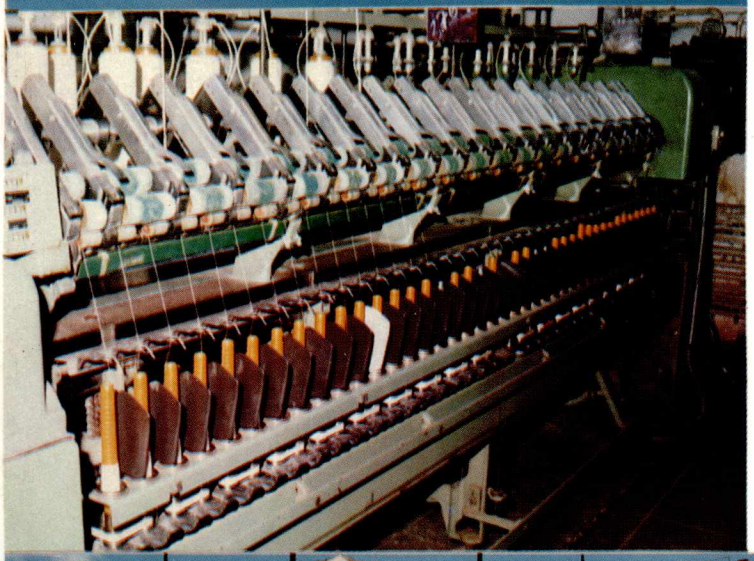

CIRCOT

ANNUAL REPORT

1996-97

भारतीय स्वतंत्रता का स्वर्ण जयंती वर्ष GOLDEN JUBILEE YEAR OF INDIA'S INDEPENDENCE
भाकृअनुप ICAR
1947-1996

Central Institute for Research on Cotton Technology, Mumbai

CIRCOT

ANNUAL REPORT

1996-97

Central Institute for Research on Cotton Technology

Indian Council of Agricultural Research

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Executive Summary

This is the Seventy-third Annual Report of CIRCOT covering the period April 1, 1996 to March 31, 1997.

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

About 3,000 cotton samples from various breeding trials were evaluated at the head-quarters, while more than 12,000 samples from initial stages of trials were screened at the Regional Quality Evaluation Units. The Institute continued as the co-ordinating centre for technology under the AICCIP and screened as many as 2,000 samples of cotton for fibre properties and spinning potential.

The total number of books in the Institute library stands at 4961 and of bound volumes of journals at 6468. The recognition granted to CIRCOT by the Bombay University as a post graduate Institution has been continued during this year as well.

Highlights of Research Results : Simple and multiple correlation coefficients and regression equations between fibre and yarn properties were determined for statistical prediction of yarn strength from fibre properties. Fibre functions were framed by combining the fibre parameters which had high correlation with yarn count and strength. The prediction equations from these functions were compared with the multiple regression equations. High correlation between fibre properties like 2.5% span length, Micronaire value and bundle tenacity at 3.2 mm gauge length and yarn parameters such as count and lea strength were found for the data analysed on 44 cottons. Equations for predicting count and lea strength using fibre functions were suggested.

Crossing programme (Line x Tester) was attempted with three female parents of extra-long *G. hirsutum* white cotton and 13 male parents of coloured cotton for a study on the structure-properties and wear comfort of naturally coloured cotton. The colour of hybrids was lower by 30% to 50% in almost all cases while all samples showed improvement in colour when washed with natural soap. Yield, seed index, lint index, ginning percentage and all fibre properties showed positive heterosis. The hybrids which

had LC-1-1 as the male parent were superior in all respects and appear promising for commercial exploitation. After exposure to sunlight for 210 hours there was decrease in tenacity at 3.2 mm gauge length.

To study the effect on fibre qualities and yield levels of cotton due to application of neem products, a field trial with 3 replications and 10 treatments was conducted in RBD. In general, no adverse effect was observed on fibre qualities due to application of neem products. Treatment with NSP 50 Kg/ha at 60 days after sowing (DAS) + 0.035% endosulfan at 60, 75, 90 & 105 DAS recorded better technological performance while treatment with NSP 25 Kg/ha at 30 days after sowing (DAS) + 0.035% endosulfan at 60, 75, 90 & 105 DAS recorded the highest yield of 1310 Kg/ha.

In a study to improve fibre properties and yield potential of *arboreum* cottons by unconventional breeding methods, it was observed that the strain 94/381 recorded significantly superior technological performance over entries in set I. The strains 94/326, 94/275 and 94/263 recorded significantly superior fibre tenacity.

The study on the effect of drip irrigation on yield and quality of cotton showed that the variations in seed cotton yield, ginning percentage, seed index, lint index, 2.5% span length, Micronaire value, percentage of mature fibres and tenacity were non-significant for different levels of drip irrigation. However, drip irrigation system was found to be beneficial for cotton cultivation because of 50% saving of water.

The physical and engineering properties of 64 cotton cultivars were evaluated in a study on engineering properties of cottonseed. It was found that the seed size has direct bearing on the size of seed grids to be selected during ginning. For quality ginning of *kapas,* seed grids with slots varying from 1.75 soot (7/32") to 3.5 soot (19/64") are recommended. The bulk density of 425 Kg/m^3 and coefficient of friction of 0.65 could be selected for design purpose. These values could be used for designing screw conveyors, flight conveyors and vertical screw lifts or bucket elevators for conveying cottonseed.

The work pertaining to about 12 samples under a study on the effect of different ginning machine parameters on the incidence of seed coat fragments (SCF) has demonstrated that SCF can be reduced to any desired level by reducing the speed of the rollers.

Spliced joints in 40s count polyester/cotton blended yarn with different compositions were examined in SEM. In the case of 75/25 P/C blend, loosely wound circular wrappers are formed with less entanglement of fibres at the joint. Retention of strength (RSS) and extensibility (RSE) was less compared to 50/50 P/C blended yarn. In the case of 50/50 P/C yarn, apart from circular wrappers the fibres from both the ends of yarn seem to be properly entangled, thereby retaining higher strength and elongation. In the case of 25/75 P/C blended yarn also the entanglement of fibres is poor with fibres running more or less parallel and no twist in the splicing zone, thereby reducing RSS and RSE. In the case of 100% polyester yarn, the fibres are scattered with circular wrappers in the splicing zone and have less RSS and RSE values in comparison with other blends.

The study on determination of relationship between imperfections and Classimat faults in yarn was continued. Thirty commercial yarn samples of export quality were tested on the Evenness tester at four sensitivity levels, *viz.* -40,3,3; -40,2,2; -50,3,3; -50,2,2. The samples were also tested on Classimat and Hairiness meter. The – 50,3,3 level of imperfection showed lower correlation with Classimat faults (r = 0.70) as compared to the imperfection level of – 40,3,3 (r = 0.82). As the time taken to carry out imperfection tests is much less than the time taken for Classimat test, estimation of total Classimat faults could be done quickly using regression equation. The study also proved that there is no relation between hairiness and the number of imperfections.

A foot operated ginning machine was developed during the period under report. The performance of this machine is satisfactory. About 1 kg *kapas* can be ginned in an hour. The gin will be useful for farmers to gin small samples of *kapas* mainly to extract seeds for sowing.

Under a study on design modifications on pneumatic splicer for improved splicing action, various spares were procured for carrying out the first modification. For independent control of air pressure through the AFR unit a bypass arrangement from the air supply source to the nozzle assembly has been made. A modular RFL unit has been also installed for adding moisture to the supplied air. These modifications will help in using the machine on experimental rig with independent control of working elements.

Aqueous swelling of cotton fibre accompanied by stretch has been found to increase tenacity, specific work of rupture, initial and secant moduli, and reduce the extension of single fibres of cotton under a study on structural weak links in cotton. The increase in tenacity due to treatment was well correlated with the increase in tenacity of raw fibre on wetting. Wetting affected the tensile characteristics of raw fibres whereas, it did not alter the tensile properties of treated fibres.

Low stress mechanical properties for a set of cotton fabrics differing in the number of ends and picks and yarn count, both in warp and weft directions, were measured by using the Kawabata evaluation system for fabrics for an objective analysis of fabric handle and wear comfort. Both the primary handle value (PHV) and total handle value (THV) were computed. It was found that both yarn count and number of threads influenced the low stress mechanical parameters. In the case of cotton fabrics to be used as summer suitings, it was noted that as cloth cover increased, properties like stiffness, crispness, smoothness and fullness also increased, thereby increasing the PHV and consequently the THV also. Summer suitings of more than average handle could be prepared from cotton using coarser yarns in the warp and weft directions and also by increasing the number of threads in both directions to effectively achieve a cloth cover of more than 20.

To study the effect of yarn structure on the dyeing behaviour of textiles, knitted fabrics prepared from ring spun (RS) and air-jet spun (AS) polyester/cotton blends were dyed with disperse and reactive dyes. Disperse dyeing was carried out by HTHP method. The dyed materials were evaluated for colour strength, wash fastness and light fastness properties. It was found that under the same conditions of dyeing, air-jet spun

samples possess higher colour strength as compared to ring spun samples. Significant differences in fastness properties were not observed.

In a study of dyeing of cotton with natural dyes, technique for dyeing cotton yarns with calcium salt of lac dye, which is used for dyeing wool and silk, as well as with sodium salt of lac dye, has been standardised. The dyed samples had good rubbing and perspiration fastness and fair fastness to light. Washfastness, which was very poor, could be improved either by using formaldehyde-free dye fixing agent or by mordanting. Mordanting produced different colours as well. A technique for dyeing of cotton fabrics and yarns to a bright yellow colour with 'berberin', a natural dye used with silk and wool, has also been standardised. The dyed yarns showed fair washfastness, good rubbing and perspiration fastness but very poor fastness to light. Though mordanting in general decreased the washfastness, iron mordanting improved the lightfastness, significantly.

Work on optimisation of chemicals for antibacterial treatment using 3-10% zinc acetate, 6-12% acetic acid and hydrogen peroxide was carried out for a study on antibacterial finishing of cotton employing electron beam curing. To ascertain the durability of the finish, the treated fabric samples along with the control fabric were subjected to a number of laundering cycles as per standard method. These samples were evaluated for physical and antibacterial properties. Fabric samples treated with 5% zinc acetate and laundered, recorded 100% antibacterial performance and showed antibacterial activity for *S. aureus* even after 15 washes. Trials to impart antibacterial finish using electron beam at various dosages are in progress.

To study the effect of chemical processing on dyeing of knit goods, directly bleached and conventionally bleached cotton knitted fabrics were dyed with cold and hot brand of dyes. It was observed that under given conditions of dyeing, single jersey fabrics show higher colour strength than double jersey fabrics. Direct bleached fabrics showed higher colour strength than scoured-bleached fabrics. In the case of direct bleached fabrics, enzyme treated ones showed lower colour strength than those not treated with enzyme while in the case of scoured-bleached fabrics, enzyme treated ones showed higher colour strength than those not treated with enzyme.

In a study of dyeing of cotton fibres, mechanical treatment was found to adversely affect the colour strength of the dyed fibres. The extent of fall in the colour strength varied from dye to dye. A general fall in the tenacity and elongation was also observed after dyeing. The percentage maturity and colour strength were strongly associated.

Corrugated boxes of various dimensions were prepared by using kraft paper made from cotton stalk pulp. These boxes were evaluated for various strength properties and supplied to KKV, Dapoli and CISH, Lucknow for conducting packaging and transportation trials on mangoes and to NRCC, Nagpur for trials on oranges. Test results in KKV and CISH trials indicated that there was no damage to the boxes or the fruits after completion of the transportation trials. The suitability of these boxes for packaging and transportation of mangoes was thus established. Transportation trial with oranges is under way.

A number of non-ionic softeners were prepared by condensing cottonseed oil, split cottonseed oil and hydrogenated cottonseed oil with polyethylene glycols of different molecular weights. The products prepared from hydrogenated cottonseed oil did not develop any rancid smell upon storage. All the products had natural pH and were stable in neutral, alkaline and slightly acidic media. These were also unaffected by electrolytes; therefore, these can be effectively used in hard water also.

For the preparation of pure fatty acids from low grade cottonseed oil, splitting of raw, refined and hydrogenated cottonseed oil was done by three methods : (i) modified Twitchell method (ii) enzymatic splitting, and (iii) splitting under pressure. Conditions of splitting by Twitchell method and enzymatic method were optimised to obtain maximum yield. To obtain maximum yield by chemical splitting, 8 hr reaction time is required, while enzymatic splitting requires 20 hr of reaction time.

A two step process for making pulp from crop residues has been standardised. Anaerobic digestion followed by mild alkali treatment has been found to be effective for pulping cotton stalk and rice straw. The new process referred to as biopulping has been patented. Feasibility studies for preparing pulp and paper from rice straw using this bio-pulping process is underway. Saving on chemicals and energy as well as the low polluting nature of effluents are the merits of this new process.

Hydra pulp was prepared from newspaper waste to study the efficiency of cellulase enzyme in deinking by hydrolysis. Optimisation study showed that 3% cellulase concentration gives good deinking result. Trials were also carried out to improve the strength of the deinked pulp by blending it with sisal pulp and by adding guargum. Paper sheets made from deinked pulp are being evaluated for various properties.

In a study of the production of biogas from cellulosic wastes at low temperature, it was observed that a mixed microbial consortium maintained at CIRCOT not only enhances the biogas production but also works at low temperature. In order to establish this finding, trials were conducted by incubating the entire bench scale assembly in an environmental chamber maintained at different temperatures. The results indicated that biogas can be produced at 15° C - 18° C as efficiently as at 25°C - 30°C.

A method has been standardised for the preparation of peptones from cottonseed meal obtained from commercial meal as well as from various cotton varieties belonging to the four cultivated species and a couple of hybrids. The peptones obtained from cottonseed meal were used in microbial media as a nitrogen source for growing micro-organisms, *viz.* bacteria, fungi, yeast and actinomycetes. It was found that the peptones specifically enhanced bacterial sporulation in the case of *Bacillus subtilis* and actinomycete cultures, *Streptomyces flavus* and *S. scabies.*

Extension Activities : The Director and Scientists of CIRCOT are members of various committees of BIS for cotton and textile testing and of advisory panels of ATIRA, BTRA, SITRA, VJTI, UDCT, etc. 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 were some of the key extension activities of CIRCOT during the reporting period. Further, over 3000 samples received at the Testing House were tested and reports issued soon after. Total test fees received during the reporting period was Rs. 7,50,069/-. Training courses on cotton quality evaluation were conducted at the headquarters for 7 batches of sponsored personnel totalling 37. An amount of Rs.1,55,500 was received as training fees. At GTC, Nagpur 159 sponsored ginning personnel were trained in five batches and sum of over Rs. 2 lakhs was received as training fees.

CONTENTS

1

Introduction

This seventy-third Annual Report of the Central Institute for Research on Cotton Technology (CIRCOT), covers the period April 1, 1996 to March 31, 1997.

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 given a re-orientation and geared up towards meeting the technological challenges aimed at increasing the production and quality of cottons in the country. Research on the better utilisation of cotton and cotton agro-wastes was accorded priority recently in order to make cotton cultivation more remunerative, apart from opening up self employment opportunities to rural people.

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

The Mandates of CIRCOT are as follows :

* 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 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 and undertake commercial testing of textile materials for the benefit of trade, industry and government agencies.
* To develop new technologies for utilization 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.

Organisation : As could be seen from the organisational chart in Annexure I, Director heads the Institute assisted by a team of Senior Scientists and Technical Officers. An Administrative Officer provides him assistance in the general admission while the Finance and Accounts Officer looks after matters concerned with budget, accounts and audit.

Library : To keep pace with the advancements in the field of cotton research, latest available books on cotton, cotton technology, waste utilisation and general books of research interest are purchased for the library. During 1996-97, 37 books were added and the total number of books by the end of March 1997 was 4961. With the addition of 160 bound volumes of journals during the year, the total number of bound volumes stands at 6468. Forty-six Indian and 54 foreign journals were obtained through subscription. Two hundred journals dealing with Textiles and allied subjects are being received in the library. During the period an expenditure of Rs. 5,38,953/- was incurred on the purchase of books as well for subscribing to journals.

Besides the staff of this Institute, the facilities were availed of by the students and researchers from various colleges affiliated to Bombay university, sister institutions and personnel from the textile industry. Inter-library loan facilities were also maintained with other libraries in Bombay.

New Equipments : As list of equipments added to the various Divisions/Sections is given in Annexure II.

Distinguished Visitors : Shri R. Kumar and Shri J. S. Munnolli, Director (West Zone) and Asstt. Director, respectively in the Ministry of Textiles, Govt. of India, Dr. R. S. Paroda, Director-General, ICAR, and Ms. Vibha Pandey, Director, Finance, ICAR visted the Institute apart from Prof. G. Singh, DDG, ICAR and Dr. R. P. Kachru, ADG, ICAR who visited in connection with official work on various occasions.

Management Committee : Forty-third meeting of the Management Committee was held on September 3, 1996. Regular items such as, confirmation of the minutes of the previous meeting, action taken on the recommendations of the Committee, progress of expenditure, progress of works, action taken on the recommendation of the Institute Joint Council and Grievance Committee, discussions on on-going research projects and research highlights, etc. formed topics for discussion.

National Science Day Celebration : The National Science Day which falls on February 28 every year was celebrated in 1996-97 also with a one day ***National Seminar on Eco–friendly Pathways to Textile Finishing and Agrowaste Utilisation*** organised by the Institute in collaboration with the ARS Forum on March 1, 1997 at VJTI Auditorium, Matunga, Mumbai. This seminar highlighted the researches in eco-friendly chemical finishing and agrowaste utilisation being carried out in different laboratories in the country. The seminar was inaugurated

by Shri Ajay Prasad, National Programme Manager, UNDP and chaired by Prof. Gajendra Singh, DDG, ICAR. Key note addresses were given by Dr. S. P. Ghosh, DDG, ICAR, New Delhi, Dr. M. S. Kairon, Director, CICR, Nagpur and Dr. S. R. Male, Vice-President, Excel Industries, Mumbai.

In all, 12 papers were presented in two Technical Sessions — *(i) Textile Processing and Finishing,* and *(ii) Agrowaste Utilisation* which touched upon various ecological issues relating to textile finishing and agrowaste utilisation.

National Seminar on Future Prospects for Denims in India : A one day National Seminar on ***Future Prospects for Denims in India*** was organised by CIRCOT and Indian fibre Society at Leela Kempinski, Mumbai on April 27, 1996. The seminar was inaugurated by Shri M. B. Lal, Chairman and Managing Director, CCI, Mumbai,. Prof. (Dr.) Gajendra Singh, DDG, ICAR was the Chairman of the inaugural session. Shri S. Padmanabhan, Chief Executive, Denims Operations (India), Aravind Mills Ltd., Ahmedabad and Atul K. Singh, Chief Operating Officer, Ashima Denims, Ahmedabad presented the keynote address. In all nine technical papers were presented at the seminar.

National Seminar on Eco-Friendly Cotton : A two day National Seminar on Eco-friendly Cotton was organised jointly by Indian Society for Cotton Improvement (ISCI), CIRCOT and CICR, Nagpur at VJTI Auditorium, Mumbai on June 8 and 9, 1996. Dr. A. B. Joshi, former Vice-Chancellor of Mahatma Phule Krishi Vidyapeeth, Rahuri inaugurated the seminar. Shri M. B. Lal, Chairman and Managing Director, CCI, Mumbai chaired the inaugural session. Shri C. V. Radhakrishnan, Chairman, ISCI Executive Council welcomed the delegates and gave a brief idea of the activities of ISCI. Dr. A. K. Basu, Counsultant, CCI and Convenor of the Seminar Organising Committee presented the theme of the seminar.

The following issues were discussed in the seminar :

— *Global demand for organic (green) cotton and naturally coloured cotton.*

— *Present status of global and Indian efforts on production of organic cotton and naturally coloured cotton.*

— *Current R&D efforts in the field of planning for future.*

— *Certification of organic cotton and legislative measures for production of naturally coloured cotton.*

— *Present status of processing for eco-friendly cotton.*

— *Domestic and export prospects for organic/coloured cotton production and processing.*

— *Future strategies towards organic/ naturally coloured cotton production and processing.*

The above issues were deliberated on a common platform involving R&D organisations in public and private sectors, trade, textile mills and others interested in the subject, and recommendations were made for the implementation by all concerned, including Government.

Productivity Week Celebration : In connection with the observance of

Productivity Week as per the directive from the Government of India, a lecture by Shri K. G. Deshpande, Secretary, Bombay Chapter, Quality Circle Forum of India and Dy. General Manager, HRD, Mahindra Tractor Ltd., Mumbai on ***Quality Circle for Empowerment*** was organised on February 22, 1997.

Staff Research Council : The ninety-sixth meeting of the Staff Research Council (SRC) was held on April 8 and 10, 1996. Progress of research work during April 1, 1995 to March 31, 1996 and new project proposals for 1996-97 were discussed and a new programme of work for 1996-97 was finalised. This was further discussed in the Management Committee Meeting held on September 3, 1996.

Research Advisory Committee : The second meeting of the Research Advisory Committee (RAC) was held on December 11 & 12, 1996 in which discussions on the On-going research projects took place; new project proposals for 1996-97 were also considered and suggestions/modifications were made. On the second day Dr. V. B. Gupta, Chairman, RAC delivered a seminar talk on ***Structural Dependence of Mechanical Properties of Fibres.***

Research Projects : In all, there were 35 on-going research projects grouped under the following five Thrust Areas :

Thrust Area	No. of Research Projects
1. Technological Research for Cotton Quality Evaluation and Improvement	11
2. Post-harveest Technology of Cotton	10
3. Structure, Property and their Inter-relationships in Textile Materials	2
4. Chemical Processing and Finishing Treatments	5
5. Utilisation of By-products of Cotton and Processing Wastes	7

Post-Graduate Training : The recognition granted to CIRCOT by the University of Bombay as a Post-Graduate Institution was continued during the period. Eight students were being guided for M.Sc. and six for Ph.D during the year. Eleven scientists of the Institute are recognised guides for M.Sc. & Ph.D. in various disciplines such as Textile Physics, Physical chemistry, Organic chemistry, Biophysics, Microbiology and Spinning.

Hindi Week Celebration : The Hindi week was celebrated from September 9 to 13, 1996 at the Institute. The programmes inaugurated by Pundit Kiran Mishra, the well known poet and musician, included the following competitions:

Short Speech	*Kavita Kathan*
Essay Writing	*Antakshari*
Noting and Drafting	*Vak-Pratiyogita*
Technical Essay	

The concluding function at the Institute was presided over by Shri Vinod Sharma, Announcer, Akashwani. Prizes were distributed by him to the winners of various competitions.

PLATE I

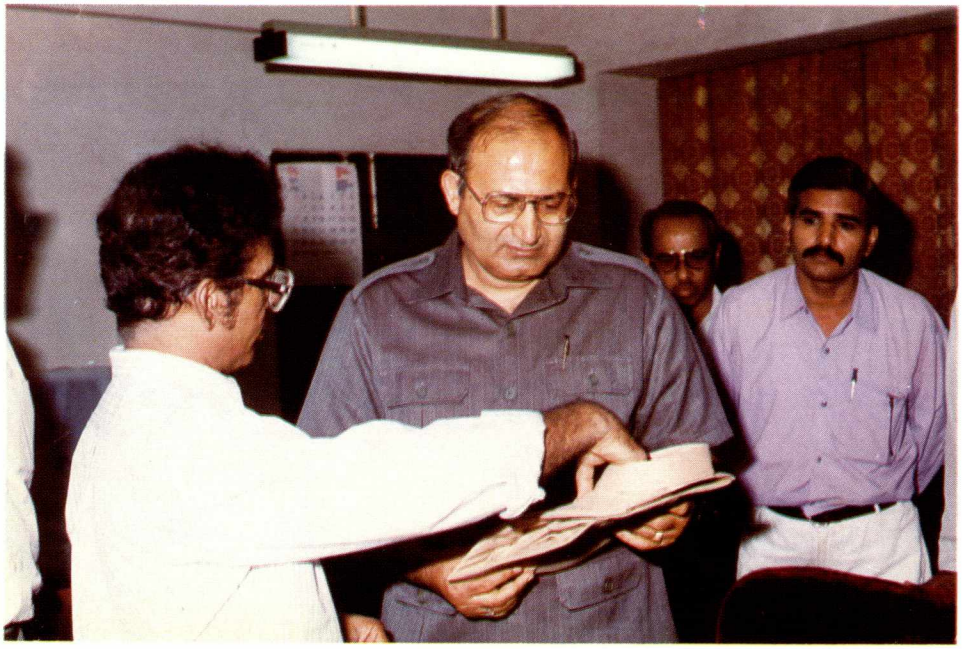
VISIT OF DIRECTOR GENERAL, ICAR TO CIRCOT

Dr. R.S. Paroda, DG, ICAR, keenly observes a shirt made out of coloured cotton prepared at CIRCOT

The DG, ICAR in the HVI Section

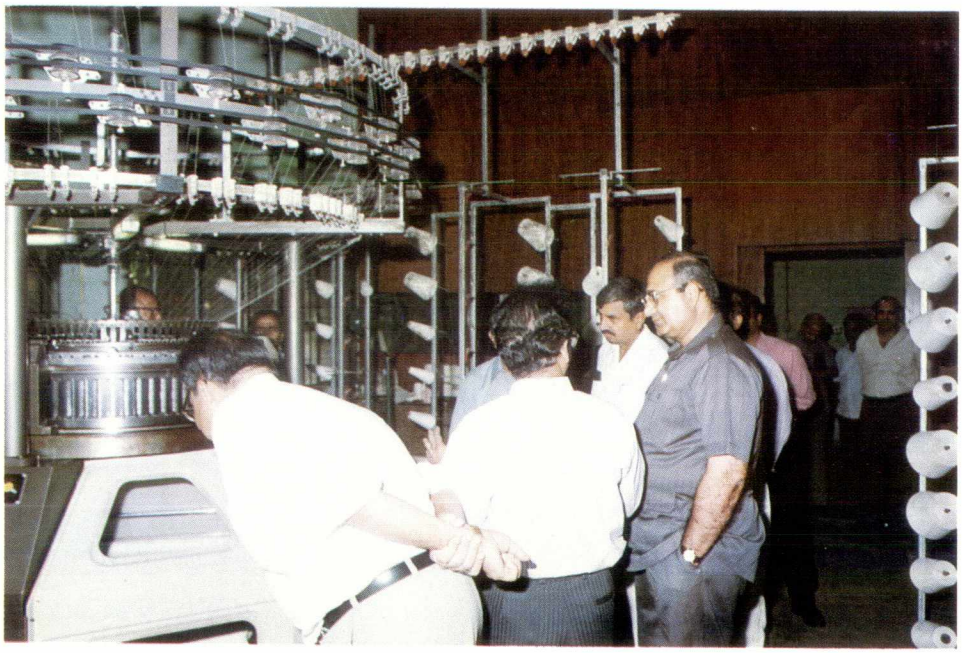
PLATE I

VISIT OF DIRECTOR GENERAL, ICAR TO CIRCOT



Dr. R.S. Paroda, DG, ICAR, keenly observes a shirt made out of coloured cotton prepared at CIRCOT

The DG, ICAR in the HVI Section



The DG keenly observes the functioning of the Double Jersey Knitting Machine

The DG in discussion with Scientists at the Chemistry Division

PLATE II

NATIONAL SEMINAR ON FUTURE PROSPECTS FOR DENIMS IN INDIA

Welcome address by Dr. K.R. Krishna Iyer, Director, CIRCOT

A section of the audience

Dr. Gajendra Singh, DDG(E), ICAR, Chairman of the Inaugural Session, addresses the delegates

Dr. Gajendra Singh inspecting a denim fabric made out of naturally brown coloured cotton. Alongside is Dr. K.R. Krishna Iyer, Director, CIRCOT

PLATE III

NATIONAL SEMINAR ON ECO-FRIENDLY COTTON

Inaugural address by Dr. A.B. Joshi, former Vice Chancellor, MPKV, Rahuri

Release of Souvenir by N.S. Kulkarni, President, ISCI, Mumbai

Cotton Monograph "Cotton Physiology" being released by Dr. V. Santhanam, FAO Expert (Retd.), Coimbatore

A section of the audience

PLATE IV

RESEARCH ADVISORY COMMITTEE MEETING

RAC Session in progress

(From L to R) Dr. V.B. Gupta, Chairman, RAC, Dr. K.R. Krishna Iyer, Director, CIRCOT, Dr. R.P. Kachru, ADG(PE), ICAR, and Dr. V.G. Khandeparkar, Member-Secretary, RAC

Dr. V.B. Gupta, Chairman, RAC, gives a talk on "Structural Dependence of Mechanical Properties of Fibres"

PLATE V

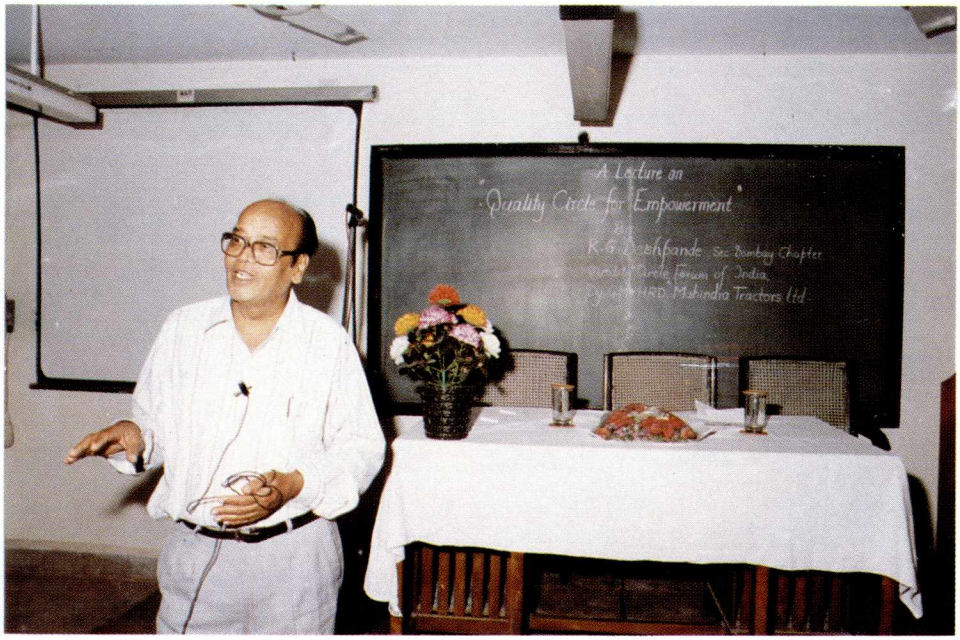
SEMINAR ON ECO-FRIENDLY PATHWAYS TO TEXTILE FINISHING AND AGRO-WASTE UTILISATION

Dr. Gajendra Singh, DDG(E), ICAR, delivers the Chairman's address at the Inaugural Session

A section of the audience

PLATE VI

NATIONAL PRODUCTIVITY WEEK



Shri K.G. Deshpande, Deputy General Manager, Mahindra Tractors Ltd., Mumbai, giving a lecture on "Quality Circle for Empowerment"

PLATE VII

GINNING TRAINING

Ginning Training at the GTC, Nagpur

A stall in the exhibition organised along with the seminar

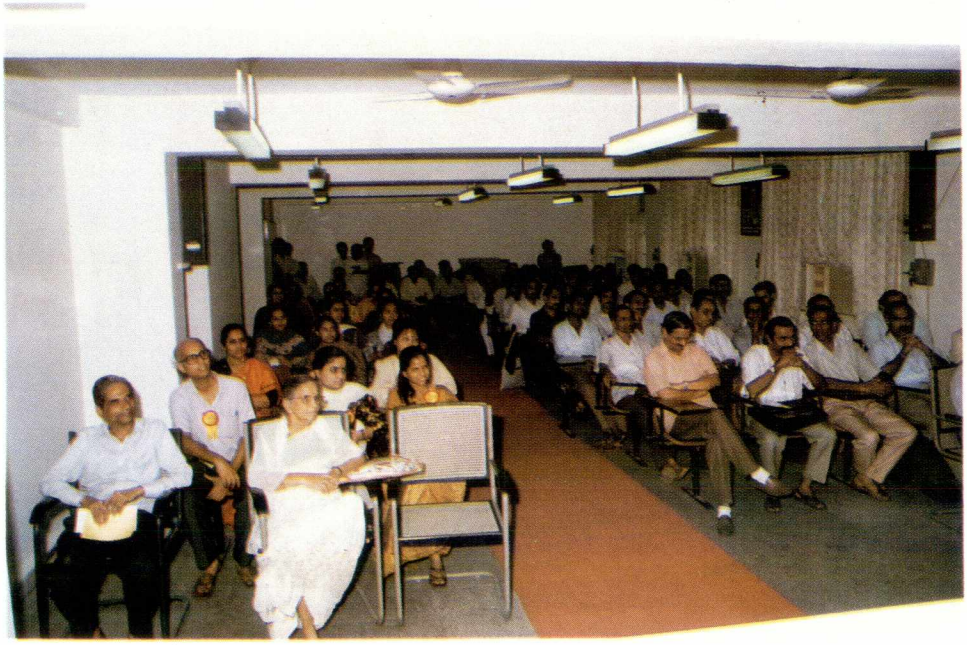
Dr. Gajendra Singh, DDG(E), at the venue of the exhibition

PLATE VIII

हिन्दी सप्ताह समारोह

श्री किरण मिश्र, प्रमुख अतिथि एवं सुप्रसिध्द गीतकार संस्थान की छमाही पत्रिका के प्रथम अंक का विमोचन करते हुए ।

डॉ. वी.जी. खाण्डेपारकर, प्रधान वैज्ञानिक एवं राजभाषा अधिकारी, संस्थान में हुई राजभाषा कार्यान्वयन की प्रगति के बारे में संबोधित करते हुए ।



श्रोतागण

श्री. प्रदीप सिंह, मुख्य अतिथि एवं संपादक, जनसत्ता, संस्थान द्वारा संकलित
हिन्दी - अंग्रेजी तकनीकी शब्दावली का विमोचन करते हुए ।

Rajbhasha Rolling Shield for the year 1996-97 was presented to Q. E. and M. P Divsions jointly.

Training : The following personnel underwent training in Hindi, in various work related areas.

Smt. S. G. Parab, Jr. Clerk (Hindi)	Hindi Stenography	August 1996
Kum. B. G. Menon and Shri A. R. Gujar, Jr. Clerk	Hindi Typewriting	February 1996
Shri J. R. Mangale, Jr. Clerk	Two-day workshop on the use of electronic typewriter	August 5 and 6, 1996
Shri K. W. Khamkar, Assistant Shri R. D. Shambharkar, Jr. Stenographer	Hindi Translation at Central Translation Bureau, Mumbai	January to March 1997

Hindi Workshop : The following two workshops were held at the Institute for the benefit of staff.

Administrative Staff

Sarkari Kamkaj aur Hindi

Technical Staff

Kya Apka Sarkari Kamkaj Hindi me Karne me Yogdan Ho Sakta Hai Ka ?

Lecture : One general lecture on *Ahar Our Swasth* by Dr. V. G. Khandeparkar, Principal Scientist was arranged.

Ashirwad Rajbhasha Award 1996 : CIRCOT was awarded a Memento by ***Ashirwad*** in recognition of the work carried out in Hindi. Smt. K. R. Joshi, Hindi Translator was awarded a Certificate in connection with the Hindi work carried out by the Institute.

Hindi Publication : Technical Terminology relating to the Institute's work was compiled and got translated from English to Hindi by a team comprising Dr. S. Sreenivasan, Shri Mumtazir Ahmed (Sr. Scientists) and Dr. (Smt.) S. D. Pai, Technical Officer and the booklet was released by Shri Pradeep Singh, Editor, Jansatta on July 6, 1996.

Sweta Sarinika : The first issue of a half yearly news bulletin in Hindi was brought out during the Hindi Day Celebration by the Chief Guest Shri Pundit Kiran Mishra.

Institute Joint Council (IJO) : Two meetings were held on June 26 and November 16, 1996 to discuss various matters of general interest to the staff.

Grievance Committee Meeting : Two meetings were held on November 8, 1996 and February 7, 1997 to discuss grievances of the staff.

Finance : A statement showing sanctioned budget of CIRCOT and the actual

expenditure for the financial year 1996-97 has been furnished in Annexure III. As could be seen therefrom, the actual expenditure under the Non-Plan was Rs. 323.77 lakhs against the sanctioned grant of Rs. 260.00 lakhs. Further, an expenditure of Rs. 109.8 lakhs was incurred under the Plan budget against a sanctioned grant of Rs. 110.00 lakhs.

Significant Findings :

1. Equations were suggested to predict count and lea strength of yarns from fibre properties like 2.5% span length, micronaire value and bundle tenacity at 3.2 mm gauge length, based on test data from 44 cottons.

2. A comparative study on drip irrigation *vis-a-vis* traditional irrigation indicated that drip irrigation does not significantly affect cotton yield and fibre quality such as G.P., S.I., L.I., 2.5% S.L., micronaire fineness, maturity and tenacity. Drip irrigation system is hence beneficial for cotton cultivation only because of 50% conservation of water and related advantages.

3. A study of 39 naturally coloured hybrid cottons and their parents revealed that no hybrid retained the intensity of colour of its coloured parent and that inheritance of colour was restricted to 50-60%. When the fibres were washed with natural soap solution all samples showed colour improvement – for green it was 75% and for brown the increase in colour was over 40%. Remarkable increases were observed in all fibre properties for most hybrids as compared to their parents. Of the 39 hybrids, the three hybrids which had LC-1-1 as male parent were superior in overall considerations.

4. Aqueous swelling followed by stretch treatment enhances the tenacity, specific work of rupture, intial modulus and secant modulus of single cotton fibres with reduction in the strain at break. Wetting does not alter tensile characteristics of treated fibres.

5. During an investigation on fabric handle and wear comfort of cotton fabrics, it was observed that summer suitings of more than average handle can be prepared from cotton by adjusting the fabric cover to be higher than 20. This can be achieved by employing coarser yarns both in the warp and weft and also by increasing both ends and picks.

6. A foot operated 'Kisan Gin' and a power operateed 'CLOY' Gin were designed and fabricated.

7. Effect of yarn structure on the dyeing behaviour of cotton/polyester blended yarns/fabrics was studied and it was found that the colour strength of air-jet spun yarn samples were generally higher than those of ring spun yarns when dyed under the same conditions.

8. Impact of dyeing on the strength and colour of fibres in different cotton varieties was discussed and it was observed that after mechanical processing, there is a fall in both colour and strength. Change in tensile properties differ from variety to

variety depending on the type of dye employed. There is a strong association between percentage maturity and the colour strength.

9. A method to dye cotton yarns with calcium salt of lac dye has been standardised. The same method with certain modifications has been used to dye cotton yarns and fabrics with the sodium salt of the lac dye. The wash fastness property of samples could be improved by using dye fixing agent or by mordanting, which produces different colours as well.

10. A technique for dyeing cotton yarns and fabrics to a bright yellow colour using berberin has been standardised. Light fastness of this dye on cotton yarns was remarkably improved by the use of iron mordant.

11. Good quality corrugated boxes suitable for packaging and transportation of fruits were prepared by using cotton stalk pulp and the performance of these boxes was found to be *on par* with those made from conventional raw materials as well as wooden boxes.

12. A procedure for de-inking of news paper waste using cellulase enzyme was standardised.

13. Mixed microbial consortium maintained at CIRCOT works efficiently at lower temperature and produces biogas from wollow dust even at 15°C and 18°C.

14. A method was standardised for the preparation of protein hydrolysates (peptones) from cotton seed meal and these peptones enhanced sporulation of bacterial cultures such as *Bacillus subtilis* and actinomycet cultures.

2

Progress of Research

A brief account of the progress of research work during 1996-97 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 work.

(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, Agricultural Universities and State Agricultural Departments. The number of samples received during 1996-97 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 and reports sent under AICCIP.

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 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

TABLE 1(a) : NUMBER OF COTTON SAMPLES RECEIVED AT THE HEAD QUARTERS OF CIRCOT DURING 1996-97

Type of test	Average for the quinquennium 1990-94	1994-95	1995-96	1996-97
Fibre and full spinning	239	195	102	82
Fibre and Microspinning	1898	1676	1182	1868
Microspinning alone	56	–	–	–
Fibre test alone	392	903	365	574
Mill test	11	4	–	–
Standard cottons	19	21	19	25
Trade varieties :				
— Lint	43	17	14	–
— Kapas	24	17	–	9
Technological Research	15	9	–	1
Miscellaneous	7	9	–	2
Total	2704	2851	1682	2561

TABLE 1 (b) : NUMBER OF SAMPLES TESTED AT THE REGIONAL QUALITY EVALUATION UNITS DURING 1996-97

Regional Quality Evaluation Units of CIRCOT	Quality Parameters				
	Fibre length (2.5% SL)	Fibre fineness	Fibre maturity	Fibre strength	Micropinning test
Akola	1020	1020	1004	908	–
Coimbatore	1097	1097	1097	1097	139
Dharwad	448	448	448	448	–
Guntur	924	924	832	924	–
Hisar	1743	889	889	821	–
Indore	462	462	462	462	–
Ludhiana	5522	1491	1491	1491	–
Nagpur	1290	933	1041	893	–
Nanded	660	660	660	660	–
Rahuri	460	460	460	460	–
Sirsa	332	602	549	438	–
Sriganganagar	1704	1704	547	1223	–
Surat	12924	12924	12924	12924	–

TABLE 2: NUMBER OF COTTON SAMPLES TESTED AT CIRCOT HEADQUARTERS UNDER AICCIP DURING 1996-97

State	Fibre and full spinning	Fibre and Micro spinning	Fibre tests alone	Total
Punjab	32(5)	109(13)	25(1)	166(19)
Haryana	2(1)	209(23)	–	211(24)
Rajasthan	12(2)	66(6)	–	78(8)
New Delhi	–	87(3)	106(1)	193(4)
Uttar Pradesh	6(1)	30(5)	–	36(6)
Gujarat	38(8)	133(7)	260(1)	431(16)
Maharashtra	–	118(21)	120(11)	238(32)
Madhya Pradesh	–	273(22)	–	273(22)
Karnataka	2(1)	192(29)	6(1)	200(31)
Andhra Pradesh	3(2)	50(8)	–	53(10)
Tamil Nadu	5(1)	13(1)	130(4)	148(6)
Total	**100(21)**	**1280(138)**	**647(19)**	**2047(178)**

Note : The numbers in brackets relate to reports issued.

production and quality of cotton with a multi-disciplinary approach.

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 and Preliminary Varietal Trials form the preliminary stages of screening while Co-ordinated Varietal Trial and Full Spinning Trial, etc. constitute the advanced trial under this project. Yield would be the main criteria in the Initial Evaluation Trial while both yield and quality are the criteria for further selections as well as subsequent trials. This is the 30th 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 2027 cotton samples were screened for fibre properties and spinning potential during 1996-97 season. The test data on various breeding trials were presented at the Panel Meetings held at Ludhiana for North Zone and at Nagpur 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 Plant Type were conducted at Faridkot, Hisar, Ludhiana, Batinda, Mathura, Sriganganagar, Kheri and Sirsa. Table 3 shows the ranges of 2.5% span length, Micronaire value and bundle tenacity at both '0' and 3.2 mm gauge lengths along with spinning potential for the samples belonging to the above two trials. The strains that had recorded encouraging spinning performance at 20s, 30s, 40s and 50s count at different locations under both these trials are listed below :

Locations	*Count*	*Promising Strains*
Faridkkot	20s	F.1255
	30s	RS.810, LH.1640, F.1506, RS.921, LH.1832, Pusa 19-27
Ludhiana	30s	LH.1696, F.1395, LH.1640, LH.1587, Pusa.179, Pusa 19-27, LH.1832
	40s	F.1395, LH.1587
Batinda	20s	RS.903
	30s	LH.1640, LH.1170, H.1470, F.1670, F.1488, H.1185
	40s	F.1488, LH.1832
	50s	LH.1832
Sriganganagar	20s	RS.810, RS.903, F.1470, F.1408, RS.1070, RS. 921, H.1185
	30s	F.1470

Locations	*Count*	*Promising Strains*
Mathura	20s 30s	LH.1470, F.1506, F.1470 F.1506, RS.921, LH.1819, LH.1832
Sirsa	30s	LH.1696, F.1506, Pusa 45-3-6, Pusa 179, LH.1832, H.974
Kheri	30s	F.1488, Pusa 19-17, LH,1832
Hisar	20s	LH.1170, F.1506, F.1440, H.1156, Pusa 19-17

Samples pertaining to the Preliminary Varietal Trial (PVT), Br 03, were received from Hisar, Faridkot, Ludhiana, Sriganganagar, and Mathura. The promising strains under this trial that fared well in spinning performance at the selected counts are listed below along with locations:

Locations	*Count*	*Promising Strains*
Hisar	20s	H.1123, HS.220, F.1515
Faridkot	30s	F.1537, LH.1769, F.1528, F.1515, F.1523
Ludhiana	30s	F.1537, LH.1747, LH.1134
Sriganganagar	20s	F.1537, F.1557, F.1528, F.1515
Mathura	30s	None

The Initial Evaluation Trial (IET), Br02 was conducted at Ludhiana and Hisar. The following strains recorded satisfactory spinning performance at selected counts and locations as follows :

Locations	*Count*	*Promising Strains*
Ludhiana	30s	F.1638, LH.1833, LH.1575, H.1196, CA.7795, LH.1134
Hisar	20s	CA.1495, LH.1877, F.1578, F.1652

G.arboreum Trials:

The Co-ordinated Varietal Trial (CVT) Br24 was conducted at Hisar, Sriganganagar, Ludhiana and Mathura. The object of this trial was to identify coarse short staple and high ginning out-turn varieties suitable for blending purpose in the place of existing varieties. The 2.5% span length of the strains tested under this trial ranged between 17.5 mm to 24.1 mm. The promising strains with Micronaire value 7.0 and above are listed below :

Locations	*Promising Strains*
Hisar	HD.305, RG.18, RG.53, HD.324
Sriganganagar	HD.305, LD.572, CAD.4, RG.45, RG.35, RG.83, RG.22, RG.77, RG.18, RG.53, RG.24, CAD.3, LD.560, LD.627, HD.324
Ludhiana	LD.572, RG.45, RG.35, RG.83, RG.22, RG.24, CAD.3, LD.560, LD.627, HD.324
Mathura	None

Samples pertaining to Preliminary Varietal Trial (PVT) Br 23, were received from Hisar, Sriganganagar, Ludhiana and Mathura. The following strains recorded Micronaire values of 7.0 and above at the locations indicated :

Locations	*Promising Strains*
Hisar	RG.40, LD.702
Sriganganagar	HD.368, HD.363, LD.700, LD.694, RG.101, LD.693, RG.113, RG,40, CSA 5-92, RG.117, RG.91, LD.702, RG.89, LD.679, HD.356, HD.371
Ludhiana	HD.363, LD.700, LD.694, RG.101, LD.693, RG.113, CAD.3, HD.371, LD.695
Mathura	RG.113, RG.40, RG.17, RG.89

Hybrids Trials:

The objective of this trial was to identify hybrids superior to the local check varieties in yield and technological characteristics. The samples belonging to intra-hirsutum hybrid trial involving G.hirsutum x G.hirsutum crosses were received from Sirsa, Sriganganagar, Ludhiana, Hisar and Faridkot. The promising hybrids having better spinning performance at selected counts are listed below along with locations:

Locations	*Count*	*Promising Strains*
	Br 05(a)-I	
Sirsa	30s	Raj HH.23, FHH.58
Sriganganagar	30s	Nil
Ludhiana	30s	Raj HH.23, LHH.107, LHH.152
Hisar	30s	FHH.58
Faridkot	30s	Raj HH.23, Raj HH.25, FHH.58

Locations	*Count*	*Promising Strains*
	Br 05(a)-II	
Sirsa	30s	CSHH.82, Raj HH.27, HHH(CM)-1, CSHH.6
Sriganganagar	30s	HHH.203, Raj HH.28
Ludhiana	30s	LHH.890, FHH.66, HHH.217, LHH.161, RajHH.27
Hisar	30s	RajHH.27, CSHH.83, HHH.217, CSHH.6
Faridkot	30s	Raj HH.27, HHH.203, HHH.217, LHH.161
	Br 05(b)	
Sirsa	30s	CSHH.25, VCHH.43, ACHH-651

Miscellaneous Trials:

A good number of trials having different objectives were conducted at New Delhi, Sirsa, Hisar, Sriganaganagar and Ludhiana. The details of these trials alongwith results are given below :

Special trials on Israel Hybrids were conducted at Hisar, Sirsa and Mathura. The hybrids were found to be extra long staple, fine and possess very high strength. Most of them were spinnable to 60s to 80s counts.

Four varieties were tried at Sirsa and their properties were compared. HHH-81, Fateh, CSHH.29 and HS.6 were found to be medium staple and having fine good bundle strength and spinning potential at 30s count.

A trial conducted at Hisar indicate that the hybrids were short staple, coarse with good bundle strength but were not spinnable to 20s count.

A Pusa-HB varietal trial was conducted at IARI, New Delhi where 11 strains were tested for fibre characteristics. Most of the strains were extra-long, fine, possessing strength and were spinnable to 80s count.

A G.hirsutum selection trial was conducted at IARI, New Delhi wherein sixty-two strains were tested, of which only a few

strains that gave very good spinning performance at 40s count were selected.

PRT and LD series was tried at Ludhiana where 25 strains were tested for fibre properties on HVI. The strains were in the range of short to medium staple having average to very low fineness with average strength.

One hundred and five strains were tested on HVI for a trial conducted at IARI, New Delhi and the results were sent to breeder for screening the strains for further evaluation.

In a miscellaneous trial, six established varieties viz. RS.921, RS.810, RG.8, RST.9, GA and BN were grown at Sriganganagar for obtaining fibre properties for comparison as local checks. Their fibre properties along with spinning potential were reported.

A trial was conducted at IARI, New Delhi to obtain high strength varieties, in which 14 strains were tested. A few of them have given strength above 50 g/t for zero gauge and were spinnable to 50s count.

A miscellaneous trial of IET was conducted at Hisar in which 22 strains were tried. Most of the strains were medium staple, above average in fineness, good in strength and few of them were spinnable to 30s count.

Central Zone

This zone has the largest area under cotton cultivation. Although emphasis is given to improve the existing Americal type G.hirsutum cottons, sizeable 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 being made to identify early maturing hybrids without sacrificing the yield. Considering the increasing demand for medium and superior medium categories of cotton, attempts are on to evolve *desi* hybrids. Trials are also conducted for the imporvement of cotton in G.herbaceum species which are traditionally grown in some pockets of Gujarat state.

G.hirsutum Trials:

Coordinated Varietal Trial Br 04 was conducted at Rahuri and Padegaon under irrigated conditions and at Akola, Khandwa, Indore, Nanded and Badnawar under rainfed conditions. The ranges of 2.5% span length, Micronaire value, maturity and bundle strength at '0' and 3.2 gauge lengths along with assessment of their spinning potential have been compiled in Table 4.

The promising strains having good spinning potential are listed below along with location and count selected.

Locations	*Count*	*Promising Strains*
	Br 04(a)	
Rahuri	–	–
Padegaon	40s	CZH.401

Locations	*Count*	*Promising Strains*
	Br 04(b)	
Akola	–	–
Khandwa	30s	CZH.453, CZH.454, CZH.456, CZH.457, CZH.458, CZH.461, CZH.462
Khandwa	40s	CZH.452
Indore	40s	CZH.456, CZH.460, CZH.461, CZH.462
Nanded	40s	None
Nanded (MKV)	40s	None
Badnawar	30s	CZH.558

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

Locations	*Count*	*Promising Strains*
Khandwa	40s	CZH.354
Rahuri	30s	None
Amreli	30s	CZH.352, CZH.353, CZH.354, CZH.355, CZH.356, CZH.357, CZH.358
Nanded	30s	NH.552
Akola	–	–

TABLE 3 : SUMMARY OF TEST RESULTS ON COTTON STRAINS UNDER CO-ORDINATED VARIETAL TRIALS (Br O4) IN THE NORTH ZONE

Location	No.of samples	Range of					Spinning Performance			Control Variety
		2.5% span length (mm)	Micronaire value	Maturity	Bundle Tenacity (g/t) 0' gauge	3.2 mm gauge	Count	A	B	
1	2	3	4	5	6	7	8	9	10	11
					Normal Plant Type (Br.04) (a)					
Faridkot	6F	24.0 – 26.0	3.7 – 4.4	70 – 77	42.3 – 48.2	17.0 – 18.4	30s	4	5	F.846
							20s	2	1	
Hisar	5M	21.9 – 25.0	4.4 – 5.0	71 – 87	46.1 – 49.8	19.0 – 21.2	20s	5	–	B.N.
Ludhiana	6F	25.5 – 27.3	3.8 – 4.4	68 – 82	44.5 – 49.3	19.0 – 20.1	40s	2	5	F.846
							30s	5	5	
Batinda	6F	23.2 – 26.6	4.1 – 4.7	72 – 78	43.4 – 47.2	17 – 19.9	30s	3	3	F.846`
							20s	1	–	
Mathura	6F	23.1 – 26.1	3.7 – 5.1	70 – 90	44.0 – 47.7	17.9 – 21.3	30s	1	2	Vikas
							20s	6	4	
Sriganganagar	6F	23.9 – 26.5	4.5 – 5.2	79 – 87	44.5 – 48.2	18.9 – 20.4	30s	1	5	RST-9
							20s	5	4	
Sirsa	6M	23.3 – 26.8	4.3 – 5.4	72 – 89	46.6 – 50.9	18.4 – 21.5	30s	2	5	HS.6

Contd.

TABLE 3 : (CONTD.)

1	2	3	4	5	6	7	8	9	10	11
					Compact Plant Type (Br 04) (b)					
Faridkot	7M	23.4 – 26.4	3.7 – 4.4	74 – 81	41.3 – 47.7	17.0 – 22.1	30s	4	2	F.1054
Ludhiana	7M	25.0 – 27.9	4.2 – 5.0	75 – 81	43.4 – 48.8	19.4 – 25.1	30s	5	4	F.1054, LH.1556
Kheri	7M	23.7 – 27.6	3.7 – 4.7	68 – 77	44.0 – 48.8	17.6 – 25.1	30s	4	4	LH.1556, F.1054
Batinda	7F	21.4 – 28.4	3.5 – 4.3	70 – 79	43.4 – 47.7	17.2 – 24.6	50s	1	–	F.1054, LH.1556
							40s	3	2	
							30s	5	2	
Hisar	5M	24.5 – 27.6	3.4 – 4.6	61 – 80	48.2 – 49.3	18.5 – 21.7	20s	4	–	LH.900
Mathura	6M	25.2 – 29.7	3.7 – 5.4	74 – 83	47.2 – 54.1	17.0 – 24.4	30s	4	3	Vikas
Sriganganagar	6M	23.9 – 26.9	4.2 – 5.1	69 – 82	44.5 – 46.6	18.6 – 20.2	20s	6	3	RST.9
Sirsa	6M	22.4 – 27.8	3.8 – 4.9	76 – 85	49.3 – 52.5	18.3 – 22.7	30s	4	3	H.977

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*

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 2.5% Span length (mm)	Micronaire value	Maturity	Bundle Tenacity (g/t) 0' gauge	3.2 mm gauge	Spinning Performance Count	A	B	Control Variety
1	2	3	4	5	6	7	8	9	10	11
				Br 04(a) Irrigated						
Rahuri	14FT	25.6 – 29.4	2.9 – 3.9	64 – 81	41.3 – 49.8	19.4 – 22.3	–	–	–	–
Padegaon	12M	25.8 – 29.4	4.6 – 5.4	79 – 91	41.3 – 47.7	17.0 – 21.5	40s	2	6	JLH-168
				Br 04(b) Rainfed						
Akola	5M	22.7 – 26.1	3.9 – 4.7	73 – 90	41.8 – 44.0	17.5 – 20.0	–	–	–	–
Khandwa	10M	24.5 – 26.6	3.6 – 4.4	69 – 79	44.0 – 50.4	18.8 – 22.3	30s	8	–	–
Indore	10M	25.0 – 28.1	3.0 – 3.9	56 – 76	44.5 – 50.9	17.1 – 20.7	40s	4	–	–
Nanded	5M	22.9 – 26.9	3.4 – 4.7	55 – 77	44.0 – 48.8	15.8 – 19.9	40s	–	–	–
Nanded (MKV)	5M	20.9 – 23.5	4.2 – 4.5	60 – 72	42.9 – 46.6	15.8 – 19.0	40s	–	–	–
Badnawar	10M	22.0 – 26.6	3.6 – 4.8	66 – 81	40.7 – 47.2	17.8 – 20.4	30s	–	–	–
Khandwa	5M	24.4 – 26.9	3.5 – 3.9	69 – 76	44.0 – 46.1	17.7 – 20.4	40s	1	–	–

FT - Fibre test only

M - Microspinning

A - No. of samples spinnable to selected count

B - No. of samples having spinning performance better than or on par with control

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

Locations	*Count*	*Promising Strains*
Akola	–	–
Rahuri	30s	GISV.25/169913, GISC.86195
Khandwa	30s	Code No. CZH.251, CZH.252, CZH.253, CZH.256, CZH.257, CZH.259, CZH.260, CZH.262, CZH.263, CZH.266, CZH.268, CZH.282, CZH.283, CZH.284, CZH.286, CZH.287, CZH.288

G.arboreum Trials :

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

Locations	*Count*	*Promising Strains*
Khandwa	20s	CZA.2401, CZA.2402, CZA.2405, CZA.2407, CZA.2411, CZA.2412, CZA.2415, CZA.2417, CZA.2418, CZA.2419, CZA.2420
Amreli	20s	CZA.2401, CZA.2402, CZA.2405, CZA.2407, CZA.2409, CZA.2411, CZA.2412, CZA.2413, CZA.2415, CZA.2417, CZA.2418. CZA.2419, CZA.2420
Indore	20s	Code No. 2401, CZA.2402, CZA.2405, CZA2407, CZA.2411, CZA.2412, CZA.2415, CZA.2418, CZA.2419, CZA.2420
Akola	–	–
Khandwa	20s	CZA.2429, CZA.2436, CZA.2431, CZA.2403

G.herbaceum Trials :

The Coordinated Varietal Trial of *G.herbaceum* Br 34-1 was conducted at Surat. Six strains were tried. The strains were found to be short stapled, coarse and possessing high bundle strength. All the strains have shown satisfactory spinning performance at 20s count.

Hybrid Trials :

The objectives 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. Considering the increasing demand for medium and superior staple categories of cotton, attempts were also made to identify *desi* hybrids.

The samples belonging to *intra-hirsutum* hybrid trial, Br 05 were received from Nanded, Rahuri, Surat, Badnawar, Khandwa, Akola and Indore. The promising hybrids showing better spinning performance at selected counts are listed below along with locations :

Locations	*Count*	*Promising Strains*
	Br 05(a)-1	
Nanded	40s	CZHH.526, CZHH.530
Rahuri	—	—
Surat	50s	CCH.5, PHH.253, SCHH.2, GHH.144
	60s	SCHH.2
	Br 05(a)-2	
Bandnawar	40s	CZHHM.531, CZHHM.506E
Rahuri	—	—
Surat	40s	Nimbkar 604, CRCHM.2, NCHH.19
	Br 05(b)-1	
Khandwa	40s	CZHH.562, CZHH.585
Khandwa	40s	CZHH.568, CZHH.571, CZHH.573
Akola	—	—
Indore	40s	Code No. CZHH.561, CZHH.562, CZHH.563, CZHH.565, CZHH.567, CZHH.568, CZHH.569, CZHH.571, CZHH.572, CZHH.573, CZHH.574, CZHH.577, CZHH.578, CZHH.580, CZHH.585, CZHH.587

Locations	*Count*	*Promising Strains*
Nanded	40s	PHH.538
Nanded (Set.I)	40s	PHH.529, PHH.530
Nanded (Set.II)	40s	PHH.546, PHH.559, PHH.567, PHH.569
	Br 05(b)-2	
Akola	—	—
Indore	40s	CZMSH.591, CZMSH.592, JKHy.1, CZMSH.596, CZMSH.598, CZMSH.599, CZMSH.601, CZMSH.604, CZMSH.606, CZMSH.607, CZMSH.608, CZMSH.609, CZMSH.615
Nanded	40s	None

Desi Hybrids :

Desi hybrids involving *G.arboreum* x *G.herbaceum* crosses Br 25 were tried at Surat, Indore and Akola. The promising hybrids which fared well in spinning performance at selected counts and locations are listed below :

Locations	*Count*	*Promising Strains*
Surat	20s	AKDH.3, AKDH.8
	30s	—
	40s	AKDH.16
Indore	20s	CZDH.2502, CZDH.2503 CZDH.2506, CZDH.2509
Akola	—	—

Evaluation of Short Duration and Compact Type Material Br 52-2 :

The Dwarf and compact type of plants of *G.hirsutum* have certain advantages in respect of yield over the normal plant types. In order to study the yield and the technological characteristics of such plant type' trials were undertaken at Khandwa, Akola, Padegaon and Indore. The promising strains under this trial giving satisfactory spinning performance are listed below along with selected count and locations :

Locations	*Count*	*Promising Strains*
Khandwa	40s	CZHPT.5203
Akola	—	—
Padegaon	30s	CZHPT.5201, CZHPT.5205
Indore	30s	None
Khandwa	20s	CZHPT.5209, CZHPT.5213, CZHPT.5217, CZHPT.5220

Miscellaneous Trial :

A few miscellaneous trials having different objectives were conducted at Surat, Junagadh, Badnawar, Nanded and Amreli, the details of which are as given below :

Seven samples were tried in the miscellaneous trial at Surat and the variety LRA.5166 gave good spinning performance at both 40s and 50s counts. Other varieties such as CNH.42, G.Cot.10, GBHV.89, RHC.0688 and GJHS.34 fared well at 30s count.

Zonal multilocation trial of *G.hirsutum* was conducted at Junagadh. Thirty-six strains were tested of which nine strains gave good spinning performance at 40s count. In another multilocation trial at Junagadh, the varieties GJAV.5, G.Cot.13, G.Cot.15, gave satisfactory spinning performance at 20s count.

Three naturally coloured cottons were tried at Junagadh. All gave satisfactory spinning performance at 30s count.

Five varieties were tried at Nanded under Br 2(b) but none of them gave satisfactory spinning performance at 30s count. Similarly samples under miscellaneous trials Br 2(A), Br.2 (D) and Br2 (E) have also not shown any encouraging results at 30s count.

Multi-location trial of *desi* cotton was conducted at Junagadh. The samples were short staple and coarse having average strength and none of the samples, was spinnable to 20s count.

In a trial conducted at Nanded, the varieties BN-1, Eknath, MGA.1, MGA.8 and NH.452 gave good spinning performance at 20s count.

A new variety Dhumad tested at Junagadh under miscellaneous trial, was of short staple with high maturity and average strength and high G.P. value.

A variety G(AM)-31 was tried at Amreli. It was found to be of medium staple with high maturity and high strength and was spinnable satisfactorily at 20s count as well as 30s count. It also possessed high G.P.

Five strains of GJHV variety were tried at Junagadh but none of the strains were suitable for spinning at 30s count.

An agronomical trial was conducted at Surat where 260 samples were tested for fibre properties on HVI. Most of the strains were medium staple and average in fineness and strength.

A multi varietal trial was conducted at Padegaon where 4 RHC variety were tested. The strains were of medium staple with high maturity and average strength but none of them were spinnable to 40s count.

A hybrid RHH was tried at Padegaon but none of the strains gave comparable fibre characteristics or spinning performance as H.6. (control).

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 large area under cultivation, 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, Guntur, Raichur, Siruguppa under irrigated conditions and at Dharwad and Raichur under rainfed conditions. A separate trial was also conducted for dwarf and compact plant types at Arabhavi, Raichur under rainfed conditions. The ranges and the mean values of 2.5% span length, Micronaire value, bundle strength, 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 :

Locations	*Count*	*Promising Strains*
	Irrigated	
Arabhavi	40s	VRS.19
	50s	Nil
Guntur	—	—
Raichur	30s	—
Siruguppa	50s	—

Locations	*Count*	*Strains*
	Rainfed	
Dharwad	40s	Code No. 466, ICMF.31
	Dwarf and Compact Plant Type	
Arabhavi	40s	Anjali
Raichur	30s	Anjali

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

Locations	*Count*	*Strains*
	Irrigated	
Arabhavi	40s	TCH.976, TCH.1028
Guntur	30s	RAC.116, TCH.976, TCH.1025
Siruguppa	40s	TCH.1028
	Rainfed	
Dharwad	30s	NA.1588, RAH.7

Initial Evaluation Varietal Trial Br 02 was conducted at Arabhavi, Guntur, Raichur, Siruguppa under irrigated conditions. The same trial was experimented at Dharwad under rainfed conditions. The following strains recorded satisfactory spinning potential.

Locations	*Count*	*Strain*
	Irrigated	
Guntur	30s	L.725, C-16-R, L-714, ARB.8824
Siruguppa	40s	CPD.447, CIZ.16
	Rainfed	
Dharwad	30s	CPD.447, CPD.473, ICMF.82, NDLH.1678

G.arboreum Trial :

Coordinated Varietal Trial, Br 24 was conducted at Dharwad under rainfed conditions. The following two strains are noticed for their satisfactory yarn strength at 20s count.

Locations	*Count*	*Strain*
Dharward	20s	ND.2631, Code.804

***G.herbaceum Trial* :**

Coordinated Varietal Trial Br 34 were conducted at Raichur and Dharwad under rainfed conditions and the following strains are identified for their satisfactory yarn strength at 20s count.

Locations	*Count*	*Strains*
Dharward	20s	DDH.11
Raichur	20s	906, 908, Raichur.430018, Raichur.RAHH6M

***Hybrid Trials* :**

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

Locations	*Count*	*Strain*
	Irrigated	
Arabhavi	40s	RCH.20
Siruguppa	40s	SCHH.2
	Rainfed	
Dharwad	40s	AHH.1, DHH.509, VICH.99, RAHH.61

Intra-hirsutum hybrid trial Br 05(a)-2 *(G.hirsutum* x *G.hirsutum)*, male sterile based trial was conducted at Arabhavi and Guntur under irrigated conditions, while the same trial was conducted under rainfed conditions at Dharwad. The following hybrids have given satisfactory spinning performance:

Locations	*Count*	*Strain*
	Irrigated	
Arabhavi	40s	CRCH.2
Guntur	50s	CRCH.2
	Rainfed	
Dharwad	40s	ARCHH.1858, ACH.213, VCHH.30

Inter-specific hybrid trial Br 15 *(G.hirsutum* x *G.barbadense)*, was conducted at Guntur, Raichur and Siruguppa under irrigated conditions and the following strains gave satisfactory spinning performance :

Locations	*Count*	*Strain*
Guntur	60s	BHB.595, NFHB.1010
Raichur	60s	RCHB.21, SIMAHB.3, RAHB.51,NFHB.101
Siruguppa	60s	NFHB.109, SIMAHB.3, DHB.290

TABLE 5 : SUMMARY OF TEST RESULTS ON COTTON STRAINS TRIED IN CO-ORDINATED VARIETAL TRIAL OF G.HIRSUTUM (Br O4) IN THE SOUTH ZONE

Location	No.of samples	Range of					Spinning Performance			Control Variety
		2.5% span length (mm)	Micronaire value	Maturity	Bundle Tenacity (g/t) 0' gauge	Bundle Tenacity (g/t) 3.2 mm gauge	Count	A	B	
				Br 04 (a) Irrigated						
Arabhavi	6M	24.8 – 30.9	3.3 – 4.1	68 – 77	46.1 – 48.8	17.7 – 21.9	40s	1	–	–
Guntur	5M	24.7 – 30.3	3.7 – 4.1	63 – 82	42.9 – 49.8	20.0 – 22.9	50s	–	–	–
Raichur	7M	24.7 – 31.1	2.9 – 3.9	53 – 70	39.7 – 46.6	14.9 – 19.6	30s	2	6	LRA.5166 MCU.5 V.T.
Siruguppa	13M	23.2 – 30.8	3.2 – 4.5	56 – 79	39.1 – 46.1	17.0 – 21.3	50s	3	6	LRA.5166 MCU.5 V.T.
				Br 04 (b) Rainfed						
Dharwad	6M	25.1 – 27.6	4.1 – 4.8	69 – 82	40.7 – 45.6	17.4 – 20.1	40s	1	2	–
Raichur	5M	24.1 – 26.3	2.9 – 4.2	64 – 73	41.3 – 45.0	17.2 – 19.4	30s	–	–	–
				Br 04 (d) Compact Type						
Arabhavi	5M	24.4 – 28.4	3.4 – 4.1	73 – 82	43.4 – 47.2	17.4 – 22.0	40s	1	–	Anjali
Raichur	7M	23.0 – 27.0	2.8 – 3.9	49 – 74	40.7 – 45.0	17.0 – 21.0	30s	1	–	Anjali

M - Microspinning

A - No. of samples spinnable to selected count

B - No. of samples having spinning performance ***on par*** *or better than control*

Special Isreli Hybrid Trials were conducted at Coimbatore and Dharwad. The following strains recorded satisfactory spinning performance :

Locations	*Count*	*Strain*
Coimbatore	80s	HA.34, HA.149, HA.151, HA.175. HA.195, HA.200, OMRI, TCHB.213
Dharwad	80s	N.431, HA.149, HA.195

***Miscellaneous Trials*:**

As many as eleven trials with various objectives at different locations were conducted and the highlights of each trial are given below location-wise.

Five Trials were conducted at Coimbatore.

HLS series miscellaneous trial was conducted with the objective of nuclear seed production. Amongst these varieties, 2.5% span length ranged from 26.8 mm to 33.7 mm, Micronaire value from 2.0 to 3.1 and strength from 19.2 to 25.0 g/t at 3.2 mm gauge length.

Another miscellaneous trial of T7 QHLS series was also conducted with the objective of nuclear seed production. The varieties registered fibre length ranging from 32.3 to 36.6 mm, Micronaire value from 2.0 to 3.3 and bundle tenacity from 22.1 to 26.5 g/t at 3.2 mm gauge length.

Another trial to breed natural coloured cottons was conducted and their 2.5% span length ranged from 13.8 mm to 29.9 mm, Micronaire value from 2.4 to 4.1 and bundle tenacity from 15.1 to 22.8 g/t. (All the colour cottons have given colour parameters significantly and appended their colour signature.)

In the trial with the objective of Suvin selection, the 2.5% span length of all the selectors ranged from 35.0 mm to 38.5 mm, Micronaire value from 2.0 to 2.7 and bundle tenacity from 29.0 to 35.5 g/t at 3.2 mm gauge length.

In an advanced culture trial, both TCH.1025 and MCU.5 showed superior yarn strength at 40s and 50s counts. TCH.976 showed good yarn strength at 40s count, while TCH.1028 and LRA.5166 registered superior yarn strength at 30s count.

G.arboreum trial was conducted at Mudhol. Out of 12 strains, 8 showed very good spinning performance at 20s count.

A multilocation trial was conducted at Siruguppa. All the five strains showed very good spinning performance at 60s count.

(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 of Indian cottons called Standard Cottons are tested every year. These varieties are grown in Government farms and cotton research

stations under the supervision of senior cotton scientists of agricultural universities, under identical conditions. Extensive fibre and spinning tests are regularly being done on such samples and the test results are published as Technological Circulars for information of cotton breeders and other research workers as early in the season as possible. During 1996-97, 18 such circulars were issued.

(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 for determination of ginning percentage. The fibre and the spinning test results, ginning percentage and other test results on each variety of cotton are being published as Technological Circulars for information of cotton trade and industry. Information on such circulars issued during 1996-97 on 10 Indian Cottons is given in Chapter 3.

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

Statistical Prediction of Yarn Strength from Fibre Properties

Statistical analysis on fibre and yarn data for forty-four cottons revealed that fibre properties like 2.5% span length (L), Micronaire value (M) and bundle tenacity at 3.2 mm gauge length (S) are the only three parameters to have high significant correlation with yarn count and strength. The best regression equations for estimating yarn count (C) and lea strength (Sy) were derived. These equations are :

$$C = 2.96\,L - 7.06\,M + 1.70\,S - 46.62 \quad (R = 0.873^{**}) \quad (1)$$

$$Sy = -3.93\,L + 14.07\,M - 1.96\,S + 152.09 \quad (R = 0.760^{**}) \quad (2)$$

$$Sy = 1.27\,L + 1.65\,M + 1.03\,S - 1.76\,C + 70.10 \quad (R = 0.917^{**}) \quad (3)$$

Using the fibre functions F_1 and F_2 which gave high correlation with lea strength, regression equations for predicting lea strength (Sy) were evolved. These equations were found to give better prediction.

$$Sy = 0.11\,F_1 + 1.94\,C + 108 \quad (R = 0.922^{**}) \quad (4)$$

$$Sy = 9.70\,F_2 - 9.79 \quad (R = 0.836^{**}) \quad (5)$$

where $F_1 = LS/\sqrt{M}$ and $F_2 = LS/C\sqrt{M}$

The regression equations (4) and (5) give the estimates of lea strength with the same accuracy as the multiple regression equation (3) from the fibre parameters.

The estimation of lea strength from fibre properties will be continued every year and analysis of data will also be continued to ensure that the prediction equations hold good. A similar analysis for single thread strength and yarns from microspinning will be done to evaluate the spinning performance of small samples being received under AICCIP programmes.

Effeect on Fibre Quality and Yield Levels of Cotton due to Application of Neem Products

Field trial with three replications and ten treatments was conducted in R.B.D. having gross plOt size 7.2 x 6.0 M^2. Crushed

powder of dried neem seeds was given through soil at 30 and 60 days after sowing (DAS) by ring method as per treatments decided. 5% neem seed extract was prepared by soaking 500 grams of powder in two litres of water overnight. The extract was filtered and additional 8 litre water was added so as to get 5% concentration. The neem seed extract was used for spraying on respective plots. Dead larvae of bollworms were manually collected from 0.07% Endosulfan treateed plots on weekly intervals on 60, 75, 90 and 105 DAS.

The treatment details are given below :

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

T2 - NSP 50 Kg/ha at 30 DAS = 5% NSE ..... as above ....

T3 - NSP 25 Kg/ha at 30 & 60 DAS + 5% NSE ... as above ....

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% .... as above ....

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 ...as above....

T8 - Neem cake 50 Kg/ha at 30 DAS + 0.035% endosulfan at 60 ,75, 90 and 105 DAS.

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

T10 - Control (No treatment)

It was observed from the results that there are no significant differences in fibre properties due to these treatments. Nevertheless numerically better performance of some treatments is interesting to discuss.

Treatment T5 and T6 gave marginally better results with enhanced 2.5% span length. For fibre fineness, treatment T3, T4 and T9 proved superior, while treatments T6 and T5 recorded better performance for '1/8' gauge fibre bundle strength as compared to control.

In general no adverse effect was observed on fibre qualities due to application of neem products. Treatment T5 and T6 recorded better technological performance coupled with promising yield levels followed by treatment T4.

All the treatments were found to reduce bollworm damage in greenbolls, picked bolls, and locules, and increasing the yield of seed cotton. Amongst the treatments, T4 recorded highest yield (13210 kg/ha) followed by treatment T6 and T7.

Improving Fibre Properties and Yield Potential of Arboreum Cottons by Unconventional Breeding Methods

Research project trial for improvement of fibre properties and yield potential of asiatic cotton by unconventional breeding methods was conducted during 1996-97 at Cotton Research Station, Nanded in two replications. Thirty-three lines were selected and evaluated for detailed fibre quality parameters in two elite trials I (18 lines) and II (15 lines) with control.

The fibre properties of Elite Trials I and II are given below :

TABLE 6 : FIBRE QUALITY PARAMETERS OF ELITE TRIALS I AND II
ELITE TRIAL SET I

Sr. No.	Strain	2.5% Span Length (mm)	Fineness µg/Inch	Maturity Coefficient	Bundle Strength 3.2 mm gauge g/tex
1.	PA-183(ch)	26.7	4.0	0.7	21.7
2.	PA-32(ch)	25.2	4.2	0.74	19.8
3.	PA-141(ch)	26.8	4.2	0.74	21.3
4.	94/141	26.4	3.9	0.73	21.3
5.	94/228	27.2	4.2	0.76	19.4
6.	94/506	27.2	4.4	0.76	19.7
7.	94/280	27.4	4.0	0.74	20.5
8.	94/165	25.5	4.4	0.76	20.7
9.	94/381	27.7	4.2	0.74	21.7
10.	94/29	27.2	4.5	0.78	19.4
11.	94/3	26.1	4.8	0.78	20.2
12.	94/145	26.4	4.1	0.74	20.0
13.	94/424	26.0	5.1	0.80	20.7
14.	94/652	25.7	4.3	0.74	18.1
15.	94/517	25.4	4.3	0.76	21.8
16.	94/332	26.6	4.4	0.78	20.6
17.	94/383	27.2	4.2	0.74	18.1
18.	94/142	27.6	4.1	0.74	19.8
	SE +	0.17	0.03	0.01	0.44
	CD at 5%	0.51	0.08	0.03	1.31

TABLE 7 : ELITE TRIAL SET I

Sr. No.	Strain	2.5% Span Length (mm)	Fineness µg/Inch	Maturity Coefficient	Bundle Strength 3.2 mm 'gauge
1.	PA-32(ch)	26.7	4.8	0.78	18.5
2.	PA-183(ch)	26.2	4.7	0.78	19.9
3.	94/339	26.0	4.8	0.78	18.0
4.	94/79	26.4	4.4	0.76	20.6
5.	94/359	27.6	4.1	0.73	20.1
6.	94/88	27.2	4.5	0.76	19.1
7.	94/326	27.8	4.5	0.76	23.8
8.	94/52	27.2	4.4	0.76	18.4
9.	94/66	27.4	4.7	0.78	22.1
10.	94/268	27.1	4.4	0.76	21.7
11.	94/465	26.4	4.7	0.76	19.7
12.	94/263	26.4	4.3	0.76	22.2
13.	94/107	25.4	4.8	0.78	20.3
14.	94/275	25.5	4.3	0.76	22.6
15.	94/340	25.2	4.3	0.76	19.7
	S.E +	0.48	0.03	0.03	0.46
	CD at 5%	1.46	0.09	0.01	1.39

The strain 94/381 and 94/142 gave significantly superior performance for 2.5% span length whereas 94/517 and 94/381 recorded highest fibre tenacity. In general, the strain 94/381 recorded significantly superior technological performance over entries in set I. The strain 94/326, 94/275 and 94/263 recorded signficantly superior fibre tenacity.

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 net plot of 3.6 x 4.5 m.

The following were the treatment combinations :

IW CPE ratios : 3
1. 0.4 IW/CPE 2. 0.6 IW/CPE
3. 0.8 IW/CPE

Topping periods : 3
1. No topping (Control)
2. Topping at 80 DAS (days after sowing)
3. Topping at 100 DAS
4. Traditional system of irrigation

All the 40 samples collected for different treatments in four replications were tested for seed cotton yield, G.P., Seed Index, Lint Index, 2.5% span length, Micronaire fineness, maturity percentage and teancity at 0 and 3.2 mm gauge lengths. The mean values are presented in table.

TABLE 8 : YIELD AND FIBRE PROPERTIES OF G.COT.HYB.6 FOR DIFFERENT TREATMENTS

Treatments	Yield (kg/ha)	G.P	S.I	L.I	2.5% span length (mm)	M.V.	Mature fibres %	Bundle strength zero gauge (g/t)	Bundle strength 3.2mm gauge (g/t)
(A) Irrigation treatment									
i. Traditional system	2487	32.4	8.2	3.8	28.2	3.8	60	47.1	23.7
ii. 0.4 IW/CPE	2270	31.8	7.9	3.7	27.4	3.7	65	46.6	24.1
iii. 0.6 W/CPE	2460	32.0	7.7	3.8	27.7	3.6	60	47.2	24.0
iv. 0.8 IW/CPE	2609	32.6	7.9	3.8	28.0	3.8	67	46.0	23.4
(B) Topping period									
i. No topping	2312	32.7	8.2	4.0	28.0	3.7	65	46.3	24.1
ii. Topping at 80 DAS	2433	32.2	8.1	3.9	27.6	3.7	65	46.4	23.5
iii. Topping at 100 DAS	2594	32.5	8.2	3.9	27.4	3.7	63	47.2	23.8
SEM ±	120	0.26	0.08	0.06	0.21	0.08	2.4	0.60	0.24
C.D at 5%	NS	NS	NS	NS	NS	NS	NS	NS	NS
C.V.%	17.0	1.7	3.7	5.0	2.6	1.9	12.8	4.4	3.5

Analysis of results indicated that the variations were non signicant for different levels of irrigation ratios and topping periods. As the yield and quality parameters are not influenced, drip irrigation system is found to be beneficial for cotton cultivation only because of 50% conservation of water and related advantages.

THRUST AREA II : POST-HARVEST TECHNOLOGY OF COTTON

Scanning Electron Microscopy of Splice Joints of Cotton and Blended Yarns

The objective of the project was to prepare the spliced Polyester/Cotton yarns of 40s count with different blend compositions and to examine the spliced zones in Scanning Electron Microscope.

In the of 40s blended polyester/cotton (25/27) yarn spun on the Rotor Spinning System, the wrappers are formed by polyester fibre due to its low density. The fibres at the end of the splicing zone are randomly oriented but held together by wrapper fibres. The RSE and RSE values for this yarn are 64.3 and 85.7 respectively. The RSS and RSE values for 50/50 polyester/ cotton blended yarn spun at the same count are 80.4 and 89.1, respectively. These values are higher than those for (72/25) polyester/ cotton blend. The SEM study revealed entanglement of fibres at the broken ends of yarn and the splicing zone ensuring proper entanglement of fibres. The wrapper fibres hold yarn section tightly. For 100% polyester yarn, SEM revealed that two ends of broken yarn are joined by very loosely wound circular wrappers in the splicing zone. The fibres in splicing zone are randomly oriented.

Determination of Relationship between Imperfections and Classimat Faults in Yarn

During the period under report, 14 more yarn samples were tested for evenness along with imperfections at 4 sensitivity levels, *viz.* – 50, 3, 3; –50, 2, 2; –40, 3, 3; and – 40, 2, 2. Thus a total of yarn samples of count in the range of 14s to 100s were tested.

For evenness tests total imperfections (thin places + thick places + Neps) were calculated for 30 samples at 4 sensitivity levels.

Development of Foot-Operated CIRCOT Ginning Machine

The first model of foot operated gin was modified during the year. A pair of counter rotating rollers was employed to pinch and pull the fibres from the seed. The lower roller is replaced with a new roller made of Nylon-12, the diameter of which is 53.5 mm. The gap between two rollers can be varied from 0.08-0.15 mm depending upon the requirements. The chain and sprocket arrangement used in the first machine has been replaced by simpler V belt system (size A-70). The operator's seat and the frame of the machine are also modified to make the machine more sturdy and operator friendly. The average hourly output of the machine is 363 g of lint. The performance of the machine was tested by ginning ten varieties/ hybrids of cotton. The data are presented in the table follows :

TABLE 9 : OUTPUT OF LINT WHEN GINNED IN FOOT OPERATED GIN

Sl. No.	Cotton	Lint output, (g/hr)			
		I	II	III	Mean
1.	Y.1	407	390	395	397.33
2.	G.Cot.11	401	395	385	393.67
3.	Abadhita	380	380	385	381.67
4.	AKH.4	406	357	362	375.00
5.	LRA.5166	361	369	385	371.60
6.	MECH.1	380	360	365	368.33
7.	Jayadhar	370	360	365	365.00
8.	H.6	370	350	355	358.33
9.	H.4	350	345	340	345.00
10.	H.777	278	263	271	270.60
				Mean	362.65

Design Modifications on Pneumatic Splicer for Improved Splicing Action

During the reported period, the following spares were procured/fabricated for carrying out the proposed modifications,

1. Air-Filter Unit
2. Spiral Hose
3. Pressure Gauge
4. Modulus FRL Unit
5. Nozzle
6. Air-tubes of various sizes
7. T-joints, reducers, nipples, valves
8. O-rings
9. Circlips
10. Pipe adapters of various sizes

As the procurement of spares was delayed and the spares could be collected only at the end of the reported period, technical programme for the period could not be completed. However, a bypass arrangement from the air-supply source to the existing nozzle assembly has been made. This has the provision of an independent control of air-pressure through an afr Unit. A modular FRL unit has also been installed in the bypass supply line with a view to adding moisture to the supplied air. This is as an optional arrangement. With these modifications, the unit can be used as experimental splicing rig, with independent control of various working elements. Fabrication of a nozzle housing and two baffle

places is in progress. At present, the above modifications are being fine tuned for efficient working.

THRUST AREA III : STRUCTURE, PROPERTY AND THEIR INTER RELATIONSHIPS IN TEXTILE MATERIALS

A Study of Structural Weak Links in Cotton

Ten cotton samples were subjected to aqueous swelling followed by stretch to investigate the effect of the treatment on the rheological properties of single fibres. Instron Tensile Tester was employed to determine the tensile parameters, like tenacity, strain at break, specific work of rupture, initial modulus and secant modulus of raw and treated fibres. Experiments were conducted both at 65% rh. and in wet state. The results are presented in Tables below.

From the data in Tables, the following inferences could be drawn :

1. Treatment enhances the tenacity of single fibres; the percentage increase ranges from 43 to 87%.

2. Strain at break of treated fibres suffers reduction; the percentage decrease varies between 15 and 53%.

3. Treatment augments the specific work of rupture; the extent of increase varies from 9% to 57%.

TABLE 10 : EFFECT OF ASTD* ON SINGLE FIBRE PROPERTIES

Cotton Variety	% increase in Tenacity	% decrease In Extension	% increase in Specific work of rupture	% increase in Initial modulus	% increase in secant modulus
Pima	63.0	48.6	– 6.8 NS	165	222
Suvin	56.4	35.7	17.0	173	139
DCH.32	57.5	35.0	8.8	176	190
H.6	78.5	29.1	– 4.6 NS	107	137
AKA.5	50.3	34.8	34.8	162	133
CJ.73	81.8	21.4	56.5	168	107
G.Cot.11	43.0	17.0	40.5	108	55.4
V.797	86.9	38.0	31.6	167	149
LRA.5166	80.3	52.8	– 12.1 NS	127	180
G. Ageti	85.3	14.8	24.4	128	120

TABLE 11 : INFLUENCE OF WETTING ON SINGLE FIBRE PROPERTIES OF UNTREATED COTTON

Cotton Variety	% increase in Tenacity	% decrease in Extension	% increase in Specific work of rupture	% increase in Initial modulus	% increase in secant modulus
Pima	18.5	15.2	12.0 NS	18.7	36.6
Suvin	23.5	17.3	18.2*	31.3	49.2
DCH.32	16.8	21.9	2.3 NS	21.1	46.0
H.6	23.7	23.9	4.5 NS	23.1	50.6
AKA.5	19.4	11.4	3.0 NS	16.2	22.0
CJ	31.1	11.2	6.6 NS	15.7	22.0
G.Cot.11	14.7	13.0	0 NS	10.0	19.3
V.797	28.6	11.0	9.3 NS	17.4	18.5
LRA	29.3	22.2	8.2 NS	29.3	54.2
G. Ageti	29.9	21.0	17.4*	24.4	45.9

% Changes are with reference to the raw fibre properties at 65% rh.

** Significant at 5% level NS : Statistically Non-significant.*

TABLE 12 : INFLUENCE OF WETTING ON SINGLE FIBRE PROPERTIES OF ASTD TREATED COTTON

Cotton Variety	% increase in Tenacity	% decrease in Extension	% increase Specific work of rupture	% increase in Initial modulus	% increase in secant modulus
Pima	2.3 NS	4.4 NS	9.6 NS	3.8 NS	3.1 NS
Suvin	10.2 NS	4.3 NS	8.7 NS	8.0 NS	2.0 NS
DCH.32	3.7 NS	5.0 NS	9.2 NS	4.3 NS	6.7 NS
H.6	7.9*	8.3 NS	11.8 NS	2.8 NS	8.2 NS
AKA.5	0 NS	5.2 NS	4.1 NS	10.0 NS	7.2 NS
CJ.73	2.6 NS	4.5 NS	6.2 NS	7.8 NS	6.5 NS
G.Cot.11	4.4 NS	5.7 NS	15.0*	1.4 NS	6.9 NS
V.797	8.9 NS	0.5 NS	20.2*	2.3 NS	3.9 NS
LRA.5166	3.5 NS	0.6 NS	10.0 NS	3.6 NS	4.5 NS
G. Ageti	1.6 NS	3.8 NS	7.6 NS	0 NS	6.6 NS

@ Aqueous swollen and stretched Fibres; % Changes with reference to property of fibres at 65% rh;

** Significant at 5% level;NS : Non Significant*

4. Treatment brings about profound increases in moduli values. The initial modulus increases by 107% to 176% and the secant modulus by 55% to 222%.

5. In the case of raw fibres wetting in water enhances the tenacity (15% to 31%), initial modulus (16% to 31%), secant modulus (18% to 54%) and reduces the extensibility (11% to 24%) of raw fibres. Wetting does not affect the specific work of rupture of raw fibres.

6. On the contrary, treated fibres do not show any significant change in tensile properties on wetting. This indicates irreversible structural transformation characterised by the elimination of built-in strains in the fibre.

Objective Analysis of Fabric and Wear Comfort

Low stress mechanical properties for a set of cotton fabrics differing in ends and picks, and yarn count (both warp and weft) have been measured by employing the Kawabata Evaluation System for Fabrics (KESF) system available at ATIRA. Tensile, shear and compression measurements for the same set of fabrics were made by using the respective moduls available at CIRCOT for a comparative study. Both Primary Handle Value (PHV) and Total Handle Value (THV) were computed from the low stress mechanical properties measured at ATIRA.

Results indicated that the values for most of the parameters obtained at ATIRA and CIRCOT agreed very well. It was observed that, fabrics had a THV of 2 and above (rated to be fair and above) if the cover factor was more than 20. A high values of PHV suggestive of high stiffness, crispness, fullness, softness and antidrape stiffness which in turn was achieved because of high values for the individiual low stress mechanical parameters. It was also noted that, the count of the yarn used as warp and/or weft and the number of threads in both the directions had a deciding influence on most of the low stress mechanical parameters.

It could be concluded that summer suiting of more than average handle value could be prepared from cotton by using coarser yarns in the warp and weft and also by increasing the number of threads in both dirctions to effectively achieve a cloth cover of more than 20.

THRUST AREA IV : CHEMICAL PROCESSING AND FINISHING TREATMENTS

Effect of Yarn Structure on the Dyeing Behaviour of Cotton/Polyester Blended Yarns and Fabrics

Earlier work on dyeing of Polyester-Cotton blends using the carrier method of dyeing polyester followed by reactive dyeing of cotton under this project has already been reported. the present report is on the work of High Temperature-High Pressure (HTHP) method of dyeing polyester followed by reactive dyeing of cotton.

Knitted fabrics prepared from ring spun and air-jet spun yarns of 63s count with a blend composition of 65% polyester and 35% cotton were scoured and bleached before dyeing. The air-jet and ring spun yarn samples were dyed together by a two step process. The polyester portion was dyed with disperse dye followed by reactive dyeing of cotton using the following five sets of dyes.

Sample No.	Disperse Dyes	Reactive Dyes
1	Terenix Blue F2GL	Reactofix Navy Blue HER
2	Terenix Yellow F7GDL	Reactofix Yellow HE4G
3	Terenix Red FBL	Reactofix Red HE8B
4	Terenix Yellow F^GL	Reactofix Yellow HE6G
5	Terenix Golden Yellow F2GL	Reactofix Golden Yellow HER

Dyeing of Polyester : The polyester portion was dyed in a laboratory model HTHP Dyeing machine at 130°C. The material was introduced into the dyebath at 50°C and then the temperature was raised to 130°C at the rate of 1-2°C/min in 40-45 min. Dyeing at 130°C was continued for 60 min. The fabrics were dyed at 2% shade using a material-to-liquor ratio of 1:30. After dyeing, the samples were rinsed, reduction cleared and washed. They were then treated with dilute acetic acetic acid solution, washed and dried.

Dyeing of Cotton : The samples were dyed with reactive dyes to 2% shade at 85°C in the same dyeing machine using an M:L ratio of 1:30. Standard dyeing procedures were followed using salt for exhaustion and alkali for fixation. After dyeing for a fixed period of time, the samples were soaped in a non-ionic detergent solution, washed and dried.

Evaluation of the dyed material: The colour strength of the dyed materials was evaluated by using computerised colour matching system. Since λ max of disperse and the matching reactive dyes differed, the evaluation was carried out at both the λ max values and the data are given Table 13. Besides, the colour measurements were also carried out at the average λ max value as determined by the computer (Table 13). The colour strength of the materials was also evaluated after dissolution of cotton (Table 14) as well as polyester portion (Table 15) seperately. The light and washfastness properties of the dyed materials have been evaluated (Table 16).

The overall results indicate that under the same conditions of dyeing the air-jet spun samples posses higher colour strength as compared to the ring spun samples. A similar trend was also observed for carrier method of dyeing. An examination of the results further show that the colour strength of the dyed samples of ring as well as air-jet is always found to be higher in the case of HTHP dyeing technique in comparison with carrier method of dyeing.

When the colour strength of the polyester and cotton portion was individually evaluated from the dyed samples, it was observed that HTHP method once again yielded samples with high colour strength compared to carrier method. Significant differences in light and washfastness properties between ring and air-jet fibrics have not been observed.

TABLE 13 : K/S VALUES OF HTHP P/C DYED SAMPLES

Sample No.	A		λ_{max} (nm)	B		λ_{max} (nm)	C		λ_{max} (nm)
	RS	AS		RS	AS		RS	AS	
1	1.396	12.074	610	10.731	11.567	620	11.040	11.678	580
2	6.869	7.181	430	6.857	7.281	440	5.482	5.660	400
3	9.218	9.365	530	9.075	9.208	520	8.641	8.725	560
4	5.116	5.176	430	5.109	5.165	440	4.463	4.475	400
5	10.309	10.463	450	9.260	9.517	470	8.734	8.772	410

A = Colour strength at average λ_{max}
B = Colour strength at disperse λ_{max}
C = Colour strength at reactive λ_{max}

RS = Ring Spun
AS = Air-jet Spun

TABLE 14 : K/S VALUES OF DYED SAMPLES (AFTER COTTON DISSOLUTION)

Sample No.	RS	AS	λ_{max} (nm)
1	27.020	26.864	620
2	20.751	19.932	440
3	11.083	10.786	520
4	14.472	13.552	430
5	22.485	22.991	470

TABLE 15 : K/S VALUES OF DYED SAMPLES (AFTER POLYESTER DISSOLUTION)

Sample No.	RS	AS	λ_{max} (nm)
1	3.354	3.660	580
2	1.482	1.515	400
3	6.355	6.302	560
4	0.92	0.96	400
5	3.851	3.911	410

TABLE 16 : FASTNESS PROPERTIES OF DYED SAMPLES

Sample No.	Fastness to Light		Fastness to Washing (ISO - 3)			
			E		S(p/c)	
	RS	AS	RS	AS	RS	AS
1	4-5	4-5	5	4-5	4-5/5	4-5/5
2	4-5	4-5	5	5	5/5	5/5
3	4	4-5	5	5	4-5/5	4-5/5
4	4-5	4-5	5	4-5	5/5	5/5
5	4	4	4-5	4-5	4-5/5	4-5/5

E = Colour change *P = Polyester*
S = Staining *C = Cotton*

Dyeing Of Cotton with Natural Dyes

Dyeing of Cotton Yarns with Calcium Salt of Lac Dye : Earlier, cotton fabrics were dyed with the calcium salt of lac dye after giving them a pretreatment with chitosan by pad-dry-cure procedure. As this procedure is not suitable for yarns, chitosan application by exhaust method was tried. Yarns of 20s count spun at CIRCOT were pressure kiered with 1% NaOH solution and were subsequently bleached yarns were treated hydrogen peroxide in the laboratory. These kiered and bleached yarns were treated with 0.3% chitosan solution at 40°C for 30 minutes. After that, the yarns were squeezed, rinsed with water at 40°C for 15 minutes and were immediately taken up for dyeing.

A laboratory model open bath beaker dyeing machine to dye yarn to 5% and 10% shades. As in the case of fabric, the material-to-liquor ratio was kept at 1 : 30 and pH of the dye bath was adjusted to 4.5. Dyeing was carried out at five differeent dyeing temperatures, *viz.* 60°C, 70°C, 80°C, 90°C and 100°C for one hour. It was observed that the dyeing temperature of 70°C resulted in satisfactory exhaustion of the dye-bath and produced a reasonably good shade on the yarns. Hence this temperature was selected for further dyeing experiments. Dyed yarns were bluish violet in colour and to improve the washfastness, these were treated with 2% solution of a cationic dye-fixing agent for 15-20 minutes at room temperature. These were then soaped with non-ionic detergent solution (2g/L) at 70°C, washed and air-dried.

To obtain different colours, both pre- and post-mordanting treatments with alum and ferrous sulphate were given. Such yarn samples were dyed to 5% shade only. Details of the treatments given, colour obtained as well as the colourfastness properties of these yarns have been summarised in Table 17.

Dyeing of Cotton Fabrics and Yarns with Sodium Salt of the Lac Dye : The dyeing

procedure was almost similar to that used for calcium salt with a few modifications. Here also, samples were given a treatment with chitosan before dyeing. As the sodium salt of the lac dye had better water solubility, its solution was prepared by dissolving it in hot water and filtering through a fine cloth after allowing to stand for some time. As the pH of this solution was around 4.5, it did not require adjustment. Dyeing was carried out to 2% and 5% shades only as there was less water insoluble residue in the dye.

To improve upon the washfastness property, dyed fabrics and yarns were treated with the 2% solution of a formaldehyde-free dyefixing agent **Hoefix 4231** at room temperature for 15 minutes. The colour of the samples dyed with sodium salt of lac dye was pinkish violet in comparison to the bluish violet colour obtained with the calcium salt.

Here, both pre- and post-mordanting treatments were given with alum and ferrous sulphate mordants to obtain different colours. Such samples were dyed to 2% shade only and were not treateed with the dye-fixing agent as their washfastness properties were found to be satisfactory. Washfastness properties of cotton fabrics and yarns dyed with the sodium salt of lac dye have been presented in Table 18.

Dyeing of Cotton Fabrics and Yarns with Berberin : Optimum concentrations of tannic acid and tartor emetic required for dyeing cotton fabrics to 0.2%, 0.5% and 1% shades by exhaust method were worked out. The colour of the dyed fabric was bright yellow. Material to liquor ratio was kept at 1 : 30. The same conditions worked well for cotton yarns also and the dye-bath was well exhausted. However, when the same conditions were applied to the dyeing of fabric on a jigger, the dye-bath exhaustion was not complete. It was observeed that a lower material-to-liquor ratio of 1 : 20 resulted in better exhaustion than in the 1 : 30 ratio.

Cotton yarns were subjected to pre- and post-mordanting treatments with various metallic mordants like alum, ferrous sulphate, copper sulphate and stannous chloride. These were dyed to 1% shade and except for iron mordanteed samples which were greenish yellow in colour, mordanting did not have much effect on the colour of the dyed yarns. These samples were evaluated for various colourfastness properties and the results are tabulated in Table 19. It can be seen from the table that unmordanted dyed sample (control) had moderate fastness to washing, good fastness to rubbing and perspiration, but very poor lightfastnes. Mordanted samples had lower washfastness but iron mordanted samples have shown a remarkable increase in lightfastness property.

Cotton fabrics were also mordanted with alum and ferrous sulphate mordants and these are being evaluated for various fastness properties.

A Study on Antibacterial Finishing of Cotton Employing Electron Beam Curing

Work on optimising the use of chemicals such as zinc acetate, acetic acid and hydrogen peroxide for antibacterial finish has been completed. The ascertain the durability of the finish, the treated fabrics along with their control were subjected to mild launderings as per standard method and were evaluated for various physical as

TABLE 17 : COLOUR AND COLOURFASTNESS PROPERTIES OF COTTON YARNS DYED WITH CALCIUM SALT OF LAC DYE TO 5% SHADE

Treatments	Colour obtained	Wash-fastness		Light-fastness	Rubbing fastness		Perspiration fastness			
		E	S(C/W)		Dry	Wet	Acidic		Alkaline	
1. Control Ch-dyed dye- fixing	bluish violet	3	4-5/4-5	4	4-5	4-5	4	4-5/4-5	4	4-5/4-5
2. Pre-mordanting										
i) T.A. + Ch– Alum-dyed-dye-fixing	reddish violet	3-4	4-5/4-5	3-4	4-5	4	4-5	4-5/4-5	3-4	4-5/4-5
ii) T.A. + Ch $FeSO_4$- dyed - dyefixing	greyish violet	4-5	4-5/4-5	4	5	4	4	4-5/4-5	3-4	4-5/4-5
iii) Harda - Alum - Ch-dyed - dye fixing	reddish brown	3	4-5/4-5	4	4-5	4	4	4-5/4-5	4	4/4
3. Post-mordanting										
a) Ch-dyed - T.A.- Alum	dull pink	3-4	4-5/4-5	4	5	4-5	3-4	4-5/4-5	4	4/4
b) Ch-dyed -T.A.- lime-$FeSO_4$	black	2-3	4-5/4-5	4	5	2-3	3-4	4-5/4-5	3-4	4/4

Ch- Chitosan *S - Staining* *C - Cotton*
T.A. - Tannic acid *E - Colour change* *W - Wool*

TABLE 18 : WASHFASTNESS PROPERTIES OF COTTON FABRICS AND YARNS DYED WITH SODIUM SALT OF LAC DYE

Treatment		Washfastness (SO2 - 2)			
		Fabric		Yarns	
		Colour	Staining	Colour	Staining
1.	Dyed to 2% shade - Dye fixing	2-3	5	4	5
2.	Dyed to 5% shade - Dye fixing	2-3	5	4	5
3.	Premordanted and dyed to 2% shade without due fixing				
	(i) Tannic acid and alum	3-4	5	3	5
	(ii) Harda and alum	3	5	2-3	5
	(iii) Harda and ferrous sulphate	4	5	3-4	5
4.	Dyed to 2% shade without dye fixing and postmodranted				
	(i) Tannic acid and alum + cream of tartar	2-3	5	3	5
	(ii) Tannic acid and ferrous sulphate	2-3	5	3-4	5

well as antibacterial properties. The samples treateed with even 5% zinc acetate and laundered 15 times recorded 100% antibacterial performance. Samples were also treated with zinc acetate and varying proportions of hydrogen peroxide and acetic acid and subjected to 15 washes. These samples also have shown antibacterial activity for *S.aureus*. The new method helps save chemicals to a significant extent. The trial to impart antibacterial finish using electron beam will be carried out at BARC.

Effect of Chemical Processing on Dyeing of Knitted Fabrics

Single and double jersey cotton knitted fabrics were pretreated by two different methods, *viz.* direct bleaching and scouring-bleaching (conventional bleaching). The pretreated fabrics were dyed to 2% shade with (i) Brilliant Organge - 2R, and (ii) Procian Yellow - 3R. Both types of fabrics were finished with cellulase enzyme separately and then dyed with the above mentioned dyes. All the dyed fabrics exhibited higher colour strength values than conventionally bleached-dyed samples. It was also observed that directly bleached enzyme treated dyed samples show higher colour strength than conventionally bleached-dyed fabrics.

Impact of Dyeing on the Strength and Colour of Fibres in Different Varieties of Cotton

The effect of mechanical processing

TABLE 19 : COLOUR FASTNESS PROPERTIES OF COTTON YARNS DYED WITH BERBERIN TO 1% SHADE

Treatment	Washfastness		Lightfastness	Rubbing fastness		Perpiration Fastness			
						Acidic		Alkaline	
	Colour change	Staining (Cotton)		Dry	Wet	Colour Change	Staining (Cotton)	Colour Change	Staining (Cotton)
1. Control (Tonnic acid + tartar emetic) -dyed	3-4	4-5	1	5	4-5	4	4-5	4-5	4-5
2. Premordanted									
i) Ferrous Sulphate	2-3	4-5	Above 5	4-5	4	4-5	4	4-5	4
ii) Stannous chloride	2	4-5	1	4-5	3-4	4-5	4-5	5	4-5
iii) Alum	1-2	4-5	1	5	4	4	4	4	4
iv) Copper sulphate	2	4-5	1	5	4	4	3-4	4-5	4
3. Post mordanted									
i) Ferrous sulphate	1	5	3-4	5	4-5	3-4	4	4-5	4-5
ii) Stannous chloride	2-3	4-5	1	5	4-5	4-5	4-5	5	4-5
iii) Alum	2-3	4-5	1	5	4-5	4-5	4-5	4-5	4-5
iv) Copper sulphate	2	4-5	1	–	–	–	–	–	–

operations especially that of carding on the colour of the dyed fibres of ten varieties of cotton were attempted. As the quantity of the dyed samples was not sufficient enough for processing through a miniature card, an attempt was made to simulate the carding action through a pair of fibrograph combs. A known weight of the dyed sample was opened with the help of combs taking care to keep the number of opening strokes the same for all the samples. The opened samples were evaluated for colour characteristics in CCMS. The results in general, indicated a fall in the colour strength on all but one sample, The fall in colour sterength was in the range of 40% to 50% in the case of samples dyed with yellow colour. With Orange and Pink dyes a fall of around 55% to 80% in the colour strength was noted. It was interesting to note that the samples dyed with Blue dye practically did not show any change in the colour strength after the mechanical treatment.

During the same period ten more samples belonging to different varieties were purified and dyed with the above set of dyes. Examination of the fibre properties before and afteer dyeing and measurement colour changes due to mechanical operations on the dyed fibres have been completed. The analysis of the data is in progress. However, the initial trend indicates a general fall in the tenacity of fibres after dyeing, though to different extents. A strong association is also observeed between maturity of the fibres and their colour strength as shown in the table below :

TABLE 20 : PERCENTAGE COLOUR REALISATION OF THE DYED FIBRES AFTER MECHANICAL TEREATMENT (λ_{max})

Sl. No.	Sample	Colour Difference			
		Yellow	Orange	Pink	Blue
1.	Deviraj	42.54	66.29	72.37	97.43
2.	Digvijay	49.03	68.57	79.03	98.29
3.	Laxmi	48.52	74.18	70.61	98.94
4.	H.6	44.39	75.50	Sample	103.54
5.	Digvijay	41.75	66.35	69.23	100.65
6.	Deviraj	49.75	71.36	72.26	108.23
7.	RG-8	29.08	55.42	57.82	108.24
8.	H-6	47.55	71.32	69.31	107.15
9.	NHH.44	45.14	76.93	69.44	109.71
10.	Wagad	32.23	63.33	66.49	104.00

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

Kraft Paper From Cotton Plant Stalks for use in the Manufacture of Corrugated Boxes for Packaging of Fruits

To confirm the results of the previous year's trials, packaging, transportation and storage trials were repeated this year. Corrugated boxes of various sizes and designs were prepared from cotton plant stalk kraft paper, incorporating all the modifications suggested by the collborating Institutes. These boxes were evaluated for various strength properties and supplied to Konkan Krishi Vidyapeeth, Dapoli and Central Insitute for Sub-tropical Horticulture, Lucknow for undertaking packaging and transportation trials on Alphonso and Dushehari mangoes. At Konkan Krishi Vidyapeeth, Dapoli, the packed boxes were transported by road to Karjat and back, covering a total distance of about 300 kms. The performance of corrugated boxes made from cotton stalks was compared with those made from conventional raw materials. At CISH, Lucknow the packed boxes were transported to New Delhi market by road covering a distance of about 900 kms; wooden boxes of similar size and capacity used as control. The trials were completed successfully and the detailed test report is awaited.

For undertaking trials on oranges, about 400 telescopic type corrugated boxes were prepared from cotton stalk kraft paper. These boxes were evaluated for various properties and then sent to National Research Centre for Citrus, Nagpur. The performance of these boxes will be compared with similar type corrugated boxes made from conventional raw materials. The packed boxes will be transported by road to Azad Mandi, New Delhi and back covering a distance of about 1100 kms. After completion of the trial, the quality of the boxes and the packed fruits will be evaluated. The preparations for the trial are over and the same will be undertaken shortly.

Textile Processing Aids from Cottonseed Oil

Various non-ionic softeners were prepared by refluxing cottonseed oil and split cottonseed oil (cottonseed oil split into constituent fatty acis) with polyethylene glycols of different molecular weights (10M, 400M and 600M) and by changing the ratio of the reactants. The consistency of the products ranged from liquid to almost solid paste and these were of light cream to brown colour.

Condensations products of polyethylene glycol with unsaturated fatty acids are known to develop some rancidity upon storage and cottonseed oil contains about 75% of unsaturated fatty acids. Therefore to overcome this problem, hydrogenated cottonseed oil was used to prepare the polyethylene glycol condensates. These were light coloured thick pastes.

All the products thus, prepared had neutral pH and were found to be stable in neutral, alkaline and slightly acidic media. They were also unaffected by electrolytes which such that they can be effectively used in hard water also.

Preparation of Pure Fatty Acids from Low Grade Cotton Seed Oil

Splitting of cotton seed oil was carried out by 3 different methods, (i) Twitchell method (ii) Enzymatic splitting, and (iii) Splitting under pressure.

(i) Twitchell method was modified to split cottonseed oil into free fatty acids. The conditions of splitting were optimised by carrying out reaction with raw cotton seed oil for different periods, *viz,* 2,4,6 and 8 hr. The reaction time of 8 hr produced maximum yield which was 85%. Refined and hydrogenated oil samples were split by the same method, under optimised conditions. The yield obtained for refined oil was 75% and for hydrogenated oil, it was 83%.

(ii) Optimisation of conditions for splitting of cottonseed oil enzymatically was carried out for reaction times varying from 4 hr to 20 hr. Raw, refined and hydrogenated cottonseed oil samples were reacted with enzyme *Recimus communis* which was obtained from castor beans. Maximum yield of free fatty acids from raw cottonseed oil was obtained at the end 20 hr. Time of reaction for maximum yield from refined and hydrogenated oil 16 hr and 6 hr respectively.

Preparation of Pulp and Paper from Cellulosic Wastes through Anaerobic Digestion

CIRCOT has already standardised a process of preparing pulp and paper from cotton stalks through anaerobic digestion. This patented biopulping process has been extended to other cellulosic materials, *viz.,* like rice straw and wheat straw. Saving on chemicals and energy and the low polluting nature of effluents are the chief merits of this new process. Efforts are already in the offing for imparting this technology to one of the paper units running on rice straw at Srikakulam in Andhra Pradesh.

Utilisation of Cellulase for Deinking of Waste Paper Pulp

Cellulase enzyme hydrolyses waste paper pulp and relases the printing ink. In recent experiments, newspaper pulp was treated with commercial cellulase at various concentrations to release the ink. It was observeed that 3.0% concentration of the enzyme was enough to release almost all the ink in the pulp. Initial experiments were carried out on 10.0 g of newspaper wastes. The procedure of deinking was standardised further for deinking 100 g and 250 g of newspaper wastes.

It is well known that paper made from waste newspaper does not have enough mechanical strength. Trials were conducted to improve the strength properties of enzymatically deinked pulp by mixing it with different concentrations of sisal fibre pulp, guar gum and polyester fibre waste. Standard paper sheets of all these pulps were prepared. The paper samples are being evaluated for various strength properties.

Attempts were also made to deink good quality catalogue paper using the same enzyme.

Production of Biogas from Cellulosic Wastes at Low Temperature

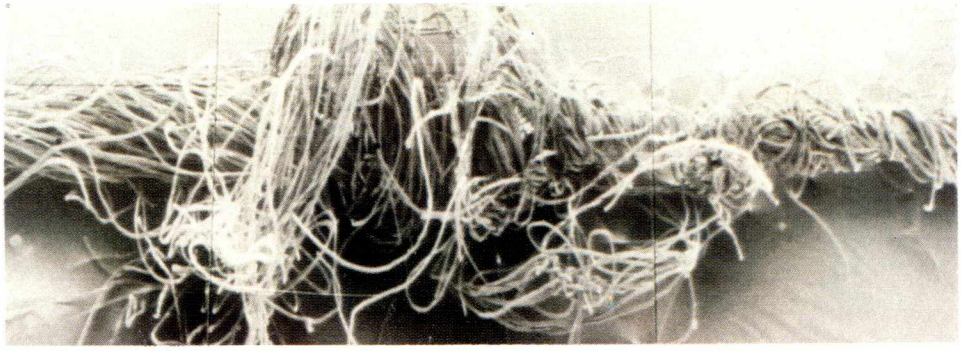
It is well known that biogas production comes down when the temperature is 20°C and less. The methanogenesis almost ceases when the temperature is around 10°C. Recently, some cultures were isolated and this new mixed microbial consortium was found not only to enhance the biogas production but also to be active at lower temperatures.

In order to establish this finding, trials have been conducted by incubating the entire

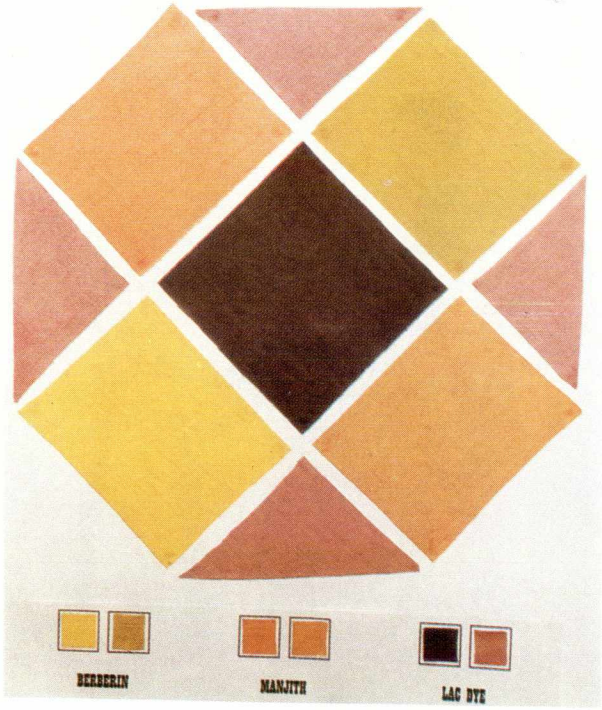
PLATE IX

TECHNOLOGY DEVELOPMENT

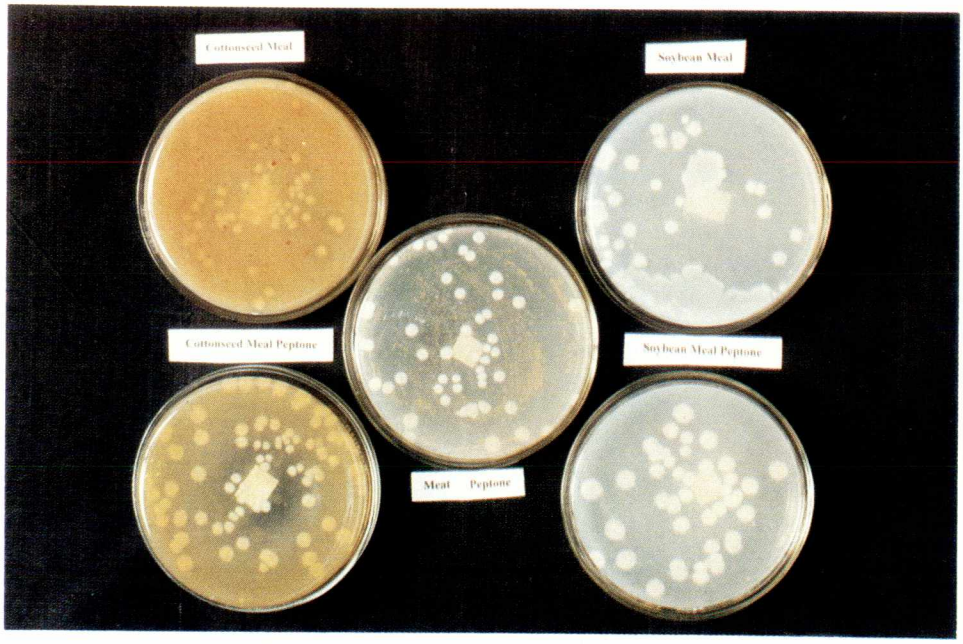
Foot-operated Kisan Gin designed at CIRCOT



Fibre wrapping at the spliced region of a Polyester - Cotton blended yarn



Different colour shades obtained on cotton fabric using Natural Dyes



Cottonseed Meal Peptone in comparison with other peptones

bench scale assembly in an environmental chamber maintained at different temperatures. A number of trials have been completed. It is observed that biogas can be prepared at 15°C - 18°C as efficiently as at 25°C to 30°C. It is proposed to take up some trials in the cow dung based biogas plants to confirm the efficiency of the cultures.

Microbial Evaluation of Protein Hydrolysates (Peptones) from Cottonseed Meal

A method has been standardised for the preparation of protein hydrolysates (peptones) from cottonseed meal obtained from commercial meal as well as from various varieties belonging to four species and a couple of hybrids. The peptones obtained from cottonseed meal were used in the microbial media as a nitrogen source for growing micro organisms, like bacteria, fungi, yeast and actiomycetes. It was found that the peptones specifically enhanced bacterial sporulation in the case of *Bacillus subtilis* and actinomycetes cultures, *viz. Streptomyces flavus and S.scabies.*

3

Publications

A. Annual Report

Annual Report of the Central Institute for Research on Cotton Technology for the year 1995-96.

B. Technological Circulars

Technological Circulars on Trade and Standard Varieties of Indian Cottons for the season 1994-95 and 1995-96.

C. Research Publications (CIRCOT Publications - New Series)

543 Balasubramanya, R.H. and Kathe, A.A. – An Inexpensive Pre-treatment of Cellulosic Materials for Spawning Oyster Mushroom (Reprinted from the Journal Bioresource Technology, Vol.57, P.303, July, 1996)

544 Ahmed, M. and Sinha. R.D. – Ring Spun vs. OE Spun Yarns (Reprinted from the Indian Textile Journal, Vol.107, No. 12, P. 42, September, 1996)

545 Narayanan, S.S., Singh, V.V., Patil, N.B. and Nagwekar, S.N. – Fibre Quality of Certain Colour Linted Cotton Germplasm of *G.hirsutum* (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 21, No. 2, P. 170, September, 1996)

546 Iyer, K.R.K., Bhama Iyer, P., Sundaramurthy, V.T., Mandloi, K.C. and Meshram, L.D. – Characteristics of Colour Cotton and Requiring Improvement (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 21, No. 2, P. 207, September, 1996)

547 Iyer, V., Saxena, S., Shaikh, A.J., Chhagani, R.R. and Shenai, V.A. – Dyeing of Cotton with Eco-friendly Lac Dye (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol.21, No.2, P.214, September, 1996)

548 Bhavana Kapoor, Nagwekar, S.N., Bhagwat, A.M. and Kamarkar, S.N.– Effect of Soil Salinity in Organic Cultivation of Y.1 (G. Arb. L) (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol.21, No.2, P.246, September, 1996)

549 Makwana, D.N. and Iyer, K.R.K. – Swelling of Cotton due to Moisture Sorption and its Effect on Micronaire Value (Reprinted from the Asian Textile Journal, Vol.5, No.10, P.82, October, 1996)

550 Bhama Iyer, P., Sreenivasan, S. and Krishna Iyer, K.R. – Ligno Cellulosic Fibres - Method for Estimation of Cellulose Content (Reprinted from the

Indian Textile Journal, Vol.107, No.4, P.20, January, 1997)

551 Makwana, D.N. and Ukidve, A.V. – Electrical Resistance of Textile Materials (Reprinted from the Indian Textile Journal, Vol.107, No.5, P.24, February, 1997)

552 Vizia, N.C., Jadhav, S.B., Anap, G.R. and Iyer, K.R.K. – Influence of Roller Speed on the Incidence of Seed Coat Fragments (Reprinted from the Indian Textile Industry and Trade Journal, Vo. 35, No. 1-2, P. 37, January-February, 1997)

553 Paralikar, K.M., Bhama Iyer, P., Iyer, K.R.K. and Golatkar – Scanning Electron Microscopy Study of Sisal Fibres (Reprinted from the Indian Textile Journal, Vol. 107, No. 6, P. 28, March, 1997)

554 Chidambareswaran, P.K., Sreenivasan, S., Makwana, D.N., Sundaram, V. and Radhakrishna Murthy – Application of X-ray Diffraction for Cotton Varietal Improvement through Single Plant Selection (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 1, P. 23, March, 1997)

555 Chattopadhyay, S.K. and Parthasarathy, M.S. – Airjet Spinning of Some Indian Cottons Part I : Properties of Air-jet Yarn Compared with Ring Yarn (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 22, No.1, P. 33, March, 1997)

556 Kathe, A.A. and Balasubramanya, R.H. – Effect of Substratum, Size on the Yield of Oyster Mushrooms on Cotton Plant Stalks (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 1, P. 41, March, 1997)

557 Bhagawathi, R., Balasubramanya, R.H. and Paralikar, K.M. – *Phyllosphere microflora* of Cotton Plant Parts in Relation to the Mill Fever Syndrome *Byssinosis* (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 1, P. 46, March, 1997)

558 Mukundan, S., Adhiseshaiah, J., Iyer, J.K. and Nagwekar, S.N. – A note on the Effect of Seed Treatment and Dates of Sowing on Cotton Fibre Quality (Reprinted from the Journal of Indian Society for Cotton Improvement, Vol. 22, No. 1, P. 60, March, 1997)

D. Other Publications

1 Kathe, A.A., Balasubramanya, R.H. and Khandeparkar, V.G. – Cotton Stalk Spawn of *Pleurotus sajor caju* and the Yield of Mushrooms (Reprinted from the Journal Mushroom Research, Vol. 5, P. 5, 1996)

2 Gupte, A.A., Bhattakar, B.L., Chattopadhyay, S.K. and Venugopal, B. – Measures of Blend Irregularities – Their Significance and Application (Reprinted from the Indian Textile Journal, Vol. 106, No. 6, P. 14, June, 1996)

3 Annual Cotton Quality Update 1996.

4 Cotton – The White Gold – Special Publication.

5 Utilisation of Cotton By-Products and Agrowastes – Research at CIRCOT.

E. Papers Presented at Seminars / Conferences, etc.

1 Bhama Iyer, P. and Iyer, K.R.K. – Laboratory Accreditation – Problems Encountered by Specialised Disciplines (Published in Proceedings of 1996 NCSL, workshop and Symposium, NCSL, Boulders, Colorado, USA)

2 Iyer, K.R.K. – Fibre Quality Evaluation of Indian Cottons by using HVI System (Presented at the 52nd All India Textile Conference on Modern Technology Management in Textiles held on October 26, 1996 at Ichalkaranji)

3 Balasubramanya, R.H. and Khandeparkar, V.G. – Production of Biogas from Citrus Peels and Batch Digesters (Presented at the 37th Annual Conference of the Association of Microbiologists, held on December 4-6, 1996, at Madras)

4 Gayal, S.G. and Khandeparkar, V.G. – Cellulose Treatment to Improve Fabric Properties (Presented at the 37th Annual Conference of the Association of Microbiologists, held on December 4-6, 1996, at Madras)

5 Iyer, K.R.K. – Need for Cotton Quality Assurance through Breeding Research – A Feedback from User Groups (Presented at the National Seminar on Century of Cotton held at Surat on December 21, 1996)

6 Iyer, K.R.K. – Indian Cotton in the Twenty-first Century (Presented at the National Seminar on Textile Vision Towards 2000 AD held at NIRJAFT, Calcutta on December 18, 1996)

The following Poster Papers were presented at the National Seminar on **Century of Cotton** held at Surat on December 21, 1996.

1 Ahmed, M., Chattopadhyay, S.K., Laxmivenkatesh, H.R., and Upadhye, D.L. – Progress of Spinning and Fabric Manufacturing Trials from Naturally Coloured Cotton.

2 Anap, G.R., Patil, P.G. and Shaikh, A.J. – Studies on Handling and Chipping of Cotton Stalk.

3 Balasubramanya, R.H., Khandeparkar, V.G. and Gangar, H.U. Biogas from Cellulosic Wastes.

4 Balasubramanya, R.H., Shaikh, A.J. and Kandeparkar, V.G. – Low Cost Technology from Hand made Paper Industries.

5 Bhama Iyer, P., Subrahmanyam, Y. and Nachane, N.D. – Heterosis for Colour Yield and Fibre Characteristics in Naturally Coloured Cotton.

6 Bhatawdekar, S.P., Balasubramanya, R.H. and Khandeparkar, V.G. – Preparation of Protein Hydrolystates from Cotton Seed Meal.

7 Chattopadhyay, S.K., Ahmed, M., Chandrasekar, S., and Murudkar, V.V. – Characterisation of Yarn Faults in Export Yarns.

8 Darade, R.S., Mane, V.S., Mehetre, S.S., and More, C.M. – Effect op Intercrops on Quality of Cotton Variety KOP.498.

9 Gurjar, R.M. – Preparation of Particle Boards from Cotton Stalks Using Low Cost Binders.

10 Hussain, G.F.S., Nachane, R.P. and Iyer, K.R.K. – Study of Fibre Friction in Cotton.

11 Iyer, J.K., Subrahmanyam, Y. and Ukidve, A.V. – Quality of Cotton Fibre in Relation to its Development Period.

12 Jadhav, S.B., Vizia, N.C. and Iyer, K.R.K. – Seed Coat Fragments and their Relation to the Seed Characteristics.

13 Lambhate, S.S., Darade, R.S., Mehetre, S.S. and Kaledhonkar – Effect of Bioagent on Yield and Quality of Seed Cotton of *G.hirsutum* Cotton.

14 Makwana, D.N., Ukidve, A.V. and Iyer, K.R.K. – Development of Cottons in Gujarat – Quality Aspects.

15 Mane, V.S., Mehetre, S.S. and Darade, R.S. – Effect of Liquid Fertilisers through Drip Irrigation on Growth, Yield and Quality of Cotton.

16 Paralikar, K.M., Balasubramanya, R.H., Vizia, N.C. and Iyer, K.R.K. – Variation in the Size of Fibre Base in Diploid and Tetraploid Cotton Varieties in Relation to the Strength of Attachment and Seed Coat Removal.

17 Patil, P.G. and Anap, G.R. – Studies on Cotton Seed.

18 Shaikh, A.J. and Varadarajan, P.V. – Writing Grade Paper and Corrugated Boxes from Cotton Plant Stalks.

19 Subrahmanyam, Y., Bhama Iyer, P. and Sreenivasan, S. – Influence of Different Soil Profiles on Phasic Development of Cotton Fibres in G.Cot.Hy.8.

20 Thejappa, N. – Cotton Seed – A Source of Nutritious Edible Oil.

21. Ukidve, A.V. and Rajagopal, K.B. – Staple Length Classification of Indian Cottons.

22 Varadarajan, P.V. – Cotton and Eco-regulations.

23 Gayal, S.G. – Enzymes in Cotton Technology (Presented at the Seminar on 'Enzymology : Clinical and Industrial Aspect held at Mumbai on January 9-11, 1997)

24 Ahmed, M. and Chattopadhyay, S.K. – Quality Control in Export Cotton Knits (Presented at the All India Seminar on Problems and Prospects in Textile and Garment Industries in Emerging Global Scenario held in March 8-9, 1997 at Davangere).

F Techological Circulars on Trade Varieties of Indian Cottons

T.C. No.	Variety	Place
2580	J.34	Chandigarh
2581	Gujarat 17	Kapadwanj
2582	R.G.8	Sriganganagar
2583	RST.9	Sriganganagar
2584	Deviraj	Surendranagar
2585	Khandwa 2	Khandwa
2586	V.797	Mehsana
2587	G.Cot.13	Dhanduka
2588	Desi	Bharuch
2589	Digvijay	Bharuch

G. Technological Circulars on Standard Indian Cottons

S.C. No.	Variety	Place
471	Deviraj	Junagadh
472	Sanjay	Amreli
473	G.Cot.`5	Amreli
474	LH.1566	Abohar
475	LD.491	Abohar
476	Hybrid 4	Surat
477	G.Cot.10	Surat
478	G.Cot.12	Surat
479	G.Cot.17	Surat
480	G.Cot.Hy.6	Surat
481	G.Cot.Hy.8	Surat
482	G.Cot.Hy.10	Surat
483	Digvijay	Bharuch
484	G.Cot.10	Bharuch
485	G.Cot.16	Bharuch
486	G.Cot.17	Bharuch
487	V.797	Chharodi
488	G.Cot.13	Chharodi

4

Extension

CIRCOT has no agricultural farm attached to it at the headquarters but all the Regional Quality Evaluation units located within the agricultural university premises in 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 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.

The Director and Scientists of CIRCOT are members of various committees of the Bureau of Indian Standards (BIS) for cotton and textile testing and they participate in many seminars, symposia, conferences, etc. in the country so that the knowledge and their expertise in various fields are passed on to different user groups. Director and many scientists are members in advisory panels of various institutions like BTRA, SITRA, VJTI, CCI, Bombay University, Textiles Committee, 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 discussions in other organisations. They also publish their research findings, apart from participating in exhibitions displaying the technologies developed, improvement in processes, by-products, waste utilisation, etc.

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

To meet the HRD needs of the textile industry and trade, CIRCOT conducts regular training courses both at the headquarters and at the Ginning Training Centre (GTC), Nagpur. At the headquarters, Integrated Training Course on Cotton Testing Methods and Evaluation with lessons in elementary statistical methods applicable to textile testing are being conducted for the personnel sponsored from the cotton trade and textile mills while at the GTC, practical training is imparted on the different aspects of ginning, maintenance and operation of ginning machines and pre-cleaners. This course is basically meant for the sponsored gin fitters, supervisors and officers working at the ginning factories. The GTC is equipped with different types roller gins, saw gin, and pre-clearners.

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 also form part of the extension activity of CIRCOT.

Technical Queries : Many queries received from private organisations, Semi-Government, State and Central Government departments on the technologies and devices developed by CIRCOT, clarifications sought on test methods for cotton fibre, yarn and fabrics, quality parameters of different cotton strains, varieties and hybrids, by-products and agro-waste utilisation, etc. were promptly replied to.

Paid Tests : The Test House at CIRCOT had received fairly large number of samples of fibre, yarn, fabric and miscellaneous items for paid tests from textile mills, Government and Semi-Government organisations as well as Cotton Trade and Industry on payment of prescribed test fees. Many types of fabric samples were received for paid tests from Mumbai Municipal Corporation, Nair Hospital and Mumbai Port Trust. Several lots of yarn and fabric samples from the Superintendent of Central Prison, Pune, Aurangabad, Nashik and Nagpur were also referred to CIRCOT for tests. Some fabric samples from Government Printing Press of Maharashtra, Directorate of Quality Assurance, RITES, Western Railway, Mantralaya, Small Scale Industries and Rural Development Departments of Maharashtra, were also received for paid tests. Demand for testing on High Volume Instrument (HVI), Honeydew Resistance and Colour Fastness had considerably increased.

The number of samples received for paid tests during the period 1996-97 together with samples tested for the year 1994-95, 1995-96 and the quinquennium 1991-92 to 1995-96 are given in the table.

TABLE : TYPES OF PAID TESTS AND THE NUMBER OF SAMPLES TESTED DURING 1996-97

Sl No.	Type of Tests	Average for quinquennium 1991-92 to 1995-96	1994-95	1995-96	1996-97
1	2	3	7	8	9
1	Fibre	1366	551	997	1839
2	Spinning	144	245	221	201
3	Yarn	270	172	207	309
4	Fabric	223	187	235	525
5	Ginning	62	103	205	96
6	Miscellaneous	92	51	78	72
7	Trash content	46	–	232	195
	Total	2203	1309	2175	3237

Total test fees received during the period from paid tests was Rs. 7,50,069/-.

Besides routine tests, some special tests were also carried out on samples received from various organisations against payment of fees. Highlights of these tests are given below :

1. Twenty-eight cotton samples received from M/s. Bhagwati Cotton Ltd., Mumbai, for honeydew content after cleaning on Shirley Instrument.

2 Twenty-four yarn samples received from Dy. Chief Inspecting Officer, Textiles Committee, Mumbai, for denier by BISFA rules, nature of fibres and oil content %.

3 Seventy-one fabric samples received from Textile Committee, Mumbai, for determining the nature of fibres, oil content % and denier by BISFA rules.

4. One tarpaulin sample received from CCI, Mumbai, for determination of copper content (%).

5. One fabric sample received from Bombay Dyeing and Manufacturing Company, Mumbai, for cross sectional view and photomicrography of both normal and defective portions.

6. Seventy-six viscose staple fibre samples received from Grasim Industries, Mumbai, for moisture regain (%).

7. One sample of dyed mineral Khaki cloth received from Madura Industrial Textiles, Madurai, for resistance to microbial attack as per Aspergillus niger method (IS : 1389 - 1959).

8. Two cotton samples, one control and the other bleached, received from Lavino Kapur Cotton Ltd., Mumbai, for the analysis of green specs.

9. Five 100% cotton yarn samples received from Clariant India Ltd., Mumbai, for antibacterial finish against organism *Staphylococcus* (Gm +ve) and *Klebsiella pneumoniae* (Gm. –ve)

10. Three samples of wool fibre received from Wool Research Association, Thane, for Scanning Electron Microscopy at low magnifications.

11. Three samples of cotton seeds received from Tradex Enterprises, Bangalore, for free gossypol.

12. One absorbent cotton sample received from Brisk Surgical Cotton Ltd., Mehsana, for phytosanitary certificate.

13. Two uncarded bleached absorbent cotton received from Jaycot Industries, Mumbai, for ash content (%), absorbancy, water soluble matter and acidity/alkalinity as per the test methods provided by the party.

14. Two samples of alpha cellulose received from Standard Alkali, Thane, for length and diameter in microns.

15. One sample of P.E. containment received from Texel Industries, Mumbai for soil burial test as per ASTM method and for breaking strength on Instron.

16. Five PSF samples and five cotton samples received from Reliance Industries Ltd., Mumbai, for special

sample preparation for blends and spinning on O.E. spinning machine.

17. Twenty Terrycot fabric samples of Khaki and Blue received from the Central Prison, Pune, for the determination of nature of dye.

Training

Integrated Training Course on Cotton Testing Methods and Evaluation : In eight batches of two weeks duration 46 sponsored personnel from cotton trade and industry were trained. They were from Cotton Corporation of India (CCI), East India Cotton Association (EICA), Mumbai and Karnataka State Co-Op. Marketing Federation.

There were five batches of trainees for the four week training course, in which 17 sponsored personnel took part. Apart from this, there were two special training courses each of one month duration also in which 20 persons sponsored by Nagarjuna Fertilisers, Hyderabad, and Rail India Technical & Economic Services (RITES) Mumbai, were trained. An amount of Rs. 1,55,500/- was generated from the training programmes in cotton testing during the period under report.

Ginning Training : At the GTC, Nagpur training was given to 159 sponsored personnel from ginning factories in five batches. The amount received from ginning training during 1996-97 has been to the extent of Rs. 2,10,800/-.

5

Conferences and Symposia

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

Sl. No.	Meetings/Conferences/ Seminars/Symposia, etc.	Place	Date	Name(s) of the Scientist(s) and Technical Personnel who attended the Conference/Meeting, etc.
1.	Seminar on Future Prospects for Denims in India	Mumbai	27-04-1996	Many Scientific and Technical Staff of CIRCOT
2.	Two day Seminar on Eco-friendly Cotton	Mumbai	08-06-1996 and 09-06-1996	Many Scientific and Technical Staff of CIRCOT
3	Seminar on Yarn Export – A Challenge	Mumbai	27-09-1996	Shri Muntazir Ahmed and Dr. S. K. Chattopadhyay
4	52nd All India Textile Conference on Modern technology Management in Textiles	Ichalkaranji	26-10-1996 and 27-10-1996	Dr. K. R. Krishna Iyer Dr. A. V. Ukidve and Dr. S. Sreenivasan
5.	One day International Seminar on Man-Made Fibres	Mumbai	25-11-1996	Dr. S. Sreenivasan
6.	Reorientation Programme on NICNET Services	Delhi	28-11-1996 and 29-11-1996	Shri V. B. Suryanarayanan and Shri D. Radhakrishnamurthy
7.	37th Annual Conference of the Association of Microbiologists	Chennai	04-12-1996 to 06-12-1996	Dr. R. H. Balasubramanya and Dr. S. G. Gayal
8.	National Seminar on Energy Management and Environmental Preservation	Saharanpur	14-12-1996 and 15-12-1996	Shri A. J. Shaikh

Sl. No.	Meetings/Conferences/ Seminars/Symposia, etc.	Place	Date	Name(s) of the Scientist(s) and Technical Personnel who attended the Conference/Meeting, etc.
9.	Textile Vision towards 2000 AD	Calcutta	18-12-1996	Dr. K. R. Krishna Iyer
10.	National Seminar on Century of Cotton in India	Surat	21-12-1996	Dr. K. R. Krishna Iyer Dr. A. V. Ukidve Dr. G. R. Anap Dr. R. H. Balasubramanya Dr. N. C. Vizia Shri A. J. Shaikh Dr. P. V. Varadarajan Dr. S. K. Chattopadhyay Shri R. M. Gurjar Dr. D. N. Makwana (Late) Dr. N. Thejappa Shri Y. Subramanyam Shri R. S. Darade
11.	Seminar on Enzymology : Clinical and Industrial Aspects	Mumbai	09-01-1997 to 11-01-1997	Dr. S. G. Gayal
12.	Seminar on Microbiology and Health Care	Mumbai	31-01-1997 and 01-02-1997	Dr. S. G. Gayal and Dr. S. P. Bhatwadekar
13.	Seminar on Eco-friendly Pathways to Textile Finishing and Agro-waste Utilisation	Mumbai	01-03-1997	All Scientists and Technical Staff of CIRCOT
14.	All India Seminar on Problems and Prospects in Textiles and Garment Industries in Emerging Global Scenario	Davangere	08-03-1997 and 09-03-1997	Shri M. Ahmed and Dr. S. K. Chattopadhyay

6

Personnel

Major events during 1996-97 relating to CIRCOT personnel are listed below :

A. APPOINTMENT

Sl. No.	Name	Designation	Effective date of appointment
		1. Administrative Staff	
	Shri N. K. Jain	Finance and Accounts Officer	01-05-1996
		2. Supporting Staff	
1.	Shri V. T. Poojari	Supporting Staff Gr. I	30-04-1996
2.	Shri S. P. Naik	Supporting Staff Gr. I	27-05-1996
3.	Shri M. N. Kamble	Supporting Staff Gr. I	26-02-1997
4.	Kum. K. T. Thapa	Supporting Staff Gr. I	27-02-1997

B. PROMOTION

Technical Staff

The Five yearly assessment of eligible technical staff was conducted committees and promotions/advance increments granted as given below :

Sl. No.	Name	Grade to which promoted	Effective date of promotion
		Through Assessment	
1.	Shri D. V. Kambli	Technical Assitant T-I-3	01-01-1996

Sl. No.	Name	Grade to which promoted	Effective date of promotion
		Through DPC	
1.	Shri H. R. Laxmivenkatesh	Technical Officer T-6	01-07-1995
2.	Dr. (Smt.) S. D. Pai	Technical Officer T-6	01-07-1995
3.	Shri K. V. Ananthakrishnan	Technical Officer T-6	01-01-1996
4.	Shri C. R. S. Moni	Technical Officer T-6	01-01-1996
5.	Shri G. Viswanathan	Technical Officer T-6	01-01-1997
		Supporting Staff	
1.	Shri C. Mhatri	S. S. Gr.IV	10-04-1996

D. TRANSFER

Technical Staff

1. Shri Hamid Hasan, Sr. Technical Assistant T-4 from CIRCOT Q.E. Unit, Sirsa to CIRCOT Q.E. Unit, Ludhiana w.e.f. 02-01-1996.

2. Shri Anil Kumar, Technical Assistant T-II-3, from CIRCOT Q.E. Unit, Indore to CIRCOT, Mumbai w.e.f. 19-03-1997.

3. Shri V. L. Rangari, Technical Assistant T-II-3, from GTC, Nagpur to CIRCOT, Mumbai w.e.f. 31-03-1997.

Administrative Staff

1. Shri S. K. Dohatare, Administrative Officer, CIRCOT, Mumbai to NBSS & LUP, Nagpur w.e.f. 04-05-1996.

2. Shri N. N. Lotha, Administrative Officer, from NBSS & LUP, Nagpur to CIRCOT, Mumbai w.e.f. 04-05-1996.

E. RETIREMENT

Scientific Staff

Dr. P. K. Chidambareswaran, Principal Scientist retired voluntarily from service w.e.f. 07-08-1996 (F.N.).

Administrative Staff

Smt. S. S. Dongre, Supdt. retired voluntarily from service w.e.f. 01-06-1996 (F.N.).

Supporting Staff

Shri P. J. Ahire, Technical Assistant T-I-3 retired from service w.e.f. 31-07-1995.

F. RESIGNATION / TERMINATION

1. Shri R. C. Yadav, Technical Assistant

resigned from service w.e.f. 07-12-1996 (AN).

2. Shri N. P. Ghuge, Technical Assistant T-II-3 resigned from service w.e.f. 01-05-1996 (F.N.).

3. Shri K. D. Varak, Supporting Staff Gr. I was terminated from service w.e.f. 16-05-1996.

G. DEPUTATION

1. The deputation of Smt. V. V. Janaskar, Jr. Clerk to B. S. College of Advanced Maritime Studies and Research, Mumbai was extended for one more year.

2. The deputation of Shri Venu Thanikal, Sr. Stenographer to Training Ship Chankya, Navi Mumbai, was extended for one more year.

3. Shri G. Moosad, Supdt. was granted deputation for one and a half years at NRCC, Nagpur w.e.f. 05-06-1996.

H. AWARD

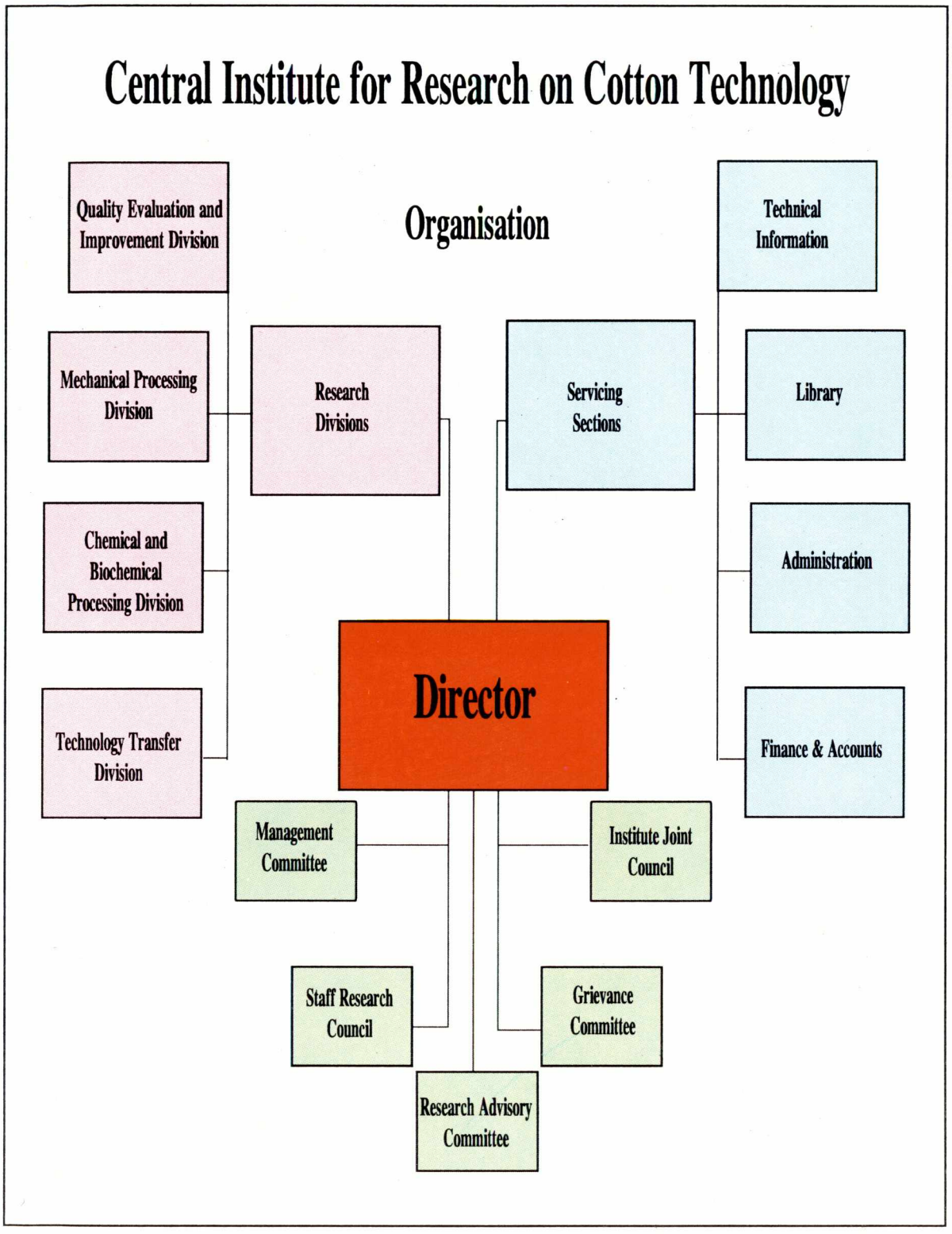
Shri A. V. Ukidve, Principal Scientist, has been awarded a merit certificate for outstanding research on cotton improvement, by the Committee on Centenary Celebration of the Main Cotton Research Station, Surat.

I. OBITUARY

Dr. N. Thejappa, Sr. Scientist expired on 28-02-1997, while in service.

7. Annexures

ANNEXURE – I



ANNEXURE - II

LIST OF EQUIPMENTS PROCURED

1. Baer Sorter
2. Yarn Twist Tester
3. KES - FB - 4 Surface Tester
4. KES - FB -1- 4 Data Processor
5. Frequency Inverter Drive System for Ring Frames
6. Trash Separator
7. Photocell Level Control Unit for Blowroom
8. Launderometer
9. Laboratory Autoclave
10. Perspirometer

ANNEXURE – III

FINANCIAL STATEMENT

EXPENDITURE AND RECEIPTS OF THE INSTITUTE DURING 1996-97

(in lakhs)

		Sanctioned Grant Rs.	Acutal Expenditure Rs.	Savings (–) Deficit (+) Rs.
	A. EXPENDITURE			
I	CIRCOT including Q.E. Unit			
	Non-Plan			
	(a) Capital expenditure including expansion of the Institute	260.00	5.90	(+) 63.77
	(b) Working expenditure		317.87	
II	***Plan***			
	(a) Capital expenditure including expansion of the Institutee	110.00	30.70	(–) 0.20
	(b) Working expenditure		79.10	
	B. RECEIPTS			
	Sale proceeds of farm produce		0.55	
	Analytical and testing fees		7.58	
	Rent		2.78	
	Application fees from candidates in connection with recruitment and training		3.68	
	Sale of publications		0.27	
	Interest on loans and advances granted to Council's employees		0.91	
	Leave salary, pension contributions, etc.		0.01	
	Miscellaneous receipts		2.73	
	Receipts for services rendered by the Institute		2.34	
	Interest on TDR & STD		2.50	
	TOTAL		23.35	

8

Appendices

APPENDIX – I

STAFF WORKING AT THE CENTRAL INSTITUTE FOR RESEARCH ON COTTON TECHNOLOGY AS ON 31-03-1997

(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

1. Dr. V. G. Khandeparkar, M.Sc., Ph.D.
2. Dr. A. V. Ukidve, M.Sc., Ph.D., F.T.A.

Senior Scientist

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

APPENDICES

Scientist (Senior Scale)

1. Shri P. Bhaskar, M.Sc.
2. Dr. S. K. Chattopadhyay, M.Tech., 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.

Technical Personnel

Technical Officer T-7

1. Shri K. S. Bhyrappa, L.T.T., A.T.A.
2. Shri T. K. M. Das, B.Sc., D.B.M., D.E.I.M., Dip.J., D.P.R., Cert. I.S.R.S.
3. Shri. H. U. Gangar, B.E., 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 H. R. Laxmivenkatesh, D.T.T., A.T.A., L.T.I.
5. Shri S. N. Nagwekar, B.Sc.
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. Shri S. J. Guhagarkar, M.Sc.
4. Shri I. H. Hunsikatti, B.Sc., A.T.A.
5. Smt. S. R. Kamath, B.Sc.
6. Smt. V. V. 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, B.Sc., A.T.A.
9. Shri R. M. Modi, S.S.C., Cert. Photography
10. Smt. N. D. Nachane, B.Sc.
11. Shri D. Radhakrishamurthy, M.Sc., M.Phil.
12. Shri K. B. Rajagopal, B.Sc.
13. Shri S. Sekar, B.Sc.
14. Smt. R. K. Shahani, B.Sc., B.Lib.
15. Smt. S.V. Sukhi, M.Sc. D.F.L.(German)
16. Shri V. B. Suryanarayanan, B.Sc., D.F.L.(German)
17. Shri D. L. Upadhye, S.S.C.(Tech.)., N.C.T.V.T.
18. Shri S. Vancheswaran, B.Sc.
19. Shri T. Venugopal, B.E.

Senior Technical Assistant T-4

1. Shri P. B. Gurjar
2. Shri G. B. Hadge, B.Sc.
3. Shri R. K. Jadhav, B.Sc.
4. Shri M. Mohan, M.Sc., Dip. J.
5. Shri V. V. Murudkar, L.T.M.
6. Shri R. D. Nagarkar, M.Sc.
7. Shri R. S. Prabhudesai, B.Sc., D.C.M.
8. Smt. C. D. Prabha, M.Sc.
9. Shri B. R. Pawar, B.Sc.
10. Shri P. N. Sahane, D.I.F.T.
11. Smt. Sheela Devi Raj, M.Sc.
12. Smt. S. D. Shetye, M.Sc., M.Lib.
13. Shri S. Kumar Subramanian, B.Sc.
14. Shri D. N. Moon, B.Sc.
15. Shri G. Vijayan Iyer, Dip.Mech. Engg., Post.Dip.Prod.Mfg., A.M.I.E.(Mech.)
16. Shri M. V. Vivekanandan, B.Sc.

Technical Assistant T-II-3

1. Shri P. S. Anil Kumar, B.Sc.
2. Shri V. N. Bhorkar, B.Sc.
3. Smt. Bindu Venugopal, B.Sc.
4. Smt. Binu Sunil, B.Sc.
5. Shri R. R. Chhagani, B.Sc.
6. Shri U. D. Devikar, B.Sc.
7. Shri S. N. Hedau, B.Sc.
8. Shri V. D. Kalsekar, B.Sc.
9. Shri D. U. Kamble, B.Sc.
10. Shri S. V. Kokane, B.A.
11. Shri H. S. Koli, B.Sc.
12. Shri R. R. Mahangade, M.Sc.
13. Kum. S. S. Nagwekar, M.Sc.
14. Smt. P. B. Subasri Subramanian, B.Sc.
15. Smt. N. A. Sonkusle, B.Sc.
16. Shri R. M. Sonke, B.Sc.

Category T-II-3

Driver

Shri. B. B. Gaykar

Shri S. S. Patekar

Category T-I-3

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

Category T-2

Shri P. G. Kadam (Wireman)

APPENDICES

Category T-1

1. Shri G. G. Ambare
2. Shri M. G. Ambare
3. Shri A. R. Bane
4. Shri M. B. Chandanshive, Cert.Cot.Spin. (Machinist/Fitter)
5. Shri R. G. Chiplunkar
6. Shri D. M. Correia, S.S.C., I.T.I., N.C.T.V.T.(Mechanic)
7. Shri G. S. Deorukhkar
8. Shri B. R. Jadhav
9. Shri T. R. Kadam
10. Shri N. D. Kambli
11. Shri K. K. Kasar
12. Shri R. R. Khurdekar
13. Shri T. S. Mhaske
14. Shri K. D. Mohite
15. Shri M. R. Nevrekar
16. Shri S. V. Patil
17. Shri B. K. Sawant
18. 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)
19. Shri M. B. Thokrul
20. Shri V. Y. Unhalekar
21. Shri S. A. Waghela
22. Shri D. A. Salaskar (Driver)
23. Shri R. S. Rane

Auxiliary Personnel

Canteen Staff

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

Administrative Personnel

Administrative Officer

Shri N. N. Lotha, B.Tech.

Finance and Accounts Officer

Shri N. K. Jain, 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. Shri M. V. Kamerkar, B.A.
3. Smt. Jayagouri Sivaramakrishnan

Assistant

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

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
2. Shri R. D. Shambharkar
3. Smt. T. P. Pawar
4. Kum. V. S. Nayak

Senior Clerk

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

Junior Clerk

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

APPENDICES

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

Supporting Staff Gr. II

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

Supporting Staff Gr. I

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

LIST OF STAFF AT THE QUALITY EVALUATION UNITS

AKOLA

Shri N. V. Bansode, B.Sc.	:	***Technical Officer T-5***
Shri R. G. Dhakate, B.Sc.	:	***Technical Assistant T-II-3***
Shri S. R. Patode	:	***Supporting Staff Grade II***

COIMBATORE

Smt. Santa V. Nayar, B.Sc.	:	***Technical Officer T-5***
Shri S. Venkatakrishnan, MSc., A.T.A	:	***Technical Officer T-5***
Shri K. Thiagarajan, M.Sc.	:	***Sr. Technical Assistant T-4***
Shri K. V. Nair	:	***Operator T-2***
Shri N. Arumugham	:	***Supporting Staff Grade IV***
Shri V. M. Subramanian	:	***Supporting Staff Grade III***

DHARWAD

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

GUNTUR

Shri S. Mukundan, B.Sc.	:	***Technical Officer T-5***
Shri K. Venkanna, M.Sc., B.Ed.	:	***Technical Assistant T-II-3***
Shri Ch. Thimmanna	:	***Supporting Staff Gr.IV***
Shri V. Y. M. Suvarchala Rao	:	***Supporting Staff Gr.III***

HISAR

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

INDORE

Shri S. Banerjee, B.Sc.	:	***Senior Technical Assistant T-4***
Shri John Robert	:	***Supporting Staff Gr.IV***
Shri H. S. Bhabar	:	***Supporting Staff Gr.III***

APPENDICES

LUDHIANA

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

NAGPUR

Shri P. G. Patil, M.Tech.	:	*Scientist*
Shri V. M. Kulmethe, B.Sc.	:	*Technical Officer T-6*
Shri S. L. Bhanuse, B.Sc.	:	*Sr. Technical Assistant T-4*
Shri M. Bhaskar, Dip. Ref. & Air-Cond.	:	*Sr. Technical Assistant T-4*
Shri V. L. Rangari, B.Sc.	:	*Sr. Technical Assistant T-4*
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.	:	*Technical Assistant T-1*
Shri B. V. Shirsath, B.A., I.T.I.	:	*Operator (Auxiliary)*
Shri B.D. Dhengale	:	*Senior Clerk*
Shri G. G. Palorkar, B.A.	:	*Senior Clerk*
Shri S. A. Telpande, M.Com.	:	*Senior Clerk*
Shri R. A. Suddawar	:	*Driver (T-I)*
Shri B. H. Umredkar	:	*Machine Operator*
Shri A. R. Chutale	:	*Supporting Staff Gr.II*
Shri J. P. Patel	:	*Supporting Staff Gr.II*
Shri C. L. Mundale	:	*Supporting Staff Gr.II*
Shri R. B. Kautkar	:	*Supporting Staff Gr.II*
Shri P. S. Panchbudhe, M.A.	:	*Supporting Staff Gr.II*
Shri M. P. Tohokar	:	*Supporting Staff Gr.I*
Shri R. G. Matel	:	*Supporting Staff Gr.I*
Shri R. C. Rokde	:	*Supporting Staff Gr.I*
Shri M. G. Bhandkkar	:	*Supporting Staff Gr.I*

NANDED

Shri L. D. Deshmukh, M.Sc.	:	*Scientist (Sr. Scale)*
Kum. P. L. Indurkar	:	*Technical Assistant T-II-3*
Shri L. R. Indurkar	:	*Supporting Staff Gr.III*
Shri S. N. Umare	:	*Supporting Staff Gr.II*

RAHURI

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

SIRSA

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

SRIGANGANAGAR

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

SURAT

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

APPENDIX - II

Statement showing the total number of Government servants and number of Scheduled Castes & Scheduled Tribes amongst them as on March 31, 1997

Group	Total No.of employees 31-3-1997	Total No.of Scheduled Castes 31-3-1997	Total No.of Scheduled Tribes 31-3-1997
Group A Permanent			
(i) Other than Lowest Rung of Group A	37	3	--
(ii) Lowest Rung of Group A	6	3	1
Temporary			
(i) Other than Lowest Rung of Group A	–	–	–
(ii) Lowest Rung of Group A	4	–	1
Group B			
Permanent	66	8	2
Temporary	–	–	–
Group C			
Permanent	100	25	7
Temporary	9	1	1
Group D (excluding Sweepers)			
Permanent	55	13	6
Temporary	10	3	–
Group D (Sweepers)			
Permanent	10	9	–
Temporary	1	2	–
Total	298	67	18

APPENDIX - III

Statement showing the number of reserved vacancies filled by members of Scheduled Castes and Scheduled Tribes during the year 1996-97 (as on 31-3-1997)

Part I : Posts filled by direct recruitment
SCHEDULED CASTES

Group	Total No. of vacancies		Number of vacancies reserved		No.of SC candidates appointed	Shortfall	No.of ST candidates appointed against vacancies reserved for SCs in the year	No.of SC vacancies carried forward to the next year	No.of reservations lapsed after carrying forward for 3 years	No.of reservations lapsed from 1980 till the end of the year previous to the year of review	Progressive total of reservations lapsed (Col.10+11)
	Notified	Filled	Out of Col.2	Out of Col.3							
1	2	3	4	5	6	7	8	9	10	11	12
Group A Other than Lowest rung of Group A	1	1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group C	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Excl.Safaiwalas)	2	2	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Safaiwalas)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

SCHEDULED TRIBES

	Number of vacancies reserved		No.of ST candidates appointed	Shortfall	No.of SC candidates appointed against vacancies reserved for STs in the 3rd year of carry forward	No.of ST vacancies carried forward to the next year	No.of reservations lapsed after carrying forward for 3 years	No.of reservations lapsed from 1980 till the end of the year previous to the year of review	Progressive total of reservations lapsed (Col. 19+20)
	Out of Col.2	Out of Col.3							
	13	14	15	16	17	18	19	20	21
Group A Other than Lowest rung of Group A	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group C	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Excl.Safaiwalas)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Safaiwalas)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

APPENDIX - III

Statement showing the number of reserved vacancies filled by members of Scheduled Castes and Scheduled Tribes during the year 1996-97 (as on 31-3-1997)

Part II : Posts filled by Promotion (on seniority-cum-fitness)
SCHEDULED CASTES

Group	Total No. of vacancies		Number of vacancies reserved		No.of SC candidates appointed	Shortfall	No.of ST candidates appointed against vacancies reserved for SCs in the year	No.of SC vacancies carried forward to the next year	No.of reservations lapsed after carrying forward for 3 years	No.of reservations lapsed from 1980 till the end of the year previous to the year of review	Progressive total of reservations lapsed (Col.10+11)
	Notified	Filled	Out of Col.2	Out of Col.3							
1	2	3	4	5	6	7	8	9	10	11	12
Group A Other than Lowest rung of Group A	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group C	6	6	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Excl.Safaiwalas)	14	14	4	Nil	4	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Safaiwalas)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

SCHEDULED TRIBES

	Number of vacancies reserved		No.of ST candidates appointed	Shortfall	No.of SC candidates appointed against vacancies reserved for STs in the 3rd year of carry forward	No.of ST vacancies carried forward to the next year	No.of reservations lapsed after carrying forward for 3 years	No.of reservations lapsed from 1980 till the end of the year previous to the year of review	Progressive total of reservations lapsed (Col. 19+20)
	Out of Col.2	Out of Col.3							
	13	14	15	16	17	18	19	20	21
Group A Other than Lowest rung of Group A	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group C	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Excl. Safaiwalas)	1	1	1	Nil	Nil	Nil	Nil	Nil	Nil
Group D (Safaiwalas)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil