, a water soluble oil was poured in the lubricator of the FRL unit. After a few preliminary trials, the pressure at the FRL unit was fixed at 2 kg/cm^2 in order to add drops of oil to the supplied air, the pressure of which was kept of 4.2 kg/cm^2 as optimum, decided by the optimisation experiments conducted earlier. The second line pressure, which is now independent of the first, was kept at 6.0 kg/cm^2. This higher pressure in the second line to facilitated quickly mechanical actions involved in splicing. Besides, this also helped in proper collection of cut ends after scissoring and thus, solved the problem associated with low pressure splicing technique.

Cotton and polyester-cotton (67:33) blended yarns of 45s count were subjected to splicing trials to study the performance of the modified design with optimized settings of Blast Index (BI), Tail Index (TI) and End Preparation Index (EPI), decided as per the earlier optimization experiments.

It can be seen from test data in Table 10 that the modified design has resulted in about 66% RSS and 77% RSS for cotton and blended yarns respectively. These values were about 53% and 73% respectively with the existing machines as reported earlier. Besides, the modified design has produced better appearance of splices as compared to those prepared with the existing splicer.

Further detailed trials will be carried out when the Tensorapid equipment is ready for testing samples.

THRUST AREA III : STRUCTURE-PROPERTY RELATIONSHIPS IN TEXTILE MATERIALS

STRUCTURE, PROPERTY AND WEAR COMFORT OF NATURALLY COLOURED COTTON

Structural parameters of fibres from

TABLE 10 : QUALITY OF SPLICES PRODUCED FROM THE MODIFIED DESIGN (45s YARN)

	Parameters	Cotton Yarn	P/C Blended yarn (67 / 33)
1.	Parent yarn tenacity (g/tex)	16.73	23.15
2.	Spliced yarn tenacity (g/tex)	11.04	17.71
3.	R. S. S. (%)	65.9	76.5
4.	R. S. S. achieved earlier with existing machine (%)	53.0	72.7

15 colour linted crosses (F1 hybrids) and their parents (5 colour linted and three white linted types) were evaluated by using infrared absorption and X-ray diffraction methods.

Colour of the lint *per se* did not produce any substantial effect on the spectral features of the fibres as revealed by their infrared spectrum. However, spectra of dark brown and chocolate coloured lints showed enhanced absorption in the 1700-1600 cm^{-1} region indicating the presence of - C - C linkages. These linkages can contribute to the colour of pigments responsible for brown shade in the lint. On the contrary, green lints showed relatively lower absorbence for this indicating the absence of a similar linkage in the pigment responsible for green colour. Further, no enchanced absorption could be noticed in any other spactral region which could be attributed to the green colour.

Crystallinity as measured by infrared Index III as well as crystalline content and crystallite size as measured from X-ray diffraction were in no way different from those for the white lint when parameters like maturity and fineness of the hybrids were *on par* with those of white lint of similar characters. Green linted cottons which were highly immature showed spiral splitting in the azimuthal intensity profiles of XRD scans. However, such effects have been also noticed on highly immature white lint of certain varieties.

THRUST AREA IV : CHEMICAL PROCESSING AND FINISHING TREATMENTS

DYEING OF COTTON WITH NATURAL DYES

During the period under report large scale trials for dyeing of cotton fabric with lac dye and berberine were undertaken at Dawn Mills, Mumbai.

Two trials were conducted using lac dye. The mill operations were carried out on a winch using 1 kg of the knitted fabric. In the first trial the fabric was given a pre-treatment with chitosan and then dyed to 10% shade with lac dye as per the procedure standardized at CIRCOT. The fabric was found to assume a light violet shade. In the second trial a pretreatment was given with an amino compound followed by dyeing. The fabric now developed a reddish violet shade. The washfastness property of both the fabrics could be improved by using a dyefixing agent.

Trials were also successfully carried out on 1 kg of the same fabric using berberine. The fabric was pretreated with tannic acid and tartar emetic and then dyed to 1% shade. A bright yellow colour was obtained by using berberine and the material retained a fairly good washfastness property.

The dyeing technique of yarns and fabrics with manjith dye was also standardized. The cloth was found to develop a bright red shade when premordanting treatment was with tannic acid and alum. Different shades were obtained with the application of other mordants. Evaluation of the dyed fabrics is in progress.

A STUDY OF ANTIBACTERIAL FINISHING OF COTTON EMPLOYING ELECTRON BEAM CURING

To ascertain the durability of finishes, fabric samples treated with 5% zinc acetate, 9% acetic acid and 9 % hydrogen peroxide, dried and cured were subjected to 25, 35, 50, 75 and 100 wash cycles along with control as per the standard method of BIS. The washed samples were evaluated for various physical and anti-bacterial properties. It was observed that laundered samples upto 75 washes showed 100 % anti-bacterial performance both for *S.aureus* and *K.pneumoniae* with 85% strength retention, whereas in the case of samples with 100 washings, there was development of 1-2 colonies on the swatch and little growth on the sides of swatch with a strength retention of 80%.

The samples treated with 8% & 12% zinc acetate and laundered for 100 wash cycles have shown 100% antibacterial performance for *S.aureus* as well as *K.pneumoniae*.

The trial to impart anti-bacterial finish to cotton using electron beam was carried out at BARC. The cotton fabric samples were given chemical treatment with i) 5% and 7% of zinc acetate and 9% acetic acid and ii) 10% and 12% zinc acetate and acetic acid. The treated samples were subjected to irradiation using electron beam at different dosages, *viz.* 0.5, 1.0, 1.5 and 2.0 megarads along with the control. The samples were evaluated for different physico-chemical properties such as air permeability, add-on percentage and zinc content. They were also tested for anti-bacterial activity.

It is observed that the % add-on of treated fabric samples ranged between 0.8 to 1.4. The air permeability was found to decrease by about 8-9% as compared to control. The samples with 5% zinc acetate at 2.0 mr dose of irradiation showed anti-bacterial activity for *S.aureus* as well as *K.pnumoniae*, whereas a dose of 0.5 mr for curing did not have any effect on antibacterial performance. Fabric samples treated with 10% and 12% zinc acetate and 12% acetic acid and also 7% zinc acetate and 9% acetic acid, cured with 1.0 mr irradiation recorded anti-bacterial performance.

To ascertain the durability of the antibacterial finish, fabrics are being subjected to wash cycles by standard procedures. The physical and antibacterial properties are to be evaluated after repeated wash cycles.

EFFECT OF CHEMICAL PROCESSING ON DYEING OF KNITTED FABRICS

To investigate the effect of chemical processes on dyeing of knitted cotton fabrics, experiments were conducted on two types of constructionally different fabrics, *viz.,* single jersey and double jersey. To prepare the fabrics for dyeing, they were purified by two methods, separately. In method-1, the fabrics were scoured with solution of sodium hypochlorite. In method-2, the scouring with sodium hydroxide was omitted and the fabrics were directly subjected to bleaching. Direct bleaching was carried out in two steps. In step-1, the fabrics were bleached with hydrogen peroxide solution. In step-2, bleaching was done by hypochlorite. One set of pretreated fabrics was further treated with cellulase enzyme. The pre-treated and enzyme treated fabrics were dyed to 2% shade, with two types of reactive dyes: (i) hot brand : Brilliant Orange (H-2R) and (ii) cold brand : Procian Yellow (M-3R). One set of pretreated dyed samples was finally finished with the enzyme cellulase. All the dyed samples were evaluated for their colour values, surface roughness and dye uptake.

It was observed that single jersey fabrics absorbed more amount of dye as compared to double jersey fabrics. This may be due to the difference in constructional features of two fabrics. Single jersey fabrics being thinner, appear to absorb more dye. The directly bleached fabrics showed higher colour strength as indicated by higher k/s values. Enzyme treated fabrics showed lower surface roughness values, compared to non-enzyme treated fabrics.

IMPACT OF DYING ON STRENGTH AND COLOUR OF FIBRES IN DIFFERENT VARIETIES OF COTTON

During the above reporting period, ten more fibre samples belonging to different varieties of cotton were purified and dyed with two dyes of different

colours. The dyes employed were Reactive, Cold Brand type. Routine dyeing procedures were followed. In conformity with the earlier observations, the dyed fibres exhibited a fall in tenacity and elongation in general as compared to the undyed control. The extent of fall was not uniform and was found to vary with the variety of cotton and the type of dye employed. Though dyed under identical conditions, the dyed fabrics showed differences in colour strength. In the case of fibres dyed with orange dye, the variation among different varieties was in the range of 3% to 60%. A similar trend was observed in the case of fibres dyed with blue dye too. A strong association is found between fibre maturity and colour strength expressed in terms of k/s values.

In order to find out whether the trend observed in the laboratory scale dyeing is reflected in the large scale operation, a trial with 1 kg fibre was conducted in a textile mill employing an industrial fibre dyeing unit. Different varieties of cotton were thus subjected to large scale dyeing test. Colour variations among the samples was observed in the large scale trial too.

THRUST AREA V : UTILISATION OF BY-PRODUCTS OF COTTON AND PROCESSING WASTES

PREPARATION OF PULP AND PAPER FROM CROP RESIDUES AFTER PROCESSING THROUGH ANAEROBIC DIGESTION

The scale-up trials proposed for the year could not be completed during 1997-98 since the digesters were not ready. This study will be completed during 1998-99. Meanwhile, trials were undertaken on the possibility of preparing paper from *tendu* leaf cuttings available in abundance in *bidi* industries. The trials have shown that the leaf cuttings can be biologically softened and re-cycled to form good quality paper retaining the orginal aroma of the leaves.

UTILISATION OF CELLULOSE FOR DEINKING OF WASTE PAPER PULP FOR PAPER MAKING

Earlier, enzymatic deinking trials on 250 gm of news paper waste were standardised using commercial cellulase. Further, the pulp thus prepared was mixed with sisal pulp, guar gum and polyester fibre waste for retention of strength properties. The results indicated that the paper samples prepared by addition of sisal pulp and guar gum to the enzymatically deinked pulp, enhanced the strength properties.

Scaling up trials were undertaken to deink 1.0 kg and 5.0 kg newspaper waste using the above enzyme. For this, hydro-pulp was prepared in a valley beater, washed thoroughly and suspended in water using 1: 25 ratio at 50°C. Cellulase was added at 3.0% level and deinking was carried out with stirring for 2 hr. The temperature of the pulp was increased to 100°C to inactivate the enzyme. The ink released was removed by washing the pulp

repeatedly with water. The pulp thus prepared was white in colour and almost free from ink particles.

A small portion of enzymatically deinked pulp was bleached with hydrogen peroxide. The bleaching treatment imparted yellowness to the pulp.

All the pulp was taken to Handmade Paper Institute, Pune and large size paper sheets were prepared. The paper samples prepared from bleached pulp were evaluated for strength properties. Addition of white rag and guar gum enhanced the strength of paper.

PRODUCTION OF BIOGAS FROM CELLULOSIC WASTES AT LOW TEMPERATURES

It has been established that the microbial consortium maintained at CIRCOT works well at low temperatures in the production of biogas. Bench scale studies have clearly indicated that the process works as efficiently at 15°C as at room temperature (25°C - 30°C). In order to translate the performance of bench scale trials to field studies, the consortium was multiplied and supplied to University of Agricultural Sciences, Dharwad during winter (Nov.1997). The cultivars were incubated in a dung based biogas plant of KVIC design. Preliminary trials indicated positive response and the performance will be monitored during 1998 winter also before drawing definite conclusions.

MICROBIAL EVALUATION OF PROTEIN HYDROLYSATES (PEPTONES) FROM COTTONSEED MEAL

Earlier, microbial response to cottonseed meal peptone (M peptones) prepared from various varieties of cotton belonging to the four species and hybrids was studied on the basis of growth of microorganisms such as bacteria, fungi, actinomycetes and yeast on them. It was observed that these microorganisms grow well on CM peptones and hence CM peptones can be used for the identification of microorganisms in general, and fungi and actinomycetes in particular since sporulation of these two organisms takes place well on CM peptones.

It is known that peptones are used in culture media as a nitrogen source for the production of enzymes. Hence the production of cellulase and amylase from *Penicillium funiculosum* F4 and *Bacillus subtilis* 159, respectively on CM peptones was studied during the period under report. CM peptones were incorporated in *Trichoderma viride* medium and modified Tendlers medium for growing *P.funiculosum* and *B.subtilis*, respectively on equal nitrogen basis. Simultaneously, production of these enzymes using commercial soybean and meat peptones was also studied as experimental controls. Cellulase and amylase production was done by submerged fermentation technique. Activity of cellulase enzyme was determined on the substrates such as

filter paper, absorbent cotton and carboxy methyl cellulose. Amylase activity was determined on starch substrate by usual methods. The protein content of cellulase enzyme was determined by Lowery's method. The results obtained are presented in Table 11.

It was observed that filter paper activity was higher than or equivalent to that of soybean peptone for all the cottonseed meal peptones with the exception of Suvin and DCH.32. Cotton activity was higher with all cottonseed meal peptones than soybean peptone and meat peptone. CMC activity also was either higher than or equal to that of soybean peptone. Amylase activity was maximum with pilot scale peptone prepared from commercial cottonseed meal. Amylase activity of all other cottonseed meal peptones was either higher than or equal to that of soybean peptone.

In general, it was observed that peptones obtained from *herbaceum* responded well to cellulase production followed by *arboreum* and *hirsutum* while amylase production was dominated by peptone prepared by large scale trials from commercial cottonseed meal followed by *arboreum* and *herbaceum*.

EXTERNALLY AIDED PROJECTS :

PREPARATION AND MARKETING OF CIRCOT CALIBRATION COTTON

Marketing of calibration cotton standards is the first project of the Institute which was financed to the extent of Rs. 20 lakhs under the Revolving Fund of the ICAR. During the year one bale from each of four cotton varieties in the short, medium, long and extra long staple categories was subjected to opening and homogenisation. Each homogenised lot was tested for fibre characteristics following rigorous statististical procedures for sampling. The data were analysed and standard values for length, fineness and bundle strength were assigned for the Conventional Set (code named : A, B, C & D) and the HVI Set (code names : HA, HB, HC & HD). Each of the four cottons in a set is stuffed in a cylindrical container (nett. weight 200 g) and all the four containers with appropriate labels are packed in a corrugated box. Adequate stocks of both the sets are available at CIRCOT for supply to spinning mills. Individual containers of cotton standards are also supplied on demand. During the year under report 243 containers were supplied to Indian mills.

EFFECT OF YARN STRUCTURE ON THE DYEING BEHAVIOUR OF COTTON AND POLYESTER BLENDED YARNS/FABRICS

During the period under report efforts were made to procure / prepare ring, rotor and air-jet yarns. Since the facilities for preparing air-jet yarns were not available at CIRCOT, various research organizations and mills were

TABLE 11 : EFFECT OF NITROGEN SOURCES ON AMYLASE AND CELLULASE PRODUCTION

Nitrogen Source	Cellulase Activity				Amylase Activity
	Filter Paper	Cotton Activity	Carboxy Methyl Cellulase Activity	Portein of Enzyme	
G.arboreum					
AK.235	2200	4340	520	368	54
Sanjay(CJ.73)	2200	3000	488	262	51
G.herbaceum					
G.Cot.13	2000	4600	380	300	44
Gujarat 11	2100	5740	460	300	46
Jayadhar	2600	6060	532	326	42
G.hirsutum					
Gujarat 12	1760	5000	500	282	46
Deviraj	2140	4340	532	262	26
SRT.1	2200	4500	488	282	14
G.barbadense					
Suvin	1600	3520	488	240	240
Interspecific Hybrid					
DCH.32	1260	3000	440	300	11
Intraspecific Hybrid					
Hybrid 6	2200	3440	532	262	20
Commercial Cottonseed Meal					
Bench Scale	1760	3900	520	282	37
Pilot Scale	1840	3700	500	262	81
Commercial Soy Peptone	1760	2800	460	300	11
Commercial Meat Peptone	1320	2740	440	282	20

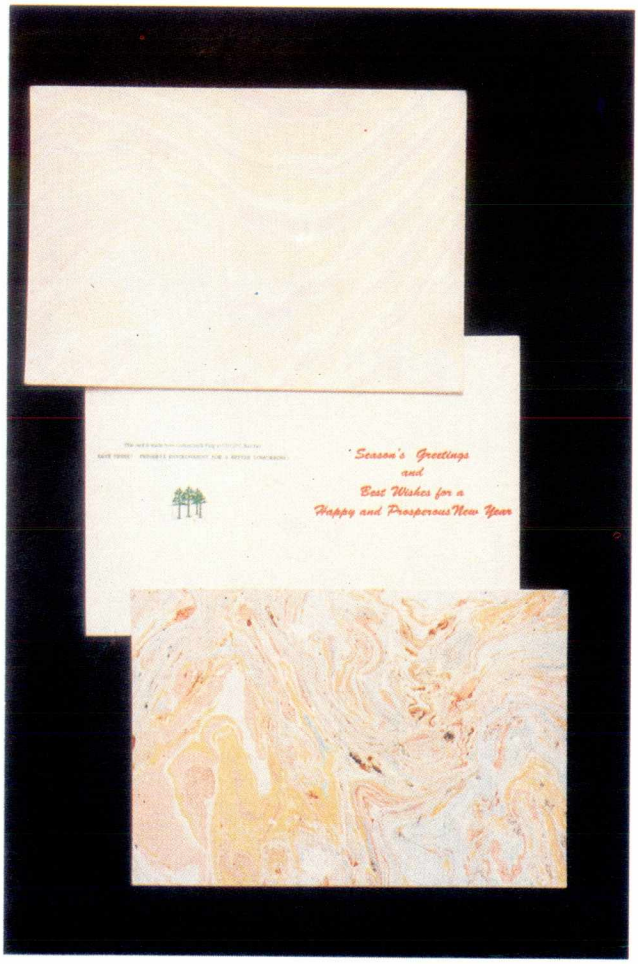
Research and Development

CIRCOT Calibration Cotton for Cotton Quality Testing Equipments

Cotton Fabrics Dyed with Natural Dyes

Research and Development (Contd.)

Enzymatically Deinked Newsprint



Marbled Greeting Cards Made from Pulp of Cotton Stalk

contacted for procuring air-jet yarns. Since SITRA, Coimbatore had the necessary equipment to spin air-jet yarns, 100% polyester air-jet yarns and 65/35 polyester/ cotton blended yarn of 63s and 40s count were obtained from them. Ring spun yarns of similar composition were also supplied by them.

Ring and rotor spun yarns (45s Ne) of different compositions consisting of 100% polyester, 100% cotton, 67:33, 50:50 and 33:67 were prepared at CIRCOT. All the yarns were subsequently, converted into knitted fabrics by employing a single jersey knitted machine.

The yarn samples prepared above were tested for tensile properties such as strength, elongation, etc. The knitted fabrics were tested for physical properties. The blend composition was also verified by chemical method.

UTILISATION OF COTTON PLANT STALKS AND OTHER CROP RESIDUES FOR MAKING PULP AND PAPER THROUGH ANAEROBIC DIGESTION

The construction of 3 m^3 anaerobic digesters has been completed. The digesters are built above ground with brick masonry work. The digesters are covered with M.S. lids coated with FRP material. The lids are housed in water-sealed compartments in order to maintain anaerobiosis. The digesters work as vessels for pretreatment with dilute alkali followed by anaerobic digestion for 7 days. The cellulosic material is boiled by supplying steam through M.S. pipes at high temperature and pressure. After the treatments, water in the digester can be drained by opening the outlets provided. The lifting of digester lids is facilitated by a chain pulley block arrangement set up by the side of the digesters.

3

Technology Assessed and Transferred

1. A power operated gin machine called CLOY Gin working on the principle of Macarthy gin has been designed. The machine consists of a chrome leather roller, fixed knife and a moving knife. The capacity of the machine is about 8 kg. *kapas* per hr. The performance of the machine was evaluated by ginning cultivars like NHH.44, Savita, G.Cot.11, DCH.32, Abadhita, Sharada, KK.119, Suman, G.Cot.11 and LRA.5166. Licence for manufacture has been given to Precision Testing Engineers, Nagpur. About 20 gins have been sold so far.

2. A pedal operated ginning machine having a capacity of one kg *kapas*/hr. was developed at the GTC of CIRCOT and licence for fabrication, supply and servicing has been given to Precision Testing Engineers, Nagpur.

3. Contracts have been signed for design modifications of double roller gins, *kapas* precleaners, lint cleaners and material handling equipments, with some manufacturing companies.

4. Spinning trials for blended and polyester yarn on open-end rotor machine was undertaken for product diversification purpose for Reliance Industries Ltd. Mumbai. The polyester fibres used were 1.0 d x 40 mm, 1.5 d x 40 mm (trilobal) and 1.2 d x 40 mm (trilobal). Both 100% yarns and blends with cotton in the proportion of 52:48 and 65:35 were produced. Yarns spun were 6s,7s, 10s and 16s with twist ranging from soft, normal and high for some of the samples. According to the quality, the yarns produced were subjected to manufacturing trials for handgloves, jeans, suiting, furnishing fabrics and sewing thread by the party. These trials have been reported as successful and encouraging, except for the sewing thread. It failed due to lack of optimum strength.

5. Trials for denim yarn production on ring and rotor machine was undertaken for Raymond Calitri Denim Ltd, Mumbai. Seven cotton samples were subjected to trials and 5.5s OE and 20s RS denim yarns were produced. For rotor spinning

cottons like Sankar 4, AHH.468, J.34 and DHY.286 were found suitable, whereas AHH.468, AKH.4 and Bengal Desi failed to meet the denim yarn requirements. For ring spinning trials, Sanker 4 and Bengal Desai were used. Out of the remaining five cottons, AHH.468 was found unsuitable for production of 20s RS denim yarn.

6. Spare Chemical Pvt. Ltd. had developed a cotton spray which was referred to CIRCOT for performance evaluation. The trial revealed that spraying of the chemical on cotton prior to blowroom operation prevents effective removal of trash and dust particles from cotton during various opening and cleaning operations. The efficiency of cleaning upto the second drawframe stage was very poor for the treated sample – about 68% as against 95% in the case of untreated sample. Besides, processing problems were encountered at the card and at the drawframe as a result of the spray treatment. The classimat analysis of yarns showed that various classes of faults including the objectionable types have increased enormously due to the application of the spray. Very high levels of A, B and C classes of faults in the yarn spun from the treated cotton suggested presence of excessive trash – originating faults. The party was advised not to market the above spray.

7. At the instance of Kotak & Co. Ltd., Mumbai a Post-cleaning treatment of ginned lint of *Desi* cotton was conducted using two efficient blowroom openers, viz. SRRL and Shirley. It was observed that Shirley opener is more effective in lint cleaning for saw-ginned cotton than the SRRL opener. For roller-ginned lint, both the openers were found equally suitable as they removed about 54% of trash. From saw-ginned lint, Shirley opener removed about 63% of trash.

8. Synthesis of cellulose was studied by using an organism belonging to *Acetobacter* species. Optimum growth conditions were identified. It was observed that cellulose production continues as long as the carbon is available in the medium. The organism could synthesise 200 mg of cellulose in 3 days at a pH of 6.0. The cellulose, thus produced, was evaluated for properties such as, tensile strength, sterile nature, bacterial filtration, etc. The project was sponsored by Arex Laboratories Private Limited, Mumbai.

9. Techniques for the application of three natural dyes, viz. Lac, Berberine and Manjith, were developed under a consultancy project with NHDC, Lucknow. The

processes were demonstrated to artisans from handloom industry. Apart from ascertaining the fastness properties, the fabrics were imparted various colour shades from the same dye using eco-friendly dye fixing agents and mordants. The technical feasibility of the process was established by conducting large scale trials in a mill.

10. A Cyclone-dust based biogas plant of 40m^3 capacity was installed at Century Denim, Satrati, Indore. This is a semicontinuous plant being charged with 100 kg of the material every day. About 30 m^3 of biogas generated every day is being used in the effluent treatment plant as thermal source. The plant is being monitored regularly and now the mill intends to go in for the installation of a battery of plants to make use of all the available material.

4

Education and Training

Education

The recognition granted to CIRCOT by the University of Bombay as a Post-Graduate Institution was continued during the year. Nine students were being guided for M.Sc. and eight for Ph.D. Eleven scientists of the Institute continued as guides for M.Sc. and Ph.D. on various disciplines such as, Physical Chemistry, Organic Chemistry, Bio-Physics, Microbiology, Spinning, Textile Physics and Textile Technology.

Shri G.F.S. Hussain, Sr. Scientist, and Shri S.J. Guhagarkar, Technical Officer have been awarded Ph.D. by the University of Mumbai. Shri P.K. Mandhyan, Technical Officer, Shri G.B. Hadge and Shri R.R. Chhagani, Sr. Technical Assistants obtained M.Sc.degree by thesis during the year.

Training

Integrated Training Course on Cotton Quality Evaluation :

In the two week training programme on Cotton Quality Evaluation, 65 sponsored personnel from cotton trade and industry were trained. They were from the Cotton Corporation of India (CCI), Maharashtra State Co.op. Cotton Growers' Marketing Federation (MSCCGMF), EICA, Engineering Entrepreneurs from Calcutta, Jawaharlal Nehru Sahakari Agricultural Produce Processing Society Ltd., Khargone and from some private mills. The courses were conducted in 11 batches of four weeks' duration for the sponsored personnel.

A special training programme of one week was organised for personnel sponsored by RITES. Also, two third year B.Tech. (Textiles) students from Sri Guru Gobind Singh College of Engineering and Technology, Nanded were imparted one month's special training.

Ginning Training :

At the GTC, Nagpur training was given to 137 sponsored personnel from ginning factories and cotton trade organisations.

5

Linkages and Collaboration

CIRCOT has no agricultural farm attached to it at the headquarters but all the Regional Quality Evaluation units located within the agricultural university premises or in the major cotton growing tracts in the country serve as extension units for the Institute. The staff at these units collaborate with the scientists in these agricultural universities or state departments of agriculture through collaborative research projects. These research projects are aimed at solving the problems faced by the farming community in the country. Assistance is also rendered by way of development of useful equipments required by them, by giving suggestions, by discussions, etc. on the technological aspects of cotton at different stages of crop development, post-harvest technology operations and gainful utilisation of cotton crop by-products and agro-wastes.

CIRCOT has regular interaction with CICR, Nagpur and has collaborative programmes with institutions like NABARD, NHDC, etc.

The Director and Scientists of CIRCOT are members of various committees constituted by the Bureau of Indian Standards for cotton and textile testing and they participate in various seminars, symposia, conferences, etc. in the country so that the knowledge and their expertise in various fields are passed on to the user groups. Director and many scientists are members of advisory panels of institutions like BTRA, SITRA, VJTI, UDCT, etc.

Being experts in the field of cotton technology and allied areas, some of the scientists are invited from time to time to give lectures and to participate in various discussions in other organisations. They also publish their research findings, apart from participating in exhibitions displaying technologies developed by them, improvement processes, technologies on by-products and waste utilisation, etc.

Periodical publication of articles based on orginal research findings in national and international journals form yet another part of the extension work.

The Institute conducts regular training courses both at the headquarters and at the Ginning Training Centre (GTC), Nagpur. At the headquarters,

integrated training course on cotton quality evaluation including elementary statistics applicable to textile testing are conducted for the sponsored personnel from the cotton trade and industry while at the GTC, theoretical and practical training is imparted on the different aspects of ginning and maintenance of ginning machines. A hostel that can accommodate about 20 trainees has also been provided at GTC.

Supply of reliable and accurate data on the quality aspects of cotton fibre, yarn and fabrics, consultancy services and publication of research results for the benefit of appropriate user groups have also been an important activity of CIRCOT.

Technical Queries : Many queries from private organisations, semi government, State and Central government departments regarding technologies and devices developed by CIRCOT, instruments designed, methods of test for cotton fibre, yarn and fabric, quality levels of different cotton varieties etc. were replied to. Information on by-products, agro-waste utilistion, etc. were also supplied to various agencies.

Paid Tests : CIRCOT Test House has been receiving a fairly large number of samples of fibre, yarn, fabric as well as samples for various miscellaneous tests from textile mills, government and semi-government organisations, cotton trade and industry for paid tests. CIRCOT's clientele includes Brihanmumbai Municipal Corporation, Nair Hospital, Mumbai Port Trust, etc. for whom several fabric samples of different types and quality were tested. Other organisations for whom paid tests were undertaken during the year 1997-98 are given below:

Sl. No.	Organisation	Type of Test
1.	Central Prison, Aurangabad	Yarn and fabric testing
2.	Central Prison, Pune	"
3.	Central Prison, Nasik	"
4.	Central Prison, Nagpur	"
5.	Govt. Printing Press of Mahaarashtra	
6.	Small Scale Industries and Rural Development of Maharashtra	fabric
7.	Zilla Parishad of Aurangabad	"
8.	Zilla Parishad of Buldhana	"
9.	Zilla Parishad of Nasik	"
10.	CCI	fibre
11.	Engineering Enterpreneurs, Calcutta.	fibre

The number of samples received for paid test during the years 1996-97 and 1997-98 together with average per year for the quinquennium 1991-92 to 1995-96 are given in Table12.

TABLE 12 : TYPES OF PAID TESTS AND THE NUMBER OF SAMPLES TESTED DURING 1997-98

Sr.No.	Type of Tests	Average per year for the quinquennium 1991-92 to 1995-96	1996-97	1997-98
1.	Fibre	1366	1839	4226
2.	Spinning	144	201	29
3.	Yarn	270	309	180
4.	Fabric	223	525	480
5.	Ginning	62	96	286
6.	Trash Content	46	96	286
7.	Miscellaneous	92	72	229
	Total	2203	3237	5773

Besides routine tests, the following special tests were also carried out on samples received from various organisations for paid tests.

1. One sample of Acitex - CS meant for facilitating mechanical processing was received from a chemical firm in Mumbai for research trial for its efficiency. The results showed that spraying of the chemical Acitex-CS on cotton hampers effective removal of trash and dust particles from cotton during opening and cleaning operations evincing that spraying of the chemical Acitex-CS is not advisable on cotton before opening and cleaning.

2. Three carbon samples received from a consultancy firm from Mumbai were tested for XRD radial scan.

3. Fourteen samples of polyester staple fibre (PSF) received from a manufacturing industry at Thane were tested for XRD radial scan and x-ray orientation scan.

4. Two polyester yarn samples received from a leading firm in Thane were analysed by Scanning Electron Microscope (SEM).

5. One sample of metal oxide powder (catalyst) received from B.U.D.C.T., Mumbai was analysed by Scanning Electron Microscope (SEM).

6. Three samples of dentures were received from Nair Hospital Dental College, Mumbai for analysis by the Scanning Electron Microscope (SEM).

7. One sample of asbestos cord were received from a firm in Andheri (E), Mumbai for the determination of cotton content %.

8. Two samples of fabric were received from a reputed firm at Thane Distt. for the determination of percentage of LOI (flamability).

9. Seventy five samples of HDPE woven sacks were received from R & D department of a Public Sector Undertaking in Mumbai for the determination of bursting strength of lamination edge (kg/cm2) for intact and ruptured portion.

10. Three samples of raw cotton were received from a textile firm in Mumbai for microscopical analysis under ultraviolet light.

11. Three cottonseed samples of LRA.5166 received from M.S.C.C.G.M.F for the determination of oil content (%) MFB.

12. Twenty non-woven fabric samples received from Guru Govind Singhji College of Engineering, Nanded, Maharashtra were tested on Instron for breaking load and elongation.

6

Publications

A. Annual Report

Annual Report of the Central Institute for Research on Cotton Technology for the year 1996-97.

B. Research Publications (CIRCOT Publications - New Series)

559. Mukundan, S., Venkanna, K., Nagwekar, S.N. and Ukidve, A.V. – Locational Variations in Fibre Quality of Cottons in Andhra Pradesh (Published in the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 2, p. 137, September 1997)

560. Chattopadhyay, S.K., Paralikar, K.M. and Parthasarathy, M.S. – Air-jet Spinning of some Indian cottons – Part II : Fibre Quality Parameters Affecting Yarn Strength and Spinnability (Published in the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 2, p. 160, September 1997)

561. Kathe, A.A. and Balasubramanya, R.H. – Conversion of Cotton Stalk Nitrogen to Mushroom Protein by three species of *Pleurotus spp.* (Published in the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 2, p. 164, September 1997)

562. Vijayan Iyer, G. and Parthasarathy, M.S. – Design of Mote Grooving Tool and its Holder for Rollers of Roller Gins (Published in the Textile Journal, Vol. 77, p. 4, April 1996)

563. Chattopadhyay, S.K., Bhaskar, P. and Murudkar, V.V. – A Profile on Low Pressure Splicing Technique for Production of Quality Splices (Published in the Journal of Textile Association, Vol. 58, No.2, p.109, September- October 1997)

564. Pai, S.D., Nachane, R.P. and Ukidve, A.V. – Comparative Study of Different Skeins (Published in the Journal of Textile Association, Vol. 58, No.2, p.65, July - August 1997)

565. Sheela Raj, Vivekanandan, M.V., Sreenivasan, S. and Krishna Iyer, K.R. – Measurement of Shear

Stiffness and Draping Quality and their Inter-relationships (Published in the Indian Textile Journal, Vol. 108, No.2, p.18, November 1997)

C. Other Publications

1. Iyer, V., Varadarajan, P.V., and Chattopadhyay, S.K. – Dyeing Studies on Fabrics made from Air-jet and Ring Spun Yarns (Published in Colourage, Vol. 44, No.10, p.23, October, 1997)

2. Venkanna, K., Mukundan, S., Moula, S.P. and Nagwekar, S.N. – Effect of Manures, Fertilisers and Monocropping on Yield and Fibre Quality of Cotton (*G. hirsutum*) Variety LK.861 – (Published in the Journal of Indian Society for Cotton Improvement, Vol. 23, No.1, p. 120, March 1998)

3. Vinzanekar, S.G. and Chattopadhyay, S.K. – An Overview of Rotor Spinning System with Special reference to Machine Variables and Developments (Part I) (Published in the Spinner's World, Vol. 2, No.4, p.1, 1998)

4. Saxena, S., Iyer, V., Shaikh, A.J. and Shenai, V.A. – Dyeing of Cotton with Lac Dye (Published in Colourage Journal, Vol. 44, p.23, November 1997)

5. Annual Cotton Quality Update 1997.

6. Vision 2020 - CIRCOT Perspective Plan.

7. Schedule of Test Fees.

8. CIRCOT Leaflet No. 2 – Ginning Training Course – A Practical Training Programme on Ginning Technology for Ginning Personnel.

9. CIRCOT Leaflet No. 3 – CIRCOT Test House.

10. CIRCOT Leaflet No. 4 – Reducing the Stickness of Cotton – The CIRCOT Approach.

11. CIRCOT Leaflet No. 5 – Training Course in Cotton Quality Evaluation.

12. CIRCOT Leaflet No. 6 – Corrugated Boxes from Cotton Plant Stalk for Packaging.

13. CIRCOT Leaflet No. 7 – Kisan Gin and CLOY Gin.

14. CIRCOT Leaflet No. 8 – CIRCOT Calibration Cottons for Conventional Fibre Testing Equipment and HVI System.

D. Papers Published in Seminars, Conferences, etc.

1. Balasubramanya, R.H., Shaikh, A.J. and Khandeparkar, V.G. – Preparation of Pulp and Paper from Rice Straw via Anaerobic Digestion (Presented at the

International Conference on Frontiers in Biotechnology held at CICR Regional Research Station at Trivandrum during November 26-29, 1997)

2. Paralikar, K.M. and Balasubramanya, R.H. – An Eco-friendly Process for Degumming Ramie (Presented at the International Seminar on Jute and Allied Fibres : Changing Global Scenario held at NIRJAFT, Calcutta during February 5 -6, 1998)

3. Vivekanandan, M.V., Bhama Iyer, P., Sreenivasan, S. and Iyer, K.R.K. – Torsional and Flexural Properties of Ligno-Cellulosic Fibres (Presented at the International Seminar on Jute & Allied Fibres : Changing Global Scenario held at NIRJAFT, Calcutta during February 5-6, 1998)

4. Chattopadhyay, S.K., Ahmed, M. and Krishna Iyer, K.R. – Processing of Natural Fibre Blends on Short Staple (Cotton) Spinning Systems (Presented at the International Seminar on Jute and Allied Fibres: Changing Global Scenario held at NIRJAFT, Calcutta jointly organised by IFS & NIRJAFT during February 5-6, 1998)

5. Bhama Iyer, P., Sreenivasan, S., Iyer, J.K. and Krishna Iyer, K.R. – Round Test for HVI Users' in India (Presented at the 24th International Cotton Conference held at Bremen during March 11 - 14, 1998)

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List of On-going Projects During 1997-98

- Evaluation of the Quality of Cotton Samples received from Research Stations under the All India Co-ordinated Cotton Improvement Project and other Research Projects Financed by ICAR, State Governments, etc.
- Evaluation of Quality of Major Trade Varieties Grown in Different Parts of the Country
- Evaluation of Quality of Standard Varieties of Indian cotton
- Study on the Spinning Performance of Newly Released Varieties of Indian Cottons
- Studies on the Inheritance of Strength and Structural Parameters on Cotton Fibres
- Statistical Prediction of Yarn Strength from Fibre Properties
- Study of Cotton Fibre Properties in Relation to their Development Period.
- The Effect on Fibre Qualities and Yield Levels of Cottons due to Application of Neem Products
- Improving Fibre Properties and Yield Potential of *arboreum* Cottons by Unconventional Breeding Methods
- Effect of Drip Irrigation on Yield and Quality of Cotton
- Abrasion Resistance of Cotton and Cotton Blended Fabrics
- Comparison of Short Fibre Estimates of Cotton by Different Methods.
- Improvement in Processing Techniques of Micro-spinning for Small Lint Samples
- Seed Coat Fragments in Germplasm Lines of *G.hirsutum*
- Study of the Effect of Different Machine Parameters on the Incidence of Seed Coat Fragments
- Scanning Electron Microscopy on Splicing of Cotton and Blended Yarns
- Design Modifications on Pneumatic Splicer for Improved Splicing Action
- Development of CIRCOT Laghu Otai Yantra (CLOY Gin)

- ⇨ Objective Analysis of Fabric Hand and Wear Comfort
- ⇨ Structure, Properties and Wear Comfort of Naturally Coloured Cotton
- ⇨ Dyeing of Cotton with Natural Dyes
- ⇨ A Study on Antibacterial Finishing of Cotton Employing Electron Beam Curing
- ⇨ Effect of Chemical Processing on Dyeing of Knitted Fabrics
- ⇨ Impact of Dyeing on Strength and Colour in Fibres of Different Varieties of Cotton
- ⇨ Preparation of Pulp and Paper from Crop Residues after Processing through Anaerobic Digestion
- ⇨ Utilisation of Cellulase for Deinking of Waste Paper Pulp for Paper Making
- ⇨ Production of Biogas from Cellulosic Wastes at Low Temperature
- ⇨ Microbial Evaluation of Protein Hydrolysates (Peptones) from Cottonseed Meal
- ⇨ Operational Research Project on the Preparation of Paper Grade Pulp from Cotton Plant Stalks by Anaerobic Digestion
- ⇨ Objective Analysis of Fabric Quality Evaluation of Handle, Comfort, and Durability Parameters of Apparel Fabrics
- ⇨ Utilisation of Cotton Plant Stalks and other Crop Residues for Making Pulp and Paper through Anaerobic Digestion
- ⇨ Preparation and Marketing of CIRCOT Calibration Cotton
- ⇨ Effect of Yarn Structure on the Dyeing Behaviour of Cotton and Polyester Blended Yarns/Fabrics

8

SRC, RAC, Management Committee and QRT

Staff Research Council

The ninety-seventh meeting of the Staff Research Council (SRC) was held on June 9 to 11, 13 and 16, 1998. Progress of research work during April 1, 1996 to March 31, 1997 and new projects for 1997-98 were discussed and a new programme of work for 1997-98 was finalised.

The SRC approved two new research project proposals one in Thrust Area I and the other in Thrust Area II for the year 1997-98. The SRC approved one year extension sought for each of 5 projects.

Research Advisory Committee

The third meeting of the Research Advisory Committee (RAC) was held on June 25 and 26, 1997 in which discussions took place on the on-going research projects as well as new research project proposals for 1997-98 and the programme of work for 1997-98 was finalised. On the second day the following two lectures were arranged : (i) **Issues Related to Environment in Agriculture** by Dr. R.P. Kachru, ADG (PE), ICAR and, (ii) **A Physcs-oriented Approach to Problem Solving in Polymers and Fibres** by Prof. V.B. Gupta, Chairman, RAC.

Institute Management Committee

Three meetings (44th, 45th and 46th) were held on April 3, September 4, 1997 and February 20, 1998. Regular items such as confirmation of the minutes of the previous meeting, action taken on the recommendations of the Committee, progress of works, action taken on the recommendations of the Institute Joint Council and Grievance Committee formed the topics for discussion in all the meetings. Discussions on the on-going research projects and research highlights were also part of the deliberations.

Quinquennial Review Team

During the year under report, the Quinquennial Review Team (QRT) submitted its draft report for the eleven year period 1986 to 1996 after a series of meetings and discussions. The following are a few important recommendations incorporated in the report:

1. Formation of a discipline-wise Project Identification Panel consisting of senior scientists / experts from industry and academic institutions.

2. Assessment of market potential through discussion with target groups before a research project is proposed for approval.

3. Widening the range of CIRCOT activities in cottonseed certification and production.

4. Suitable action plan for educating ginners about the precautions to be taken for avoiding contamination in cotton and also training them in the importance of pre and post cleaning of *Kapas* to produce quality lint.

5. Intensifying training programmes at the zonal levels separately and also in areas where ginning factories are concentrated.

6. Formulating necessary classification system for instrumental grading.

7. Modernising Mechanical Processing Division of CIRCOT.

8. Procurement of additional land at Navi Mumbai for the Institute's activities.

9. Expanding the activities of Ginning Training Centre at Nagpur.

10. Phased reduction of regional stations and strengthening of the retained units, posting an experienced scientist as officer in-charge of each unit, improving communication facilities for monitoring their work and widening the scope of these units.

11. Asking for a one-time grant of Rs.20 crores from ICAR to meet the urgent needs of the Institute.

12. Seeking retention of the present ratio of scientific, technical and administrative staff.

Research Advisory Committee Meeting

Dr. K.R.Krishna Iyer, Director, CIRCOT Welcomes the Members. Seated are (from l to r) Mr. S.R. Lather, Member, Mr. V. Ramachandran, Member, Dr. N. Balasubramanian, Member, Dr. V. Sundaram, Member, Mr. Sudhir Sanghi, Member, Prof. (Dr.) V.B. Gupta, Chairman, Dr. R.P. Kachru, ADG (PE), ICAR

Dr. R.P. Kachru, ADG (PE), ICAR giving a Talk on Issues Relating to Environment in Agriculture at the Concluding Session of the RAC

Quinquennial Review of CIRCOT

The QRT in Discussion with Scientists of CIRCOT. Seated are (from l to r, facing) Dr. R.B. Patil, Member, Dr. K.R. Krishna Iyer, Director, CIRCOT, Dr. Jaiprakash, Chairman, Ms.(Dr.) Pushpa Bajaj, Member, Dr. N.E. Dweltz, Member and Dr. S.R. Vengsarkar, Member

Management Committee

Management Committee in Session

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Participation of Scientists in Conferences, Meetings, Workshops, Symposia, etc.

Director, Scientists and Technical personnel of CIRCOT participated in the following scientific and technological conferences, seminars, meetings, etc. connected with the work of this Institute.

Sl. No.	Meetings/Conferences/ Seminar/Symposia, etc.	Place	Date	Name(s) of the person who attended
1.	DST - C II Interaction Meet with Testing and Calibration Laboratories	New Delhi	29-04-1997 & 30-04-1997	Dr. (Smt.) P. Bhama Iyer
2.	One-day Awareness Programme on Intellectual Property Rights and Strategic Implications for Industry and R&D	Mumbai	28-06-1997	Dr. R.P. Nachane
3.	One day Seminar on Industrial Hydraulics	Mumbai	19-08-1997	Dr. S.K. Chattopadhyay
4.	One day ASHIRWAD Rajbhasha Adhikari Conference	Mumbai	10-10-1997	Shri M. Ahmed
5.	National Conference on Post GATT Scenario in Cotton Research and Development and Trade	Nagpur	16-10-1997 & 17-10-1997	Dr. G.R. Anap
6.	Half-day Seminar on Improving Yarn Quality to International Level for World Trade	Mumbai	24-11-1997	Dr. K.M. Paralikar and . Dr. S. Sreenivasan
7.	International Conference on Frontiers in Biotechnology	Trivandrum	26-11-1997 to 29-11-1997	Dr. R.H. Balasubramanya

Sl. No.	Meetings/Conferences/ Seminar/Symposia, etc.	Place	Date	Name(s) of the person who attended
8.	Two day National Seminar on Calibration and Testing of Non-electrical Parameters	Mumbai	04-12-1997 & 05-12-1997	Shri M.V. Vivekanandan
9.	Third International Conference on PAPEREX' 97 on Pulp and Paper	New Delhi	16-12-1997 to 20-12-1997	Shri A.J. Shaikh and Dr. P.V. Varadarajan
10.	Fifth National Science Conference	Gwalior	10-01-1998 to 12-01-1998	Shri M. Ahmed
11.	Three day National Workshop on X ray Analysis (XRAN'98)	Nagpur	19-01-1998 to 21-01-1998	Shri S. Sekar and Shri M.V. Vivekanandan
12.	Seminar on Technical Textiles	Mumbai	31-01-1998	Dr. A.V. Ukidve, Shri M. Ahmed and Dr. S.K. Chattopadhyay
13.	International Seminar on Jute and Allied Fibres : Changing Global Scenario	Calcutta	05-02-1998 & 06-02-1998	Dr. K.M. Paralikar Dr.R.H. Balasubramanya, Dr. (Smt.) P. Bhama Iyer and Shri M. Ahmed
14.	Seminar on Technology Choice in Spinning	Mumbai	02-03-1998 & 03-03-1998	Shri M. Ahmed
15.	National Symposium on Biotechnology in Agriculture and Environment	Chandigarh	25-03-1998 & 26-03-1998	Dr. S.G. Gayal

HVI Users' Meet

Dignitaries on the Dais (from l to r) Dr. K.R.Krishna Iyer, Director, CIRCOT, Mr. B.C. Khatua, Textile Commissioner, Mr. Sudhir Sanghi, Chairman, Indian Cotton Development Council, r. Gajendra Singh, Deputy Director General, ICAR, Mr. Hossein M. Ghorashi, Sr. Vice President R&D and Engineering), Zellweger Uster, USA, Ms. Anjah C. Schleth, Zellweger Uster, USA and Mr. V.R. Ratnam, President, Zellweger Uster (India)

A Section of the Audience

CIRCOT-User Group Meet

Dr. G.R. Nadiger, Director, Central Testing Laboratory of Textiles Committee, Mumbai Addressing the Delegates. Seated are (l to r) Dr. T.A. Somashekar, Director, Central Silk Board, Bangalore, Mr. Y.P. Singh, Secretary, Textiles Committee, Mumbai, Dr. K.R.Krishna Iyer, Director, CIRCOT, Mumbai

A Section of the Audience

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Workshops, Seminars, Summer Institutes, Farmers' Day, etc. Organised at the Institute

HVI Users Meet

A HVI Users Meet was organised by CIRCOT at Holiday Inn, Juhu, Mumbai on May 31, 1997 to discuss the results of a *Round Test* conducted by this Institute. This one day event, sponsored by Zellweger Uster was inaugurated by Mr. B.C.Khatua, Textile Commissioner, Govt. of India, Mumbai. The Guest of Honour at the Inaugural Session was Mr. Sudhir Sanghi, Chairman, Indian Cotton Development Council (ICDC). Dr. Gajendra Singh, Deputy Director General (Engg.), ICAR, presided over the session.

It was observed that the deviant results obtained on HVI in the round test is attributable to lack of proper instrument calibration, faulty humidification system and improper specimen preparation methods.

CIRCOT - User Group Meet

CIRCOT organised a meeting of the current and prospective user groups who can avail of the testing facilities already available and those to be created through financial assistance from the Ministry of Textiles. The meet had participation by 25 representatives from trade, industry and government and non-government organisations who regularly use the test reports from CIRCOT for their commercial transactions, apart from members of an appraisal team consisting of Shri Y.P.Singh, Secretary, Textiles Committee, Dr. G.R.Nadiger, Director, Central Testing Laboratory, Textiles Committee and Dr. T.A. Somashekar, Director, Central Silk Board , who were appointed by the Ministry of Textiles, to assess the requirements additional of testing facilities at CIRCOT. Five representatives from different segments of user groups expressed their views on the type of additional testing needs of the textile trade and industry. Discussions were centered round the type of samples received by CIRCOT for testing as well as the methodology adopted at CIRCOT to provide timely and accurate results to the large number of clients who approach CIRCOT for their testing needs.

Celebration of 50 Years of India's Independence

As per directive from the Council fifty years of India's Independence was celebrated with various programmes:

1. On August 15, 1997, the Independence day was celebrated with cultural programmes and competitions for the children of staff members at a grand get-together at the Seminar Hall of CIRCOT.

2 A quiz programme was conducted for staff members under the auspices of the CIRCOT Club at the Library Hall.

3. Special leaflets on various technologies developed by CIRCOT were brought out.

4. Planning was done to conduct a national seminar in April, 1998.

Conventional Grading vis-a-vis Instrumental Grading

This was jointly organised by CIRCOT and the EICA on October 9, 1997, Thirty delegates from trade and industry participated in the workshop. The forenoon session comprised lectures on topics like instrumental tests, contamination of cotton and problems encountered by mills in cotton selection. Six cottons tested on instruments for trash, length, fineness, tenacity and spinnable count, were kept for visual grading. Twelve members of cotton trade carried out estimation of these characteristics by traditional hand-and-eye methods. It is evident from the comparison of the estimates by men and machines that there is a wide range of variation in values obtained by visual estimation. Workshop demonstrated fact that visual grading demands exceptional skill attainable only by a few.

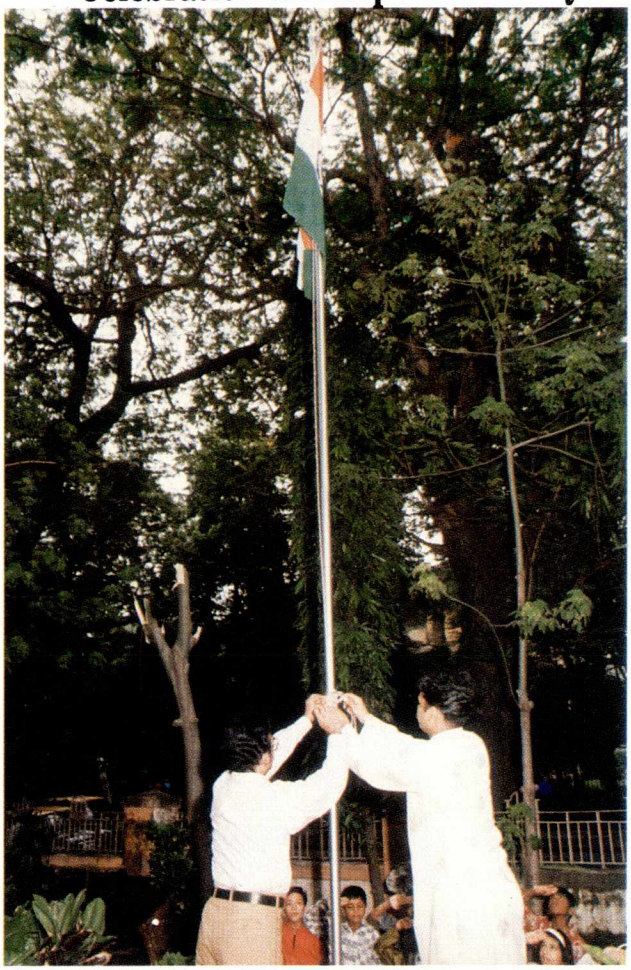
N-House Computer Training

During the year, computer training was imparted to 36 members of the staff belonging to various departments. The training was mainly on the use of Windows 3.1, Windows 95, M.S.Office, e.mail and Internet accessing.

Computer Training for Establishing ARIS Cell

Computer Training Course in two batches — first batch from July 31, to August 8, 1997 and the second batch from August 28 to September 5, 1997 — was conducted at CIRCOT for HCL-HP, as per directive from the Council under NARP for establshing ARIS Cells. In all, 45 participants from NRCs, SAUs, PDs and ICAR Institutes of Maharashtra and Gujarat attended the course. The topics covered in the course included Windows 3.1, MS Office, Novell Netware 4.1 and Visual C++.

50 Years of India's Independence
Celebration of Independence Day



Dr. K.R.Krishna Iyer, Director Hoisting the National Flag

Staff and Invitees Saluting the Flag

Celebration of Independence Day (Contd.)

Dr. K.R.Krishna Iyer, Director, CIRCOT Addressing the Audience at the Independence Day Get-together

Participants of the Fancy Dress Competition for Children

Workshop on
Conventional Grading Vs. Instrumental Grading of Cotton

Mr. Suresh Kotak, President, EICA, Mumbai Addressing the Participants of the Workshop. Seated (l to r) Mr. Shirish Shah, EICA, Mumbai and Dr. K.R.Krishna Iyer, Director, CIRCOT, Mumbai

Visual Grading in Progress

ARIS Cell Training Course

Inauguration of the First ARIS Cell Training Course by Dr. A.V. Ukidve, Principal Scientist, CIRCOT

Mr. D. Radhakrishna Murthy, Course Co-ordinator Addressing the Trainees. Dr. K.R. Krishna Iyer, Director, CIRCOT is in the Chair

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Distinguished Visitors

1. Dr. R.S. Paroda, Secretary, DARE, Director General, ICAR, New Delhi.
2. Dr. M. Rafiq Chaudhry, Head, Technical Information Section, International Cotton Advisory Committee, Washington, USA.
3. Shri Y.P. Singh, Secretary, Textiles Committee, Mumbai.
4. Dr. G.S. Nadiger, Director, Central Testing Laboratory, Textiles Committee, Mumbai.
5. Dr. T.H. Somashekar, Director, Central Silk Board, Bangalore.
6. Dr. (Prof.) Gajendra Singh, DDG (Engg.), ICAR, New Delhi.
7. Dr. R.P. Kachru, ADG (PE), ICAR, New Delhi.
8. Dr. (Prof.) V.B. Gupta, Retd. Professor, Department of Textile Technology, IIT, New Delhi.
9. Shri Sudhir Sanghi, Chairman, Indian Cotton Development Council (ICDC), Hyderabad
10. Shri S.R. Lather, Progressive Farmer, Nashik, Maharashtra.
11. Shri V. Ramachandran, General Manager (Spinning), Century Textiles & Industries, Mumbai
12. Dr. N. Balasubramanian, Retired Deputy Director, BTRA, Mumbai.
13. Dr. A.K. Basu, Advisor (Cotton), Cotton Corporation of India, Mumbai.
14. Shri M.N. Joshi, Director (Purchase & Sales), Cotton Corporation of India, Mumbai.
15. Dr. Jaiprakash, Advisor, Northern India Textile Research Association (NITRA) Ghaziabad.
16. Dr. R.B. Patil, Retd. Director, Institute for Post Graduate Studies, University of Agricultural Sciences, Dharwad, Karnataka.
17. Dr. Pushpa Bajaj, Professor, Textile Technology, IIT, New Delhi.
18. Dr. N.E. Dweltz, Retd. Deputy Director, ATIRA, Ahmedabad.
19. Dr. S.R. Vengsarkar, Chief Executive Officer, Zenith Fibres, Baroda.
20. Dr. M.S. Kairon, Director, CICR, Nagpur.

12

Infrastructural Facilities

Library

To keep pace with the advancements in the field of cotton research, latest available books on cotton technology and agro-waste utilisation as well as books of general research interest are periodically added to the library. During 1997-98, 60 books were purchased. The total number of books at the end of March 1998 was 5021. With the addition of 80 bound volumes of journals, the total number of bound volumes stands at 6548. One hundred journals were obtained through subscription. Many journals were also received as complimentary or on exchange basis. During the period Rs. 5 lakh worth of books and periodicals were added to the library. Besides the staff of this Institute, the library facilities were availed of by students and researchers from various colleges affiliated to Mumbai university, sister institutions and personnel from textile industry. Inter-library loan facilities were also maintained with other libraries in Mumbai.

List of Major Equipments Procured

1. SKF-PK-225 Drafting System for Ring Frames
2. SKF-PK-1400-60 Drafting System for Fly Frames
3. Small Diameter Circular Knitting Machine
4. Inverter Drive System for Speed Frame
5. Ring Spindle Centering Device
6. Ring Spindle Lubricating Machine
7. Inverter Drive System for Micro-drawframe, Fly Frame and Carding machine
8. Uster HVI 900 for fibre quality evaluation
9. Uster AFIS for fibre quality evaluation
10. Single Yarn Strength Tester
11. KMI Make 1.3 Model Yarn Strength Testing Machine
12. Electronic Balance (Contech)
13. Kawabata Fibre Bending Tester (KES FB2) for fibric handle evaluation
14. Baby Boiler (40 Kg/h) for use in biopulping
15. Power Driven Chaff Cutter for cotton stalk.

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Personnel

Major events during 1997-98 relating to CIRCOT personnel are listed below :

A. APPOINTMENTS

Sl. No.	Name	Designation	Effective date of appointment
		1. Scientific Staff	
1.	Dr. R. H. Balasubramanya	Head, C.B.P. Division	25-09-1997
2.	Dr. S. Sreenivasan	Head, Q.E.I. Division	25-09-1997
3.	Kum. Premiladevi Thongbom	Scientist	28-08-1997
4.	Shri N. Shanmugham	Scientist	12-12-1997
5.	Shri T.S. Manoj Kumar	Scientist	24-12-1997
		2. Technical Staff	
1.	Kum. C.D. D'Souza	Technical Asstt. (for project)	01-07-1997
2.	Shri R.P. Kadam	Lab Technician (for project)	01-07-1997

B. PROMOTIONS

Technical Staff

The 12 yearly assessment of eligible technical staff was held and promotions granted as indicated below :

Sl. No.	Name	Grade to which promoted	Effective date of promotion
1.	Dr. (Smt.) S. D. Pai	T-6	01-07-1995
2.	Shri H. R. Laxmivenkatesh	T-6	01-07-1995
3.	Shri C. R. S. Moni Iyer	T-6	01-01-1996
4.	Shri K. V. Anantha Krishnan	T-6	01-01-1996
5.	Shri G. Vishwanathan	T-6	01-01-1997

The five yearly assessment of eligible technical staff was held and promotions/advance increments granted to the following technical personnel:

Sl. No.	Name	Grade to which promoted	Effective date of promotion
		Promotion through Assessment	
1.	Shri D. N. Moon	T-5	01-07-1997
2.	Shri Vijayan Iyer	T-5	01-01-1997
3.	Shri K. Venkanna	T-4	01-07-1996
4.	Shri R. R. Chhagani	T-4	01-01-1997
5.	Shri H. S. Koli	T-4	01-01-1997
6.	Shri U. D. Devikar	T-4	01-01-1997
7.	Shri M. B. Chandanshive	T-2	01-01-1997
8.	Shri B. V. Shirsat	T-2	01-01-1997
9.	Shri D. M. Corriea	T-2	01-01-1997
		Promotion through DPC	
1.	Shri C. L. Mundale	T-1	01-01-1997
2.	Shri S. K. Parab	T-1	01-01-1997
		Advance Increments	
	Shri I. H. Hunsikatti	One advance increment	01-07-1996

Supporting Staff

1. Shri Hari Singh Bhabar to the post of S.S. Gr. IV w.e.f. 29-06-1996.
2. Shri S. D. Gurav to the post of S.S. Gr. III w.e.f. 29-06-1996.
3. Shri Mohsin Ahmed to the post of S.S. Gr. II w.e.f. 29-06-1996.

C. TRANSFERS

1. Shri Anil Kumar, Tech. Asstt. T-II-3 from CIRCOT H.Q. to Q.E. Unit of CIRCOT, Indore w.e.f. 19-05-1997.
2. Shri S. Banerjee, Sr. Tech. Asstt. T-4 from Q.E. Unit of CIRCOT, Indore to CIRCOT H.Q.w.e.f. 26-08-1997.
3. Shri Naveen, Fin. & Accounts Officer from CIRCOT to ICAR, New Delhi w.e.f. 21-01-1998.
4. Shri R. G. Dhakate Tech. Asstt. T-II-3 from Q.E. Unit of CIRCOT, Akola to CIRCOT H.Q. w.e.f. 17-02-98.
5. Shri B. P. Nema, Sr. Scientist, CIAE, Bhopal to GTC, Nagpur w.e.f. 09-02-1998.

D. RETIREMENT

1. Dr. V. G. Khandeparkar, Principal Scientist and Head, CBPD retired voluntarily from service w.e.f. 2-4-1997 (FN)

2. Shri T. R. Kadam, Technician T - 1, retired from service on superannuation w.e.f. 31-5-1997.

3. Shri K. S. Bhyrappa Technical Officer T-7, retired from service on superannuation w.e.f. 30-9-1997.

4. Shri. R. G. Chiplunkar, Technician Gr. T-1, retired voluntarily from service w.e.f. 2-2-1998. (FN).

E. RESIGNATIONS/TERMINATION

1. Shri S. Kumar Subaramanian, Sr. Technical Asstt. T - 4, resigned from service w.e.f. 3-9-1997.

2. Smt. S. D. Shetye, Sr. Technical Asstt. T-4, resigned from service w.e.f. 23-1-1998.

3. Shri G. Vijayan Iyer, Technical Officer T-5, resigned from service w.e.f. 10-2-1998.

F. DEPUTATION

1. Smt. V. V. Janaskar, Jr. Clerk on deputation for another one year at Lalbahadur Shastri College of Advance Maritime Studies and Research, Mumbai.

2. Shri R. G. Shambarkar, Jr. Stenographer on deputation for three years w.e.f. 1-7-1997 to Patent Information System, Nagpur.

G. OBITUARY

Shri P. G. Kadam, Technical Assistant T-2 expired on 10-12-1997 while in service.

STAFF WORKING AT THE CENTRAL INSTITUTE FOR RESEARCH ON COTTON TECHNOLOGY AS ON 31-03-1998

(List does not include vacant posts)

LIST OF STAFF AT THE HEADQUARTERS

Scientific Personnel

Director

Dr. K. R. Krishna Iyer, M.Sc., Ph.D., F.T.A.

Principal Scientist

Dr. A. V. Ukidve, M.Sc., Ph.D., F.T.A.

Head of Division

1. Dr. S. Sreenivasan, M.Sc., Ph.D.
2. Dr. R. H. Balasubramanya, M.Sc. (Agri.)., Ph.D.

Senior Scientist

1. Shri M. Ahmed, B.Sc., B.Text.
2. Dr. G. R. Anap, M. Tech., Ph.D.
3. Dr. (Smt.) P. Bhama Iyer, M.Sc., Ph.D.
4. Dr. (Smt.) S. P. Bhatawadekar, M.Sc. Ph.D.
5. Dr. S. G. Gayal, M.Sc., Ph.D.
6. Shri A. K. Gupta, M.Sc., L.L.B., W.P.M.M.T.
7. Shri R. M. Gurjar, M.Sc.
8. Dr. G. F. S. Hussain, M.Sc., Ph.D.
9. Smt. J. K. Iyer, M.Sc.
10. Dr. R. P. Nachane, M.Sc., Ph.D.
11. Dr. K. M. Paralikar, M.Sc., Ph.D., F.R.M.S.
12. Smt. Prema Nair, M.Sc.(Agri.)
13. Kum. C. R. Raje, M.Sc.
14. Shri A. J. Shaikh, M.Sc.
15. Dr. P. V. Varadarajan, M.Sc., Ph.D.
16. Dr. (Smt.) Vatsala Iyer, M.Sc., M.Phil., Ph.D.
17. Dr. N. C. Vizia, M.Sc., Ph.D.

PERSONNEL

Scientist (Senior Scale)

1. Shri P. Bhaskar, M.Sc.
2. Dr. S. K. Chattopadhyay, B.Sc. Tech. (Text.), M.Tech., (Text. Engg.), Ph.D.
3. Shri S. B. Jadhav, M.Sc.
4. Dr. D. N. Makwana, M.Sc., Ph.D.
5. Shri D. V. Mhadgut, M.Sc.
6. Shri G. S. Patel, M.Sc.
7. Shri K. H. Sawakhande, M.Sc.
8. Dr. (Smt.) Sujatha Saxena, M.Sc., Ph.D.

Scientist

1. Kum. Premiladevi Thongbom, M.Sc.
2. Shri N. Shanmugam, M. Text. (Textile Manufacture)

Technical Personnel

Technical Officer T-7

1. Shri T. K. M. Das, B.Sc., D.B.M., D.E.I.M., Dip.J., D.P.R., Cert. I.S.R.S.
2. Shri H. U. Gangar, B.E., (Electrical) Grade I.E.T.E.

Technical Officer T-6

1. Shri K. V. Ananthakrishnan, M.Sc., D.B.M.
2. Shri S.Chandrasekhar, L.T.M., A.T.A., Cert.S.Q.C.
3. Shri B. S. Ganvir, B.Sc.
4. Shri S. N. Nagwekar, B.Sc.
5. Shri H. R. Laxmivenkatesh, D.T.T., A.T.A., L.T.I.
6. Shri E. A. Pachpinde, M.Sc.
7. Dr. (Smt.) S. D. Pai, M.Sc., Ph.D., F.T.A.
8. Shri R. S. Pathare, B.Sc.
9. Shri C. R. Sthanu Subramony Iyer, M.Sc., D.B.M., A.T.A.
10. Dr. (Smt.) Sudha Tiwari, M.Sc., Ph.D.
11. Shri G. Viswanathan, M.Sc., A.T.A.

Technical Officer T-5

1. Shri S. G. Dalvi, S.S.C., Cert. Wireman, Cert. Ref. & A.C., Govt. Elect. Sup.
2. Shri S. M. Gogate, B.Sc.
3. Dr. S. J. Guhagarkar, M.Sc., Ph.D.
4. Shri I. H. Hunsikatti, B.Sc., A.T.A.
5. Smt. S. R. Kamath, B.Sc.
6. Smt. A. A. Kathe, M.Sc.
7. Shri V. V. Kshirsagar, S.S.C., I.T.C.Cert. Elec. Super., Cert. F.&S., Conditioning Plant Operator
8. Shri P. K. Mandhyan, M.Sc., A.T.A.
9. Shri R. M. Modi, S.S.C., Cert. Photography
10. Shri D. N. Moon, B.Sc.
11. Smt. N. D. Nachane, B.Sc.
12. Shri D. Radhakrishnamurthy, M.Sc., M.Phil.
13. Shri K. B. Rajagopal, B.Sc.
14. Shri S. Sekar, B.Sc.
15. Smt. R. K. Shahani, B.Sc., B.Lib., M.A.
16. Smt. S.V. Sukhi, M.Sc. D.F.L.(German)
17. Shri V. B. Suryanarayanan, B.Sc., D.F.L.(German)
18. Shri D. L. Upadhye, S.S.C.(Tech.)., N.C.T.V.T. (I.T.I.&C.T.I.)
19. Shri S. Vancheswaran, B.Sc.
20. Shri T. Venugopal, B.E. (Civil)

Senior Technical Assistant T-4

1. Shri S. Banerjee, M.Sc.
2. Shri R. R. Chhagani, M.Sc.
3. Shri U. D. Devikar, B.Sc.
4. Shri P. B. Gurjar
5. Shri G. B. Hadge, M.Sc.
6. Shri R. K. Jadhav, B.Sc.
7. Shri H. S. Koli, B.Sc.
8. Shri M. Mohan, M.Sc., Dip. J.
9. Shri V. V. Murudkar, L.T.M.
10. Shri R. D. Nagarkar, M.Sc.
11. Shri B. R. Pawar, B.Sc., (LL.M.)
12. Shri R. S. Prabhudesai, B.Sc., D.C.M.
13. Smt. C. D. Prabha, M.Sc.
14. Shri P. N. Sahane, D.I.F.T.
15. Smt. Sheela Devi Raj, M.Sc.
16. Shri M. V. Vivekanandan, B.Sc.

Technical Assistant T-II-3

1. Shri V. N. Bhorkar, B.Sc.
2. Smt. Bindu Venugopal, B.Sc.
3. Smt. Binu Surendaran, B.Sc.
4. Shri R. G. Dhakate, B.Sc.
5. Shri S. N. Hedau, B.Sc.
6. Shri V. D. Kalsekar, B.Sc.
7. Shri D. U. Kamble, B.Sc.
8. Smt. S. P. Kawelkar
9. Shri S. V. Kokane, B.A.
10. Shri R. R. Mahangade, M.Sc.
11. Smt. P. B. Subasri Subramanian, B.Sc.
12. Smt. N. A. Sonkusle, B.Sc.
13. Shri R. M. Sonke, B.Sc.
14. Shri. B. B. Gaykar (Driver)
15. Shri S. S. Patekar (Driver)

Hindi Translator

Smt. K. R. Joshi M.A.

Category T-I-3

1. Shri D. B. Gadankush
2. Smt. K. K. Kale, B.A.
3. Shri D. V. Kambli (Wireman)
4. Shri S. B. Kamble
5. Shri G. D. Narkar (Carpenter)
6. Shri H. K. Pawar
7. Shri S. G. Shinde

Category T-2

1. Shri M. B. Chandanshive, Cert. Cot. Spin. (Machinist/Fitter)
2. Shri D. M. Correia, S.S.C., I.T.I., N.C.T.V.T. (Mechanic)

PERSONNEL

Category T-1

1. Shri G. G. Ambare
2. Shri M. G. Ambare
3. Shri A. R. Bane
4. Shri G. S. Deorukhkar
5. Shri B. R. Jadhav
6. Shri N. D. Kambli
7. Shri K. K. Kasar
8. Shri R. R. Khurdekar
9. Shri T. S. Mhaske
10. Shri K. D. Mohite
11. Shri M. R. Nevrekar
12. Shri S. K. Parab
13. Shri S. V. Patil
14. Shri. D. A. Salaskar (Driver)
15. Shri B. K. Sawant
16. Shri C. V. Shivgan, H.S.C., Cert.Wireman, Cert. Electrician, N.C.T.V.T., Cert. Elec.Supr. (PWD)., Cert.M.&A.W.(Technician)
17. Shri M. B. Thokrul
18. Shri V. Y. Unhalekar
19. Shri S. A. Waghela

Auxiliary Personnel

Canteen Staff

Smt. K. R. Khaire (Tea Maker & Dish Cleaner)

Administrative Personnel

Administrative Officer

Shri N. N. Lotha, B.Tech. (Agri.)

Finance and Accounts Officer

Shri Naveen, M.Com.

Assistant Administrative Officer

1. Shri P. D. Sonawane, B.A., L.L.B.
2. Shri K. Sudhakaran

Superintendent

1. Shri M. Z. Bhagat
2. Smt. M. V. Kamerkar, B.A.
3. Shri G. Moosad, B.Com.

Assistant

1. Smt. Jayagouri Sivaramakrishnan
2. Shri K. W. Khamkar, B.A.
3. Shri S. N. Salve
4. Shri B. D. Sawant
5. Shri A. B. Dalvi
6. Shri D. G. Kulkarni
7. Shri B. S. Bhenwal
8. Smt. S. S. Shanbhag
9. Smt. S. Koshy, B.Com.
10. Smt. V. V. Desai
11. Smt. S. D. Ambre
12. Smt. T. P. Mokal M.A.
13. Smt. S. M. Desai
14. Shri A. P. Natu
15. Smt. J. J. Karanjavkar

Senior Stenographer

Smt. S. D. Dudam, M.A.

Stenographer

1. Smt. T. T. Souz
2. Smt. U. N. Bhandari

Junior Stenographer

1. Smt. R. R. Tawde B.Com.
2. Kum. V. S. Nayak
3. Smt. S. G. Parab B.A.

Senior Clerk

1. Shri E. T. Gurav
2. Shri K. Parleshwar
3. Smt. S. R. Shirsat, B.A.
4. Shri N. V. Kambli
5. Shri J. R. Mangale, B.Com.

Junior Clerk

1. Shri S. D. Ambolkar
2. Shri R. K. Pallevad, B.A.
3. Shri P. V. Jadhav
4. Smt. S. P. Paiyala
5. Shri V. M. Sable
6. Smt. J. R. Chavkute
7. Shri A. K. Kunjipalu
8. Kum. B. G. Menon
9. Shri S. V. Kasabe, B.Com.
10. Shri S. S. Angane
11. Shri A. R. Gujar
12. Shri T. D. Dhamange, B.Com.

PERSONNEL

Sr. Gestetner Operator

Shri A. B. Sawant

Supporting Staff Gr. IV

Shri C. Mhatri

Supporting Staff Gr. III

1. Shri N. J. Kharat
2. Shri M. Y. Chandanshive
3. Shri R. B. Jadhav
4. Shri S. M. Sawant
5. Shri M. B. Gurve
6. Shri O. T. Thapa
7. Shri B. R. Satam
8. Shri D. M. Chougule
9. Shri S. D. Gurav

Supporting Staff Gr. II

1. Smt. T. V. Bhowar
2. Shri M. K. Ghadge
3. Shri M. Z. Rathi
4. Shri N. Singh
5. Shri D. B. Temgire
6. Shri D. M. Raje
7. Smt. B. R. Balmiki
8. Shri C. S. Salvi
9. Shri R. S. Rane
10. Shri T. B. Khan
11. Shri K. T. Ghogale
12. Shri R. R. Gosai
13. Shri L. S. Takkar
14. Shri M. M. Katpara
15. Shri M.A.A. Rashid

Supporting Staff Gr. I

1. Shri C. P. Solanki
2. Shri M. J. Sumra
3. Shri H. B. Vesmiya
4. Shri G. N. Mayawanshi
5. Shri S. K. Bobate
6. Shri P. P. Patil
7. Shri R. G. Tak
8. Shri R. P. Karkate
9. Shri S. B. Worlikar
10. Shri N. D. Walzade
11. Shri S. G. Phalke
12. Shri M. M. Kadam
13. Shri S. N. Bandre
14. Shri D. G. Gole
15. Shri C. D. Acharekar
16. Shri M. K. Prabhulkar
17. Shri J. D. Sakpal
18. Shri V. B. Khandeshe
19. Shri A. D. Sonawane
20. Shri S. D. Magar
21. Shri V. Murugan
22. Shri S. R. Tondse
23. Shri V. T. Poojari
24. Shri S. P. Naik
25. Shri M. N. Kamble
26. Kum. K. T. Thapa

LIST OF STAFF AT THE QUALITY EVALUATION UNITS

AKOLA

Technical Officer T-5	:	Shri N. V. Bansode, B.Sc.
Supporting Staff Grade II	:	Shri S. R. Patode

COIMBATORE

Technical Officer T-5	:	Smt. Santa V. Nayar, B.Sc.
		Shri S. Venkatakrishnan, MSc., A.T.A
Sr. Technical Assistant T-4	:	Shri K. Thiagarajan, M.Sc.
Operator T-3	:	Shri K. V. Nair
Supporting Staff Grade IV	:	Shri N. Arumugham
Supporting Staff Grade III	:	Shri V. M. Subramanian

DHARWAD

Technical Officer T-5	:	Shri M. T. Danoli
Technical Assistant T-II-3	:	Shri K. Narayanan, B.Sc.
Supporting Staff Gr.I	:	Shri C. J. Bagalkoti
	:	Shri A. F. Gudadur

GUNTUR

Technical Officer T-5	:	Shri S. Mukundan, B.Sc.
Technical Assistant T-4	:	Shri K. Venkanna, M.Sc., B.Ed.
Supporting Staff Gr.IV	:	Shri Ch. Thimmanna
Supporting Staff Gr.III	:	Shri V. Y. M. Suvarchala Rao

HISAR

Senior Technical Assistant T-4	:	Shri Amarpal, B.Sc.
	:	Shri Jal Singh, B.Sc.
Supporting Staff Gr.IV	:	Shri Gian Singh

INDORE

Technical Assistant T-II-3	:	Shri P. S. Anil kumar, B.Sc.
Supporting Staff Gr.IV	:	Shri John Robert
	:	Shri H. S. Bhabar

PERSONNEL

LUDHIANA

Technical Officer T-8	:	Shri Ram Parkash, B.Sc., L.L.B.
Sr. Technical Assistant T-4	:	Shri Hamid Hassan, M.Sc.
Technical Assistant T-II-3	:	Shri Nehrulal Meena
Supporting Staff Gr.I	:	Shri Satyanarayan Gope
		Shri Sarup Singh

NAGPUR

Sr. Scientist	:	B. P. Nema, M.Tech. (Agril. Engg.) (Farm Machinery & Power)
Scientist	:	Shri P. G. Patil, M.Tech. (Post-Harvest Engg.)
		Shri T. S. Manojkumar, M.E. (Agril) (Agril. Structure & Process Engg.)
Technical Officer T-6	:	Shri V. M. Kulmethe, B.Sc.
Sr. Technical Assistant T-4	:	Shri S. L. Bhanuse, B.Sc.
		Shri M. Bhaskar, Dip. Ref. & Air-Cond.
		Shri V. L. Rangari, B.Sc.
Technical Assistant T-2	:	Shri B. V. Shirsath, B.A., I.T.I.
Technical Assistant T-1	:	Shri C. L. Mundale
		Shri P. N. Raut, S.S.C. (Tech), H.S.C., Dip.Elect.Eng., N.T.C., N.A.C., N.C.T.V.T.
Senior Clerk	:	Shri B.D. Dhengale
		Smt. G. G. Palorkar, B.A.
Junior Clerk	:	Shri S. A. Telpande, M.Com.
Driver (T-I)	:	Shri R. A. Suddawar
Machine Operator (T-1)	:	Shri B. H. Umredkar
Supporting Staff Gr.II	:	Shri A. R. Chutale
		Shri J. P. Patel
		Shri R. B. Kautkar
		Shri P. S. Panchbudhe, M.A.
		Shri M. P. Tohokar
Supporting Staff Gr.I	:	Shri R. G. Matel
		Shri R. C. Rokde
		Shri M. G. Bhandkkar

NANDED

Scientist	:	Dr. L. D. Deshmukh, M.Sc., Ph.D.
Technical Assistant T-II-3	:	Kum. P. L. Indurkar, B.Sc.
Supporting Staff Gr.III	:	Shri L. R. Indurkar
Supporting Staff Gr.II	:	Shri S. N. Umare

RAHURI

Technical Officer T-5	:	Shri R. S. Darade, B.Sc.
Technical Assistant T-II-3	:	Shri C. M. More, B.Sc.
Supporting Staff Gr.II	:	Shri D. G. Kamble

SIRSA

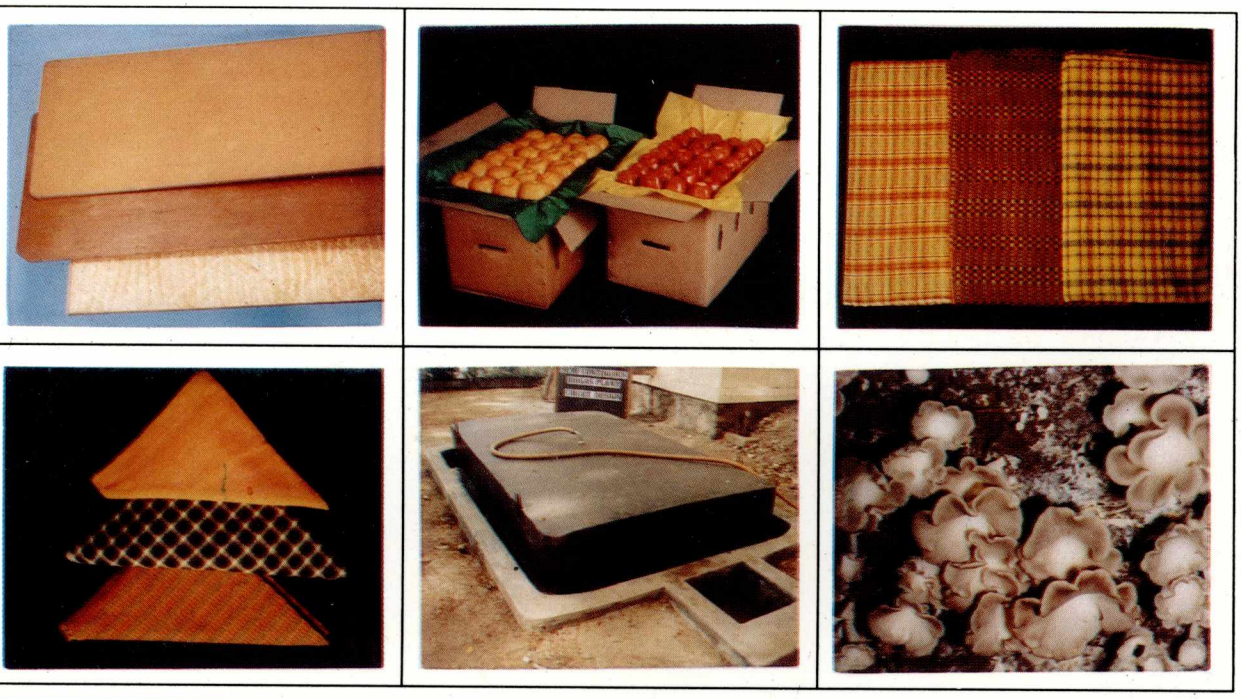
Senior Technical Assistant T-4	:	Shri Udai Vir Singh, B Sc., B.Ed.
Supporting Staff Gr.I	:	Shri Mahabir Singh

SRIGANGANAGAR

Senior Technical Assistant T-4	:	Shri Matish Chandra, M.Sc.
Supporting Staff Gr.IV	:	Shri Vijendra Singh
Supporting Staff Gr.III	:	Shri Sanwarmal Saini

SURAT

Scientist (Sr. Scale)	:	Shri Y. Subrahmanyam, M.Sc.
Technical Officer T-5	:	Shri M. C. Bhalod, B.Sc.
Technical Officer T-5	:	Shri G. G. Mistry, B.Sc.
Sr.Technical Assistant T-4	:	Shri M. B. Patel, B.Sc.
Senior Clerk	:	Shri J. I. Parmar, B.Com.
Operator (T-I)	:	Shri J. B. Dhodia
Supporting Staff Gr.III	:	Shri K. M. Rathod
Supporting Staff Gr. I	:	Shri M. G. Sosa



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