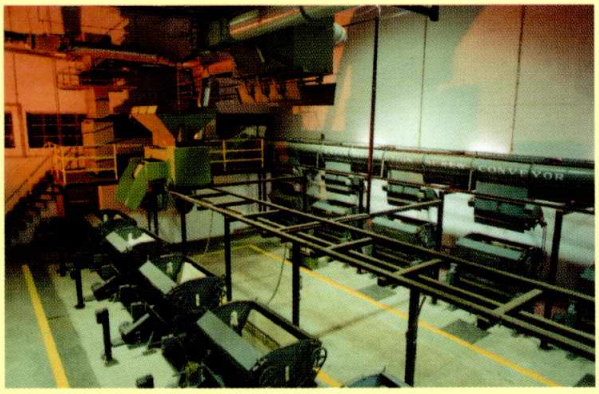

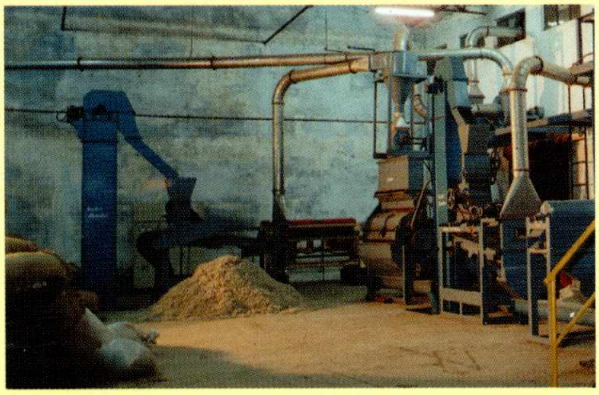

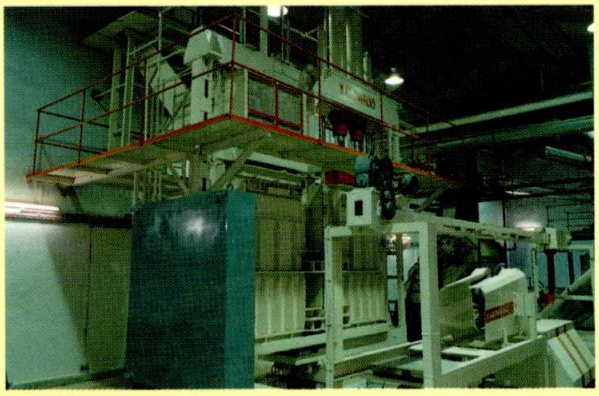

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ICAR

CIRCOT
Annual Report
2002-2003

Central Institute for Research on Cotton Technology
Adenwala Road, Matunga, Mumbai 400 019

CIRCOT

ANNUAL REPORT

2002-2003

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(Indian Council of Agricultural Research)

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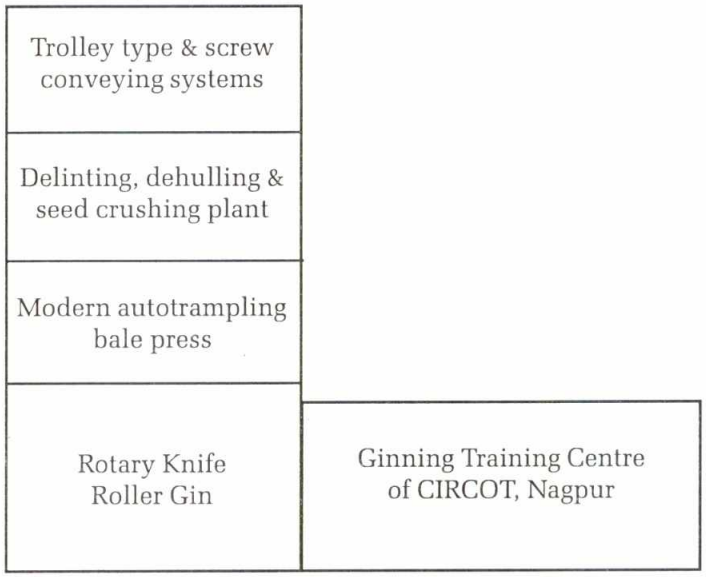

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Preface

The 79th Annual Report of CIRCOT pertaining to the year 2002-03 is being presented to the distinguished readers with a sense of pride. The Institute has completed 79 years and is in the threshold of reaching yet another milestone of having rendered fruitful service to the nation for eight long decades.

The textile sector seems to have set in a revival path after a long lull. The Mission mode programmes under the Technology Mission on Cotton have started paying dividends. CIRCOT in very close collaboration with the cotton improvement scientists is ensuring quick development of high quality cottons that would serve the needs of the user industry apart from providing adequate returns to the grower. Under Mini Mission II, CIRCOT has completed the task of establishing a pilot plant facility for scientific crushing of cotton seeds viz. delinting, dehulling, seed crushing and oil refining. Both 'kapas' and seed storage platforms have been provided at the Ginning Training Centre at Nagpur and a fire fighting system is being commissioned. With all these facilities now in place, CIRCOT is ready to provide a comprehensive training on modern methods of ginning with a view to ensure contaminant-free quality lint to the user industry at competitive rates.

Although the Government of India programme under Mini Mission IV provides for adequate financial incentive to set up modern Ginneries so as to make available contaminant-free quality cotton to the textile industry in the country, the response from the processing sector particularly from the north and south has been to say the least highly disappointing.Similarly although the package under Mini Mission IV includes a training component for fitters, supervisors and managerial personnel, the modernized factories from Gujarat and Maharashtra who have availed the benefit of the scheme, have been showing no enthusiasm to utilize the training facilities for ginning available at Nagpur. Since CIRCOT firmly believes that 'men behind machines' and not "machines" decide and are responsible for the quality of lint produced in ginneries, awareness programmes were conducted at Adilabad, Sirsa and Rajapalayam during the year to highlight the need for trained manpower in this sector.The response from the ginners to the meets was highly encouraging. How far the enthusiasm shown in attending the programmes translates into action is an issue we need to wait and watch.

Another significant development that took place during the year was the establishment of High Volume Instrument facility at the quality evaluation units at Coimbatore and Dharwad. The ANGRAU is in the process of installing a HVI unit at Guntur under the aegis of MM I of Technology Mission on Cotton. With this, the Instituite has ensured that the quality support being provided to the All India Coordinated Cotton Improvement programme is not only on modern lines but also that it is timely, accurate

and available for the samples generated right at the very early stages of the trial.

In addition, during the year at regular intervals a flurry of activities at the Institute took place in the form of Workshops, review meetings, technology transfer activities, discussions, under Technology Mission on Cotton, NATP and regular institute programmes. A one day Seminar was organized at Nagpur on ***Role of Cost Effective Ginning in Production of Clean Cotton Bale and Scientific Processing of Cotton Seed*** *wherein Ginning industry personnel and seed processors enthusiastically participated.*

The final audit pertaining to the accreditation of CIRCOT from the National Accreditation Bureau for Testing Laboratories for ISO-IEC 17025 is imminent. Probably by middle of next year CIRCOT would be an accredited Laboratory under a more stringent guidelines to provide quality testing service having wider international acceptance.

S. Sreenivasan
Director

Executive Summary

This is the Seventy-ninth Annual Report of CIRCOT covering the period from April 1, 2002 to March 31, 2003.

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

CIRCOT continued as the technology partner for the All India Co-ordinated Cotton Improvement Project (AICCIP) and over 5000 samples of cotton were tested for their spinning potential in addition to evaluation of fibre properties. During the current year more than 2,500 cotton samples from various breeding trials were evaluated at the headquarters for fibre quality, while at the Regional Quality Evaluation Units more than 40,000 samples from initial stages of trials were screened.

The total number of books in the Institute library stands at 5339 and the bound volumes of journals at 7249. The Institute continued to be recognised as a post graduate institution affiliated to the Mumbai University.

Forty projects, including externally aided programmes, were being dealt with during 2002-2003 under different core areas.

During the period under report two SRC, one RAC and two Management Committee meetings were held. The Quinquennial Review Team (QRT) appointed by ICAR to review the work of CIRCOT for the period 1997-2001 submitted its final report to the Council during the year.

The following Seminars/Workshops were conducted during 2002-2003 :

- **Quality Awareness Meet** at Surat on April 20, 2002
- Workshop on **Utilisation of Cotton Plant By-produce for Value Added Products** at Mumbai on May 29, 2002
- National Seminar on **Future Prospects of Knitting and Knitwear** on June 1-2, 2002
- Awareness programme on **Ginning Modernisation and Human Resource Development** at Adilabad, Andhra Pradesh on November 30, 2002
- Awareness programme on **Ginning Modernisation and Human Resource Development** at Sirsa on January 30, 2003
- Awareness programme on **Ginning**

Modernisation and Human Resource Development at Rajapalayam, Tamilnadu on March 22, 2003

- Seminar on **Role of Cost Effective Ginning in Production of Clean Cotton Bale and Scientific Processing of Cottonseed** at Nagpur on March 28, 2003.

Research Highlights : In connection with the study on ergonomic evaluation of ginning factories, a survey was carried out on fully automatic, semi automatic and conventional Indian ginneries for manpower requirement, to record cases of accidents among the ginnery workers and to assess the effect of sound and dust pollution on the health of workers. It was observed that noise generated by gins can be controlled by minimising sound transmission and by noise source isolation or by employing proper enclosures for gin. The survey recommends that noise pollution act can be enforced upon ginneries for creating safe working condition for the worker. To protect workers from contacting respiratory diseases, employers should take precautions to limit the amount of respirable cotton dust in the air. It is also recommended that those working in areas having high noise or dust levels should use plugs or muffs and breathing aids such as dust masks.

To develop a package for effective management of modern ginneries current, voltage and input power requirement of each component system in a ginnery was computed for several conventional and modern ginneries in Maharashtra. It was observed that a lot of scope exists to reduce the power requirement for transportation of seed cotton heaps to precleaner. The trolley feeding system saves on an average 20 units per hour for 24 DR gins as the seed cotton suction could be stopped whenever not required. On a Jumbo DR gin 90 % of the energy is utilised to overcome friction between roller and fixed knife. Belt conveyor system utilised less power when used for transferring lint from post cleaner to pala house. The energy required for transporting lint from pala house to press house depended upon the distance between them. It is recommended that installation of real time cycle-to-cycle power factor connection system would result in significant saving in energy.

To mechanise the heaping operations in ginneries, a cotton loading/unloading machine consisting of an inlet flexible pipe, casing, impeller, perforated conical disc, electric motor, outlet GI pipe and trolley has been designed and fabricated. The impeller of the centrifugal fan was modified by incorporating a perforated disc to avoid choking of cotton. Perforations of 3 mm was found to be optimum. The capacity of the machine was 2400 kg cotton per hour. It was possible to transport 30 quintal of seed cotton per hour. Attachment of a cone at the inlet side of impeller increased the efficiency of transportation.

To study the effect of cylinder type and saw band type precleaners on trash content and lint quality an experiment was conducted with Surabhi cotton. The cleaned seed cotton was ginned on double roller gins and evaluated for trash and fibre properties. On an average, about 1 mm reduction in fibre length was noted for the lint obtained during ginning after precleaning by saw band type machine. The harsh opening of seed cotton by saw bands might be the reason for this

reduction in length.

Preliminary trials were carried out for a comparative evaluation of saw ginning, roller ginning and rotary knife roller ginning for all length classes of representative Indian cotton. It was observed that 2.5% span length, length uniformity and fibre tenacity measured by using HVI were better for lint obtained from rotary knife roller ginning. Double Roller ginning followed in the gradation. Saw ginning produced comparatively shorter and weaker fibres. Evaluation of fibre properties using AFIS indicated that fibres obtained from rotary knife roller gin had low short fibre content. Saw ginned fibres had higher neps. The preliminary results indicated that for long staple cottons rotobar ginning results in higher seed coat neps, although this observation needs further strengthening with the help of more cottons.

By monitoring two parameters viz. ginning output and fibre attributes, the impact of wear of leather roller and that of knife on ginning efficiency and lint quality was assessed. Along with commercial trials for finding out wear rate and its effect on ginning output experiments were carried out in laboratory to determine the ginning output using rollers having predetermined diameters. It was observed that the rate of wear of leather roller varied between 0.028 and 0.054 mm/h. The percentage reduction in ginning output varied from 7.26 % to 12.75 %. It was observed that a net enhancement in revenue of about Rs. 28000/- from one DR gin was possible if the leather rollers were replaced after 1000 hours of operation.

More than 6800 samples were received under the All India Coordinated Cotton Improvement Project (AICCIP) for technological evaluation. Over 5000 samples were received at the headquarters and over 12000 samples were received at the six regional units of CIRCOT under various agricultural trials for different tests. The samples received were tested and reports sent to the respective agencies. A compiled report on the technological assessment of samples received under AICCIP was presented at the Annual Workshop held at Central Institute for Cotton Research, Nagpur.

Under a study on evaluation of major standard and trade varieties grown in different parts of the country, 40 standard cotton varieties and 53 trade varieties were received and tested for various fibre properties, spinnability and yarn quality.

Twenty four genotypes of *G. hirsutum* from different parts of the country were evaluated for a study on the effects of moisture stress on yield and quality of cotton with special reference to short fibre content and trash. No significant differences in yield and quality were observed. Though there was marginal stress situation at the end of the crop maturity, the impact was not observed probably due to the reason that the boll maturation was complete by that time.

About 200 bolls each from two varieties were collected for a study of variation in the quality of lint according to the position of seed in the locule. One seed each from tip, middle and base positions was collected from each locule. The lint was separated and seeds were sown during June 2002. The fibre properties were evaluated after harvest. There was a gradual increase in seed weight

from tip to base position in both varieties. Between varieties, the variations were highly significant for different characteristics. However, these variations were not significant for different positions of the seeds.

For identification and development of promising genotypes from introgressed materials, about 535 samples received from Sriganganagar, Hisar, Dharwad and Surat were tested for fibre properties. Eight out of 55 samples from Sriganganagar, seven out of 60 from Hisar, one out of 336 from Dharwad and nine out of 84 from Surat possessed the required fibre qualities and were recommended for further study.

Fibre attributes of 12 samples from Dharwad, 26 from Khandwa, 27 from Hisar, 22 from Sriganganagar and 26 from Sirsa were tested for identification and development of diploid cotton with high yield and fibre quality suitable for high speed spinning. None of the samples from Sirsa, Sriganganagar and Hisar satisfied the norms due to lower strength. Four samples from Khandwa and 3 from Dharwad were classified under Very Good category while 3 from Khandwa and 13 from Dharwad fell under Average category while looking at their fibre quality.

For a study on improvement of medium long and extra long staple fibre suitable for high speed spinning 555 samples were received from Coimbatore, Delhi and Surat. Only one sample out of 118 from Coimbatore could satisfy the quality norms.

During the year, 4 calibration cotton samples, one each of extra long, long, medium and short staple were prepared and introduced. About 808 containers were sold during the period under report generating a revenue of over Rs. 5.7 lakhs. A Calibration Cotton Users' meet was organised at Rajapalayam as a part of CIRCOT-Industry Interface.

Thirty sets of cotton plant samples – a prominent variety from each zone along with LRA.5166 – were collected from different locations for a study on quantitative analysis of toxic inorganic elements and gram-negative bacteria in soil, cotton plant materials, lint and processing dust. Concentration of Fe was higher in lower parts of cotton plant as compared to top and middle. Irrespective of the year of cultivation, the trend of variation in elemental concentration among the plant parts remained the same. Variation in plant parts was found to be independent of the elemental concentration profile of the soil. All the plant parts are densely populated with bacteria except for the lint. The leaves close to soil as well as bract and rind harboured high numbers of Gram-negative bacteria. Gram-negative bacterial population in the variety LRA 5166 was maximum for bract sample followed by rind and there was not much difference in the population in other plant parts. The geographical location appears to alter the population of gram-negative bacteria. It is the total endotoxin content (dead or alive bacteria), which is responsible for byssinosis. Presence of *Methylobacterium* was detected. In all samples *Beijerinkia* outnumbers other gram-negative bacteria.

Fifty-seven varieties of banana pseudostem obtained by hand scrapping have been tested for their mechanical properties in a study on physico-chemical and structural characteristics of banana

pseudostem fibre. The tenacity values show a high of 60.8 g/tex and a low of 32 g/tex. The breaking strain values ranged from 1.7% to 3.7%. The tex of the thick fibres is seen to be almost double than that of the thin fibres within a variety, the highest being 10 tex and the lowest being 2.6 tex. A small modification has been made in Raspador fibre extractor to suit the extraction of fibers from banana pseudostem. Also, a cleaner has been developed to remove non-fibrous material from the fibres extracted by Raspador. These two in combination give fibres, which are as good as hand-extracted material in terms of mechanical properties. Hand extracted fibres possess better whiteness index, soft silky feel with silvery appearance.

A computer programme based on Artificial Neural Network (ANN) model has been developed and named as Cotton Performance Evaluation System (COPES) for predicting cotton ring yarn quality from the knowledge of fibre properties. It can be used to optimize cotton selection and to reduce production cost. COPES can predict yarn properties such as yarn evenness (U%), thin places per kilometre (-50%), thick places per kilometre (+50%), neps per kilometre (+200%), yarn tenacity (at test speed of 500 metres/minute), elongation at break (at test speed of 500 metres/minute), yarn hairiness (hairs above 3mm length), lea CSP and highest standard count. The agreement between prediction and observation has been noted to be good.

Fifty commercial samples spun to different counts viz. 20s, 24s, 30s, 40s, 50s, 60s, 70s, 80s, 90s and 100s were subjected to estimation of lea-strength and parallelised yarn bundle strength. For bundle strength, a bundle of 160 threads was taken for test. The bundles were prepared on the specially fabricated instrument and tested by using the lea tester employing a special jaw fabricated for this purpose. For determination of lea strength, Statex Lea tester was used. From the analysis of the data it is observed that the relationship between lea strength and corresponding parallelised yarn bundle strength is perfectly linear with a correlation coefficient $r = 0.9982$ (significant at 1%) and the CV% of parallelised yarn bundle strength is considerably lower than that of lea strength.

To formulate norms for Uster evenness (U%) and imperfections for yarns spun at Central Institute for Research on Cotton Technology (CIRCOT) 621 yarn samples having count varying from 20s to 60s were tested for CSP, U%, thin and thick places and neps. From the cumulative frequency distribution curve, values corresponding to 5%, 25%, 75%and 95% and above 95% levels are classified as V. Good, Good, Average, below Average and Poor. These norms suggested are for the yarns spun on the present CIRCOT spinning system.

In a study on assessment of performance, testing and refinement of CIRCOT miniature spinning system, the setting of main processing parameters like total draft, rpm of cylinder, doffer and lickerin has been made programmable *via.* the PLC system using a Human-machine Interface (HMI) in miniature carding machine. A similar system has also been incorporated in CIRCOT miniature ring frame machine for easy setting of main processing parameters like total draft, break draft, twist per inch and spindle speed. Twenty-two cotton samples were

processed on miniature spinning system so as to produce yarns from 30s to 80s Ne. The same samples were also subjected to CIRCOT improved microspinning process. The twist level in both the sets of yarns was kept same as far as possible. The miniature spinning yields yarn with lower strength values ranging from 2.7 lbs to 8.3 lbs and the difference increases with the improvement in yarn fineness. A correlation coefficient of 0.77 was observed between the two systems of spinning in case of CSP.

Large scale knitting trials of cotton-ramie (65:35) blended 30s yarn was successfully carried out at a commercial unit under a study on processing of cotton-ramie blends on short staple spinning system. The knitting was done on a 24-gauge double jersey circular knitting machine. In addition to plain interlock, peanut design was also produced. The knitted fabrics were then scoured, bleached, washed and printed at an export oriented process house. Various types of knitwear garments have also been produced. Spinning of coarser and finer counts from 16s to 40s Ne on ring frame was also successfully carried out by blending degummed ramie sample with medium to long staple cottons. Air-permeability of blended fabric was higher than 100% cotton fabric indicating the suitability of cotton-ramie blends as apparels. Higher absorbency of blended fabrics also indicates their suitability for use as towelling and other dress materials. Thus by improved degumming method coupled with appropriate modification in the spinning process and proper selection of cotton, finer cotton-ramie yarns can be produced by adopting commercial cotton spinning system. These yarns can be used for production of fabrics on commercial machines which can be converted into inner and outer wear garments and good quality towelling and home textiles.

A technology has been identified/ developed for utilisation of indigenously developed short but fine wool in blends with cotton through short staple spinning system, popularly known as cotton spinning system for production of finer quality and novel varieties of value-added woven and knitted fabrics. Mechanical methods for removal of burrs from wool and guard fibres from Angora rabbit hair have been also standardised replacing fully the chemical treatment for their removal. Various types of garments like full shirts, Jackets, trousers have been made as exhibits from Avivastra wool and cotton blend and shirts from Angora rabbit hair and cotton blended yarn.

To study the frictional characteristics of chemically modified cotton fabrics, grey fabrics of plain weave having three different thickness, weight/sq. cm and threads per inch were chosen. These samples were initially desized, scoured and bleached before subjecting them to finishing treatments such as wrinkle free finish, flame retardant finish, biopolishing and mercerization with NaOH and KOH both in slack and stretched states. Fabric-to-fabric frictional coefficients under various conditions such as warp moves warp, weft moves weft, warp over weft and weft over warp were measured. Metal to fabric frictional coefficients were also estimated for control (grey fabric) as well as fabrics subjected to chemical treatments. There is no appreciable difference in frictional coefficient for all the three types of fabrics whether warp moves warp or weft

moves weft. Movement of warp over weft results in higher values of coefficient of friction in the case of light and medium weight fabrics while the reverse is true in the case of heavy fabric. All the treatments enhance frictional coefficient. Mercerization leads to considerable increase in coefficient of friction as against minimal change during biopolishing. Coefficient of friction between metal to fabric is highest in light weight fabric and least for heavy fabric. This is just reverse to fabric-to-fabric frictional behaviour. Flame retardant finished and Bio-polished fabrics show considerable increase in coefficient of friction after treatment.

While assessing the effect of mordants and mordanting methods on cotton being dyed with natural dyes, only premordanting was found to be suitable as there was almost no dye pick up in postmordanting. Simultaneous mordanting resulted only in lighter shades. Premordanting with alum produced red shades and aluminium content of mordanted fabric varied depending on mordanting conditions. Ferrous sulphate premordanted samples were of violet colour and their redness values were much lower than those of alum premordanted samples. Extractable copper contents of samples premordanted with copper sulphate and dyed with manjith were much lower and well within the eco-limits. Except bringing about some improvement in washfastness, mordanting with copper and iron mordants did not have much effect on colourfastness properties. Use of mercerised fabric not only improved the colour strength of dyed fabric but also the washfastness. Mordanting pH plays a very important role in determining the colour strength of fabric upon subsequent dyeing with manjith.

Cleaning up procedures were standardized through suitable combination of solvents for estimation of banned pesticide residues on cotton. This procedure resulted in minimizing the elution of cotton wax in the extract to be analysed for pesticides. Known amounts of three of the reference pesticides were incorporated in a given weight of cotton lint and the pesticides were extracted as per standard procedures. It was found that a minimum of 5g Florisil is required to obtain an effluent totally free of cotton wax. Analysis of chromatograms revealed that a recovery of 36.4%, 26.9% and 80.7% could be obtained for Lindane, Aldrin and DDT respectively from the extracts obtained using 5 g of Florisil.

Polyester blends along with component fabrics were dyed with natural dye Manjishtha and found to produce similar shades on both types of fibres. Polyester required slightly acidic pH and a temperature of 130° C, whereas for cotton neutral pH and a temperature of 80°C were found to be optimum. Unmercerized and mercerized fabrics with different blend ratios of polyester and cotton mordanted with tannic acid and alum were dyed employing three different sets of conditions. All the dyed fabrics were evaluated for colour parameters and fastness to washing, perspiration and light. It was noted that polyester-cotton blended fabric can be dyed successfully with natural dye manjishtha. Although mercerisation or heat setting does not affect various colourfastness properties, it is found to improve the colour strength. Post heat setting of unmercerised-dyed fabrics improved the colour strength, when polyester component was higher in blend.

A series of experiments on plasma treatment on cotton fabrics revealed that ammonia and dimethylsiloxane treatment reduced water absorbency of the fabric. Cotton drill fabrics were exposed to plasma from ammonia, hexamethyldisiloxane and their mixtures. 80w and 200w power were used for producing plasma, with the time of exposure varying from 5 min to 150 min. Samples treated with plasma from hexamethyldisiloxane showed considerable decrease in water absorbency and hence they were further tested for moisture regain, air-permeability and water repellency (cone test). It was observed that these treatments did not affect moisture regain and air permeability. Though, these samples showed considerable decrease in water absorbency, they failed to pass water repellency test.

Studies on the dyeing characteristics of five varieties of safflower, elemental profile of safflower petals and stability of safflower pigments against natural agents were carried out during the current year. Dye content in terms of colour intensity expressed as K/S value varied from 1.3 to 7.3 in normal varieties of safflower while in non-spiny varieties it ranged from 5.2 to 7.3. One of the potential avenues for the utilization of safflower petals is in the form of food additives to enhance the nutritive and medicinal values of the products. A detailed elemental analysis was carried out employing AAS on ten important varieties of safflower. The results showed total absence of As and Hg in all the varieties. Cd, Cr, Ni & Pb are present in quantities well within the prescribed limit for various food preparation in 5 of the 10 varieties studied. The elements As, Cd, Cr, Hg Pb and Ni were absent. The elements Cu and Zn which are known for their beneficial effects in herbal medicines are present in all the varieties studied. The storage of 1% and 0.1% of yellow dye solutions containing permitted quantities of a preservative under ambient conditions showed satisfactory stability of the colour for over 60 days period. It was also found that 0.01% of sodium benzoate as preservative is sufficient to prevent microbial growth. Similar trend was noted in storage studies of the yellow dye in solid form. A detailed study on purified red and yellow pigments showed that carthamine red is thermolabile and in aqueous solutions degradation occurs even at room temperature. While the red pigment suffered a degradation of 30% at room temperature and 60% around 100°C, yellow pigment showed around 20% degradation at the end of 12 h at 60°C. The chemical analysis of safflower stalk indicated it to be a cellulose rich raw material with properties closer to wood. The laboratory trials undertaken to prepare pulp, paper, particle board and fiberboard proved successful. The properties of the particle board conformed to IS standards. The hard board prepared through the wet process without using any resin also proved successful.

Bench scale trials were undertaken on the effect of propionic acid and live culture of yeast on the growth of *A. flavus* on cotton seeds and the subsequent effect on the quality of oil and protein. Hundred gram seeds in each case were treated with either propionic acid or yeast culture and incubated for different periods. At the end of 2 months period it was noticed that there was no growth of *A. flavus* in the samples treated with propionic acid @ 0.75%. The detection of aflatoxin production was also carried out

qualitatively using high performance thin layer chromatography (HPTLC) using the fluorescence detector. Presence of fluorescence bands were detected in the chromatogram for samples inoculated with *A. flavus* and not in the ones treated with propionic acid but inoculated with *A. flavus*. One yeast culture identified as *pichia* sp. recovered from the microbial consortium maintained under anaerobic conditions has been found to be effective in arresting the growth of *A. flavus*.

For scale-up studies on the preparation of peptone from cottonseed meal, commercially available cottonseed meal was analysed for various chemical constituents viz. nitrogen, ash, crude fibre, lignin, carbohydrate as per standard methods. It was observed that meal is of good quality with 60% protein content. Laboratory scale preparation of peptone from meal was carried out to find out quality of peptone. The trials were carried out with 25, 75, 100 and 200 g of meal. On an average 65% peptone was recovered. Protein content was 60% and solubility of peptone was total. Scale up trials with 1 kg cottonseed meal were successfully completed.

Several samples pertaining to precleaning and post cleaning operations were collected from ginneries in Nagpur and Ahmedabad for preparation of value-added products from these wastes. They were mechanically cleaned to remove trash and recovered cleaned fibres were digested in a rotary digester with alkali at 130°C for 90 min. at a material to liquor ratio of 1:20. The cooked fibres were washed thoroughly and then bleached employing a two-step bleaching process. Bleached samples were evaluated for various properties like ash content, alpha cellulose content, water absorbency, etc. Samples obtained from pre cleaners having longer fibre length were suitable for use as absorbent cotton, while samples from post cleaners having shorter fibre length could be utilised for the preparation of high-grade pulp and good quality paper.

Trials were also undertaken to standardise processing parameters and to prepare high grade pulp from linter samples obtained employing different varieties of cottons in a pilot delinting plant installed at GTC, Nagpur. It was observed that the quality of linters obtained from H.6 cotton was quite satisfactory having higher yield, alpha cellulose content and D.P. as against those from LRA.5166 and J.34. All the samples were found suitable for utilisation as high-grade pulp and for the preparation of good quality paper. In another experiment, trials were undertaken to study the effect of different types of ginning on delinting characteristics of cottons in a pilot delinting plant. In general, it was observed that saw ginned cottons gave highest percentage of linters followed by Rotobar and then D.R. Rotobar ginned cotton recorded maximum percentage of kapas bonda, followed by saw gin samples and D.R. gin.

Commercial trials for preparation of binderless hard boards from cotton plants stalks were conducted at M/s. Jolly Boards Ltd., Sangli, by processing four tonnes of cotton stalks. Trials were also conducted to prepare boards by blending pulp of cotton stalk and bagasse in 50:50 proportion and also from 100% cotton stalks. The quality of boards was good although the colour was

brownish as compared to boards from bagasse. The boards were tested and found conforming to the BIS 1658 - 1977 meant for Hard Boards from Ligno-cellulosic materials. Trials were conducted for preparation of softboards from cotton stalks by blending with bagasse in different proportions and bitumen sizing at the pulp stage. The quality of boards prepared with 50:50 bagasse and cotton was good and appears to be ideal, with 240 kg/m^3 density, 21 kg/m^2 MOR and with 11.6 mm thickness.

Tender coconut outer cover in wet condition was subjected to anaerobic treatment for one week under batch digestion for the preparation of cellulose powder. The anaerobically treated fibres were steam cooked in alkali for 30 min followed by bleaching with hypochlorite for 30 min. The bleached material was hydrolysed with 2.5N HCL for 20 min to obtain cellulose powder. It was observed that cellulase activity is higher when *Penicillium funiculosum* is grown in a medium containing cellulose powder as carbon source prepared from tender coconut coir waste. Cellulase activity in this case was considerably higher than that on commercial cellulose which indicates that the product is superior and can be used for the production of cellulase enzyme.

Finely powdered Arecanut was extracted with water at M:L of 1:30 at room temperature for half an hour and the decanted liquid used as mordant while dyeing with natural dye Manjistha. The initial weight of the Arecanut was so adjusted as to yield 10% and 20% tannin content in the extract. The cotton fabric was dipped in tannic acid solution for 10 min., padded and treated with alum solution containing 10% alum and then dyed with Manjistha as per standard procedures. The dyed fabric was evaluated for colour parameters employing computerised colour matching system. It was noted that the samples dyed using commercial tannic acid were reddish in colour whereas samples dyed using arecanut derived tannin were having reddish - orange shade. Higher colour strength was indicated for samples dyed using arecanut derived tannins as compared to the commercial tannic acid. The above results seem to suggest that tannin extracted from Arecanut could be used for dyeing of cotton with natural dyes. Biologically softened arecanut husks were pressed at 160° C in a steam heated hydraulic press and the boards thus prepared were found to be of good quality possessing a natural finish.

A hand operated cotton stalk compacting machine has been designed and fabricated at CIRCOT. Cotton stalks (whole plants) arranged in such a way that the bushy part comes to the centre in a total horizontal length of 4′, height 1′ with 1′ width, are pressed downwards by means of three compacting units wherein each unit is driven by screw shaft. The material pressed to a height of 4″ during baling has been noticed to come to a final height about 6″ after releasing the pressure. The unit weighs about 475 kg. The average density of the bale is 72 kg/m^3 with a weight of 4.4 kg. It has also been observed that the stalks are nearly parallelised indicating the possibility of obtaining uniform chips when the bundles are fed through drum chipper normally employed for chipping wood in hard board making factories.

For a study on utilisation of cottonseed

hulls for animal feed after enriching with microbial protein, two tonnes of cottonseed hulls were procured. In each batch, about 500 kg of cottonseed hulls were treated with 0.5% sodium hydroxide and 50 ppm manganese chloride in a substrate to water ratio of 1:1 containing CIRCOT's microbial consortium as inoculum. The fermentation was carried out in a specially constructed reaction vessel for 7 days. The enriched material was sent to NDRI, Karnal for undertaking feeding trails on cross-bred cows. A two fold increase in nitrogen content and a marked improvement in digestibility of the fermented product were noted.

Trials were conducted to study the extent of damage caused to cottonseed oil during intermittent heating at the time of repeated frying and the effect of antifoaming agent in minimizing the deterioration. Frying of papad in cottonseed oil was carried out to assess the effect of repeated frying on oil as well as on the fried food. In one experiment, papads were fried on alternate days for a period of 14 days using cottonseed oil (control). In another experiment the above trials were repeated using cottonseed oil with 10 ppm of dimethyl polysiloxane (an antifoaming agent). Peroxide value and viscosity of oil were determined after each frying. Oil uptake of the fried food was also determined after extracting oil from the fried food. Results indicated that there was gradual increase in the viscosity of the oil with each frying. The oil uptake by the fried food also increased with each frying. Peroxide value of oil in the fried food also increased progressively with increase in the number of frying cycles. The results indicated that deterioration of oil was more pronounced in control sample as compared to the oil having anti-foaming agent. The control oil became unfit for frying and consumption after 4th use i. e. after 8 days. On the other hand the oil having anti-foaming agent could be used upto 6th frying cycle, 12 days without any deleterious effect on the quality of fried food.

While extracting oil from cottonseeds using supercritical fluid extraction (SFE) method using carbon dioxide, attempts were made to optimise three parameters of SFE namely temperature, pressure and time of extraction to obtain good yield of oil with minimum gossypol content. Extractions were carried with 10 g of dehulled and ground kernels per batch of extraction. The extracts were collected in about 50 ml n-hexane in a collection vial kept in an ice bath and concentrated on a rotovac system (40-45°C and 200 mm Hg for 10-15 min) to a volume of about 3-5 ml and further subjected to a gentle nitrogen stream to remove the solvent. The yield of the oil was estimated gravimetrically. The efficiency of oil extraction besides pressure, temperature and contact time depended on the particle size and moisture content of the oil seeds. In the present study the maximum oil yield was 17.26 % (at 560 bar 80°C, 2 h). This amount of oil was only about 43 % of the total oil in the cottonseeds. The free gossypol present in the oil was quite less (0.022) than that present in the solvent extracted oil (0.243) and well within the FDA specified limits (0.045 %) under all experiments. The colour of the oil was golden yellow as against dark brown solvent extracted oil. From this study it could be concluded that SFE technique using carbon dioxide is most suitable for extraction of oil. The extracted oil is of good quality and requires minimum refining due to presence of less gossypol.

Attempts were made to extract oil enzymatically from cottonseed. In enzymatic process, cottonseed meal treated with a combination of enzymes, is subjected to solvent extraction at room temperature and thereafter to centrifugation. When cottonseed kernel powder of mixed varieties was hydrolysed enzymatically, 50 % oil recovery was obtained. Therefore, kernel powder was treated with enzymes for 18 to 72 h and extracted oil was estimated. The results showed that 80% of the total oil could be recovered in 24 h of enzymatic treatment. The properties of enzymatically extracted and solvent extracted oil (Conventional method) were studied and found to be comparable. During enzymatic hydrolysis of cottonseed kernel powder, protein also gets hydrolysed by the enzyme papain. The aqueous layer, which contained hydrolysed protein when concentrated under vacuum, yielded a good quality peptone in powder form. The Peptone finds applications in microbiological media as a nitrogen source for the growth of organisms and in fermentation industry and pharmaceuticals for the production of antibiotics. The peptone yield was found to be around 50%. The properties of peptone thus prepared when compared with other peptones were found acceptable. Thus, enzymatic extraction method apart from giving 80% oil recovery, also yields a value added product, viz., peptone simultaneously.

Technologies Transferred : M/s. Bajaj Steel Industries Ltd., Nagpur has produced and marketed 616 DR ginning machines, 419 autofeeders, 10 precleaners, 33 raw cotton suction unit, 16 lint suction system, 6 lint cleaners and 2 baling press with the technical supervision and active collaboration of CIRCOT. This includes an export of 102 DR gins, 102 autofeeders and 1 lint suction system. An MOU has been signed between CIRCOT and M/s. Mac-Well Engineering Pvt. Ltd., Mumbai for the manufacture of attachment for fibre cleaner to Raspador machine.

Extension Activities : The Director and Scientists of CIRCOT continued as members of various committees of BIS for cotton and textile testing and in advisory panels of ATIRA, BTRA, CCI, ICMF, UICT, etc. during the period under report. Some of the key extension activities of CIRCOT during the period were (i) supply of accurate and reliable data on quality aspects of fibres, yarns and fabrics, (ii) consultancy services, (iii) publication of research results through scientific papers, leaflets and booklets for the benefit of appropriate user groups and (iv) dissemination of technical information through training programmes. The testing house received about 12000 samples of fibre, yarn and fabric for different kinds of tests. Training courses on cotton quality evaluation were conducted at the headquarters for 66 persons engaged in textile trade and industry. Specialised courses on HVI and AFIS instruments were also organised for appropriate user groups and 12 persons participated. At the GTC, Nagpur around 53 sponsored personnel were trained on various aspects of cotton ginning. A specialized training course was organised for eight sponsored trainees from RITES on the use of sophisticated instruments and for certain special tests on textiles.

सार संक्षेप

यह केन्द्रीय कपास प्रौद्योगिक अनुसंधान संस्थान के 1 अप्रैल, 2002 से 31 मार्च, 2003 तक की उनासियवीं वार्षिक रिपोर्ट है ।

भूमिका : भारतीय केन्द्रीय कपास समिति (भा.कें.क.सं) के अन्तर्गत वर्ष 1924 में प्रौद्योगिक प्रयोगशाला के रुप में केन्द्रीय कपास प्रौद्योगिक अनुसंधान संस्थान (के.क.प्रौ.अनु.सं.) की स्थापना हुई थी । वर्ष 1966 में सभी पण्य समितियों के साथ साथ भा.कें.क.सं. का भी समापन कर दिया गया तब भारतीय कृषि अनुसंधान परिषद (भा.कृ.अ.प.) ने इस प्रौद्योगिक प्रयोगशाला का प्रशासनिक नियंत्रण अपने जिम्मे लिया और कपास प्रौद्योगिक अनुसंधान प्रयोगशाला के रुप में इसका नामकरण हुआ । भारतीय कृषि अनुसंधान कार्यों में तेजी लाने और संस्थान के कार्यकलापों को नया मोड देने के उद्देश्य से नये सिध्दान्त बनाये गये और 1 अप्रैल, 1991 से इस प्रयोगशाला को केन्द्रीय कपास प्रौद्योगिक अनुसंधान संस्थान के नाम से पुकारा जाने लगा ।

इस वर्ष के दौरान कें.क.प्रौ.अनु.सं. ने अखिल भारतीय कपास विकास समन्वय योजना (अ.भा.क.वि.स.यो.) के अन्तर्गत प्रौद्योगिक सहभागी के रुप में योगदान देते हुये तन्तु गुण धर्मों के अलावा 500 से अधिक कपास के नमूनों का कताई परीक्षण किया । वर्तमान वर्ष में देश के विभिन्न कपास प्रजनकों से प्राप्त 2500 से भी अधिक कपास नमूनों का तन्तु परीक्षण मुख्यालय पर किया गया जब कि इसकी क्षेत्रीय गुणवत्ता मूल्यांकन इकाइयों द्वारा प्रयोग की प्रारंभिक अवस्थाओं से प्राप्त 40,000 से अधिक नमूनों के तन्तुगुणों का अध्ययन पूरा किया गया ।

इस संस्थान के पुस्तकालय में कुल 5339 किताबें और पत्रिकाओं के जिल्दबन्दी किये हुये 7249 खण्ड हैं । मुंबई विश्वविद्यालय की स्वीकृति से स्नातकोत्तर संस्थान के रुप में इसकी मान्यता जारी रही ।

वर्ष 2002–2003 के दौरान बाहरी निधि की मदद से चल रहे कार्यक्रमों को मिलाकर कुल चालीस योजनायें चल रही थीं ।

रिपोर्ट अवधि के दौरान दो एस.आर.सी., एक आर.ए.सी. तथा दो प्रबंध समितियों की बैठकें आयोजित की गई थीं । वर्ष 1997– 2001 की अवधि के लिए के.क.प्रौ.अनु.सं. के कार्यों का पुनर्वलोकन करने के लिए भारतीय कृषि अनुसंधान परिषद द्वारा नियुक्त दर पंचवार्षिक पुनरीक्षण दल क्यू.आर.टी. ने अपना अंतिम रिपोर्ट परिषद को प्रस्तुत किया ।

वर्ष 2002–2003 के दौरान इस संस्थान द्वारा निम्नलिखित सम्मेलनों एवं कार्यशालाओं का आयोजन किया गया :

- सूरत में 20 अप्रैल, 2002 को गुणवत्ता जानकारी कार्यक्रम ।
- मुंबई में 29 मई, 2002 को कपास तकनीकी मिशन के अन्तर्गत कपास पौधों के उपोत्पादों के मूल्य संवर्धन हेतु एक कार्यशाला ।
- मुंबई में 1–2 जून, 2002 को निटिंग एवं निटवेयर की भावी संभावनाओं पर एक राष्ट्रीय सम्मेलन ।
- आंध्र प्रदेश के अदिलाबाद में 30 नवम्बर, 2002 को ओटाई आधुनिकीकरण तथा मानव संसाधन विकास पर जानकारी कार्यक्रम ।

- सिरसा में 30 जनवरी, 2003 को ओटाई आधुनिकीकरण तथा मानव संस्थान विकास पर जानकारी कार्यक्रम ।
- तामिलनाडू के राजपालयम में 22 मार्च 2003 को ओटाई आधुनिकीकरण तथा मानव संसाधन विकास पर जानकारी कार्यक्रम ।
- "'रुई की स्वच्छ गाँठ उत्पादन तथा बिनौलों के वैज्ञानिक प्रक्रियाओं पर कास्ट इफेक्टिव ओटाई की भूमिका" नामक एक सेमिनार 28 मार्च, 2003 को नागपूर में संपन्न हुआ ।

अनुसंधान क्षेत्र की विशेष उपलब्धियाँ : ओटाई कारखानों की एरगोनोमिक मूल्यांकन हेतु परम्परागत, अर्धस्वचालित एवं स्वचालित ओटाई कारखानों का विधिवत सर्वेक्षण किया । इस सर्वेक्षण के दौरान भारतीय ओटाई कारखानों में मानव शक्ति की आवश्यकता, दुर्घटनाओं के दर्ज मामले, धूल एवं ध्वनि प्रदूषणों पर विशेष रुप से झान बीन की गई । इस सर्वेक्षण पर अध्ययन करने से पता चला कि ध्वनि संचारण में कमी ध्वनि सोत्र पार्थक्य तथा ओटाई मशीनों को अनुकूल चहारदीवारी में बंद करके ओटाई कारखानों में उत्पन्न होने वाली ध्वनि का नियंत्रण किया जा सकता है । ओटाई कारखानों में सुरक्षित कार्य वातावरण बनाये रखने के लिए ध्वनि प्रदूषण कानून को लागू करने के लिए इस सर्वेक्षण रिपोर्ट में सिफारिश की गई है । इन कारखानों में काम करनेवालों को साँस के रोगों से बचाने के लिए ओटाई मालिकों को चाहिए की इन कारखानों में कपास धूल को खतरे की सीमा से कम रखें । जिन क्षेत्रों में ध्वनि एवं धूल अधिक हो वहाँ काम करनेवालों को इनसे बचने के लिए अनुकूल मुखौटों (मास्क) का उपयोग करना चाहिए ।

महाराष्ट्र की ओटाई कारखानों में बिजली की बचत पर काफी अध्ययन करने से पता चला कि कपास ढेर को सफाई मशीन तक ले जाने में बिजली की काफी बचत की जा सकती है । 24 डबल रोलर ओटाई मशीनों को ट्राली फीडिंग से प्रति घण्टा 20 ईकाइयों की बचत की जा सकती है । जम्बो डबल रोलर ओटाई मशीन में ऊर्जा का लगभग 90 प्रतिशत भाग रोलर और स्थिर दुरी के घर्षण पर काबू पाने में ही खर्च हो जाता है ।

मशीन द्वारा कपास ढेर लगाने के लिए एक मशीन बनाई गई है जिसमें कपास को भरने और खाली करने की सुविधा मौजूद है । कपास की अवरुध्दता कम करने के लिए सेन्ट्रीफ्यूगल फंखे के प्रेरक को छिद्रित डिस्क लगाकर संशोधित किया गया । प्रयोगों से सिध्द हुआ कि कपास अवरुध्दता को कम करने के लिए 3 मि.मी. के छिद्र बहुत अनुकूल हैं । इस मशीन की क्षमता 2400 किलोग्राम प्रति घण्टा है जिससे 30 क्विंटल कपास प्रति घण्टे की दर से ढोया जा सकता है । प्रेरक के प्रवेश द्वार की तरफ एक कोन लगा देने से ढोने की क्षमता बढ़ जाती है ।

बेलन तथा आराबैण्डप्रकार के प्रीक्लीनरों का कचरे की मात्रा एवं रुई की गुणवत्ता पर प्रभाव जानने के लिए सुरभी कपास पर प्रयोग किये गये । साफ किये गये कपास की ओटाई डबल रोलर ओटाई मशीनों पर करने के बाद रुई में कचरे की मात्रा एवं तन्तु गुणवत्ता की जाँच की गई । आरा बैण्ड प्रीक्लीनरों से प्राप्त रुइयों की तन्तु लम्बाई में अपेक्षाकृत एक मि.मी. की कमी पाई गई ।

आरा ओटाई, रोलर ओटाई तथा रोटरी नाइफ रोलर ओटाई मशीनों के तुलनात्मक मूल्यांकन के लिए विभिन्न प्रकार के भारतीय कपासों पर प्रारंभिक प्रयोग किये गये । रोटरी नाइफ रोलर ओटाई द्वारा प्राप्त रुई के तन्तुओं की लम्बाई, लम्बाई मं समरुपता एवं तंतुशक्ति अधिक पाई गई । डबल रोलर ओटाई का दूसरा स्थान रहा जबकि आरा ओटाई से प्राप्त तन्तुओं की लम्बाई एवं तन्यता अपेक्षाकृत कम पाई गई । रोटरी नाइफ रोलर ओटाई से प्राप्त रुइयों में लघुतन्तुओं की मात्रा कम थी जब कि आरा ओटाई वाली रुई में "नेप" की संख्या अधिक आँकी गई । प्रारंभिक प्रयोगों से पता चला कि लम्बे तन्तुओं की रोटोबार ओटाई करने से बिनौलों के छिलकों से बनने वाले "नेप" की संख्या अधिक होती है ।

ओटाई उत्पादन तथा तन्तुगुणधर्मों को मानीटर करके नाइफ और लेदर रोलर के घिसने का ओटाई क्षमता तथा तन्तु गुणवत्ता पर प्रभाव जानने के लिए ओटाई क्षमता तथा तन्तुगुणवत्ता का मूल्यांकन किया गया । व्यापारिक मशीनों के साथ साथ प्रयोगशाला माडल मशीनों पर भी अध्ययन किये गये । इन प्रयोगों से मालूम हुआ कि लेदर रोलर के घिसने की दर 0.028 से 0.054 मि.मी. प्रति घण्टा है । रोलर घिसने से ओटाई उत्पादन में 7.25 से 12.75 प्रतिशत की कमी पाई गई । इन प्रयोगों से सिध्द हुआ कि डबल रोलर ओटाई मशीनों के लेदर रोलरों की तदली हर 1000 घण्टों तक मशीन को चलाने के बाद करने पर एक डबल रोलर मशीन से लगभग 28000 रुपये के बचत की संभावना होती है ।

इस वर्ष के दौरान अखिल भारतीय समन्वित कपास सुधार परियोजना (अ.भा.स.क.सु.प.) के अन्तर्गत 6800 से भी अधिक कपास के नमूने प्राप्त हुये । विभिन्न परीक्षण हेतु बहुत से कृषि प्रयोगों के लगभग 5000 नमूने मुख्यालय मुंबई में प्राप्त हुये जबकि 12000 से भी अधिक नमूने इस संस्थान की 6 गुणता मूल्यांकन इकाइयों पर प्राप्त हुई । प्राप्त नमूनों का परीक्षण करके उनके रिपोर्ट संबंधित एजेन्सियों को प्रेषित कर दिये गये । अखिल भारतीय समन्वय कपास सुधार परियोजना के अन्तर्गत प्राप्त नमूनों का प्रौद्योगिक मूल्यांकन करके संकलित रिपोर्ट केन्द्रीय कपास अनुसंधान केन्द्र, नागपुर में वार्षिक वर्कशाप में प्रस्तुत किया गया ।

मानक एवं व्यापारिक प्रजातियों के अध्ययन के दौरान इस वर्ष कुल 40 कपास की मानक तथा 53 व्यापारिक प्रजातियों की तन्तु गुणवत्ता, कताई क्षमता एवं उनकी सूत गुणवत्ता का मूल्यांकन किया गया ।

कपास की उपज एवं गुणवत्ता पर नमी के अलाव (स्ट्रेस) का प्रभाव जानने के लिए जी हिरसुटुम जाति की दो प्रजातियों का अध्ययन किया गया । इस अध्ययन के दौरान रुई मं लघुतन्तुओं एवं कचरे की मात्रा पर विशेष बल दिया गया । कपास की उपज एवं गुणवत्ता पर कोई विशेष प्रभाव नहीं पाया गया ।

कोष्ठक में बिनौले की स्थिति (Position) के अनुसार रुई की गुणवत्ता में विभिन्नता मालूम करने के लिए दो प्रजातियों के 200 मूलरों का अलग अलग परीक्षण किया गया । ऊपरी, बीच तथा निचला स्थिति के आधार पर से एक एक बिनौले इकठ्ठा किये गये । तन्तुओं को अलग करके बीजों को जून, 2002 में बोया गया । फसल कटाई के बाद सभी के तन्तु गुणों का विधिवत परीक्षण किया गया । दोनों प्रजातियों में ऊपरी भाग से मिले फसल के आधार पर बीज के भार में क्रमागत बढ़ोत्तरी देखी गई । दो प्रजातियों के बीच विभिन्न तन्तु गुणों में विभिन्न पोजीशनों के लिए यह परिवर्तिता नगण्य रही ।

इंट्रोग्रेस्ड मैटेरियलस से उत्साहवर्धक जीनोटाइप के विकास एवं पहचान के लिए श्रीगंगानगर, हिसार, धारवाड और सूरत से प्राप्त 535 नमूनों का तन्तु परीक्षण किया गया । श्रीगंगानगर के 55 नमूनों में से आठ, हिसार के 60 नमूनों में से सात, धारवाड़ के 336 नमूनों में से केवल एक तथा सूरत के 84 नमूनों में से नौ नमूनों की तन्तुगुणवत्ता मानकानुसार पाई गई जिनके लिए और अधिक अध्ययन हेतु सिफारिश की गई ।

अधिक उपज एवं तीव्रगामी कताई मशीन के अनुकूल तन्तु गुणवत्ता के लिए धारवाड़ के बारह, खण्डवा के छब्बीस, हिसार के सत्ताइस, श्रीगंगानगर के बाईस तथा सिरसा के छब्बीस नमूनों के तन्तु गुणधर्मों का परीक्षण किया गया । कम तन्यता के कारण सिरसा, श्रीगंगानगर तथा हिसार की कोई भी प्रजाति निर्धारित मानकानुसार नहीं पाई गई । खण्डवा के चार तथा धारवाड के तीन नमूने "बहुत अच्छे" समूह में वर्गीकृत किये गये जब कि खण्डवा के तीन तथा धारवाड़ के 13 नमूनों को "औसत" समूह में वर्गीकृत किया गया ।

तीव्रगामी कताई मशीनों के लिए मध्यम लम्बे तथा अधिक लम्बाई वाले रेशो में सुधार हेतु कोइम्बटूर, दिल्ली और सूरत से 555 नमूने प्राप्त हुये । कोइम्बटूर से प्राप्त 118 नमूनों में से केवल एक को गुणवत्ता मानकानुसार संतोषजनक पाया गया ।

अधिक लम्बे, लम्बे, मध्यम तथा छोटी लम्बाई वाले चार अंशशोधक कपासों को विधिवत तैयारी करके जारी किया गया । रिपोर्ट अवधि के दौरान 808 पैकेट बेचे गये जिनसे 5.7 लाख रुपयों से अधिक रेवेन्यू की प्राप्ति हुई । अंशशोधक कपास इस्तेमाल करनेवालों की जानकारी के लिए संस्थान ने राजपालयम में एक बैठक का आयोजन किया ।

मिट्टी और कपास पौधे में विषैले अकार्बानिक तत्वों तथा ग्राम निगेटिव बैक्टीरिया के अध्ययन हेतु विभिन्न स्थानों से एल.आर.ए. 5166 सहित प्रत्येक क्षेत्र से कपास पौधों के कुल तीस नमूने एकत्र किये गये । पौधों के मध्य तथा ऊपरी भाग की अपेक्षा निचले हिस्सों में सांद्रण अधिक पाया गया । प्रत्येक वर्ष के नमूनों में इसी प्रकार के परिणाम प्राप्त हुये और विभिन्न वर्षों के दौरान एकत्र नमूनों में कोई अंतर देखने को नहीं मिला । पौधों के विभिन्न भागों पर पाये गये तत्वों की मात्रा पर मिट्टी में तत्वों के सांद्रण का कोई विशेष प्रभाव नहीं देखा गया । रुई के अलावा पौधे के अन्य भागों पर बैक्टीरिया की सघन संख्या देखी गई । जमीन के नजदीकवाली पत्तियों, ब्रैक्ट तथा रिण्ड पर ग्राम निगेटिव बैक्टीरीया अधिक मिले । एलआरए प्रजाति के नमूनों के ब्रैक्ट में ग्राम निगेटिव बैक्टीरिया सबसे अधिक पाई गई इसके बाद रिण्ड का दूसरा स्थान था । पौधों के अन्य भागों में लगभग समान रुप से ग्राम निगेटिव बैक्टरिया का फैलाव मालूम हुआ । भौगोलिक परिस्थतियों का ग्राम निगेटिव बैक्टरिया के जमाव पर साफ प्रभाव मालूम पड़ता है, मिथाइलोबैक्टीरियम की मौजूदगी का भी पता लगाया गया था ।

हाथ से छीले हुये बनाना स्यूडोस्टेम की 57 प्रजातियों के तन्तु प्राप्त किये गये और उनकी यांत्रिक प्रक्रियाओं का विधिवत अध्ययन किया गया । तन्तु, तन्यता 32 ग्राम प्रति टेक्स और 60.8 ग्राम प्रति टेक्स की सीमा में पाई गई । विभंजन तनाव का विस्तार 1.7 से 3.7 प्रतिशत के बीच पाया गया । एक ही प्रजाती की महीनतम एवं मोटे तन्तुओं की महीनता में लगभग 2:1 का अनुपात मालूम हुआ । तन्तुओं की महीनता विस्तार 10 टेक्स से 216 टेक्स के बीच में पाया गया । बनाना स्यूडोस्टेम से अनुकूल तन्तु निकालने के लिए रैस्पेदोर तन्तु एक्सट्रेक्टर में थोड़ा परिवर्तन किया गया । रैस्पडोर द्वारा निकाले गये तान्तुक पदार्थों में से अतायुक्त पदार्थों को पृथक करने के लिए एक निर्मलक का विकास किया गया । इन दोनों यंत्रों के संयोजन से निचोड़े गये तन्तुओं की यांत्रिक गुणवत्ता हाथ से निकाले गये तन्तुओं की गुणवत्ता के समतुल्य पाई गई, परन्तु हाथ से निकाले गये तन्तुओं की चमक, सफेदी और कोमलता अधिक थी ।

संगणक प्रोग्राम पर आधारित एक कृत्रिम न्यूरल नेटवर्क प्रतिमान ए.एन.एन. का विकास किया गया । इस प्रतिमान का नाम कपास परफार्मेंस मूल्यांकन सिस्टम रखा गया । इस विधि द्वारा तन्तुगुणों के आधार पर सूत की गुणवत्ता का अनुमान लगाया जा सकता है । इसकी सहायता से अनुकूल कपास के चयन में मदत मिलेगी और सूत उत्पादन लागत में कमी की संभावना है । इस विधि का उपयोग करके सूत की समरूपता (U%), पतले स्थान, मोटे स्थान, नेप, तन्यता, दैर्घ्यवृध्दि, रोमिलता तथा ली.सी.एस.पी.आदि का सही अनुमान लगाया जा सकता है । यथार्थ एवं अनुमानित मूल्यों में बहुत नजदीकी संबंध नोट किय गया ।

कपास के 50 व्यापारिक नमूनों की कताई करके क्रमशः 20^{S}, 24^{S}, 30^{S}, 40^{S}, 50^{S}, 60^{S}, 70^{S}, 80^{S}, 90^{S} तथा 100^{S} नम्बरों के सूत का उत्पादन किया गया । इन सभी सूत के नमूनों की "ली की ताकत" तथा समानान्तरित सूत बण्डल शक्ति का परीक्षण किया गया । बण्डल परीक्षण के लिए सूत के 160 धागों का समानान्तरित पुंज इस्तेमाल किया गया । यह समानान्तरित सूत पुंज एक विशेष प्रकार के संरचित यंत्र की सहायता से बनाये गये जिनकी ताकत मालूम करने के लिए ली टेस्टर पर विशेष प्रकार के संरचित जबड़ों को लगाया गया था ।

इस प्रयोग के लिए "स्टेटेक्स ली टेस्टर" को उपयोग में लाया गया था । परीक्षण से प्राप्त आँकड़ों का विश्लेषण करने के फलस्वरुप "ली की ताकत" तथा समानान्तरित सूत बण्डल शक्ति में रैखिक संबंध पाया गया जिसका सहसंबंध गुणांक r= 0.9982 (सिगनीफिकेंट ऐट 1%) है । समानान्तरित सूत बण्डल शक्ति का विचलन गुणंक "ली की ताकत की" तुलना में काफी कम रहा ।

केन्द्रीय कपास प्रौद्योगिक अनुसंधान संस्थान पर कते सूतों के ऊस्टर इवेननेस (U%) तथा सूत की अपूर्णताओं के मानकों को सूचित करने का अध्ययन किया गया । इस अध्ययन के लिए 20^S स 60^S अंकों तक कते सूतों की "ली सी.एस.पी", महीन एवं मोटे स्थान, नेप तथा U% मालूम किये गये । "क्यूमुलेटिव फ्रीक्वेंसी डिस्ट्रीब्यूशन कर्व " से 5%, 25%,75% और 90%से अधिक के अनुरुप "बहुत अच्छा", "अच्छा", "औसत", "औसत से कम" और "खराब" श्रेणियों में वर्गीकृत किया गया ।

सिरकाट द्वारा विकसित लघु कताई यंत्र का मूल्यांकन करने के लिए गहन अध्ययन किया गया । इस मशीन में मुख्य प्रक्रिया प्रचालों जैसे कुल ड्राफ्ट, सिलिंडर, डाफर तथा लिकरिन का आर.पी.एम. इत्यादि को पी.एल.सी. की सहायता से प्रोग्रामक बनाया गया । इसी से मिलता जुलता प्रोग्रामक रिंग कताई यंत्र में भी लगाया गया जिसकी सहायता से विभिन्न प्रक्रिया प्रचालों को सरलता पूर्वक सेट किया जा सकता है । इस लघु कताई यंत्र द्वारा 22 कपास के नमूनों की कताई 30^S से 80^S अंकों के सूत बनाने के लिए पूर्ण की गई । इन्हीं 22 नमूनों की कताई सिरकाट इंप्रूवड माइक्रो कताई विधि द्वारा भी की गई । लघु कताई तंत्र द्वारा बने सूतों की ताकत अपेक्षाकृत कम 2.7 से 8.3 पाउण्ड पाई गई । दोनों विधियों द्वारा बने सूतों की "ली सी.एस.पी" में 0.77 सहसंबंध गुणांक पाया गया ।

कपास –रैमी 65:35 मिश्रित रेशों से बने 30 अंक के सूत की बुनाई बड़े पैमाने पर व्यापारिक निटिंग मशीनो पर सफलतापूर्वक पूरी की गई । मिल में बुनाई करने के लिए 24 गेजवाली डबल जरसी इण्टरलाक मशीन का उपयोग किया गया । इस मशीन पर कपास–रैमी मिश्रित सूत से प्लेन इण्टरलाक तथा पी नट डिजाइन में कपड़े बुने गये । इस प्रकार बुने कपड़ों को एक निर्यात ओरिएन्टेड इकाई में ले जाकर मिल के तौर तरीके पर विभिन्न डिजाइनों में उनकी छपाई की गई । इसके बाद इन छपे कपडो से नाना प्रकार के वस्त्र परिधान सिलाये गये । इसके अतिरिक्त कपास–रैमी मिश्रित रेशों से 16^S से 40^S अंकों तक के सूत बनाकर उनका परीक्षण किया गया और बाद में कुछ सूतों से निटेड एवं बुने कपड़ों का उत्पादन किया गया । सूती कपड़ों की तुलना में मिश्रित रेशों से बुने वस्त्रों की वायुपरगम्यता थोड़ा अधिक पाई गई जिससे पता चलता है कि इन कपड़ों को पहनावे के वस्त्रों के लिए उपयोग में लाया जा सकता है । मिश्रित सूत से बने कपड़ों की नमी खींचने की क्षमता काफी अधिक आँकी गई जिससे पता चलता है कि इन वस्त्रों का उपयोग तौलिया आदि के बहुत अनुकूल रहेगा । इस अध्ययन से निष्कर्ष निकला कि कताई मशीनों में थोड़ा बहुत परिवर्तन करके कपास–रैमी मिश्रित मोटे तथा महीन सूतों का उत्पादन किया जा सकता है जिनकी बुनाई करके पहनने योग्य नाना प्रकार के वस्त्र परिधान बनाये जा सकते हैं ।

स्वदेशी छोटे रेशों वाली महीन ऊन की अधिक उपयोगिता के लिए इसे रुई में मिश्रित करके धागे एवं वस्त्र उत्पादन की तकनीक का विकास किया गया । इस प्रयोग के लिए स्वदेशी अविवस्त्र ऊन का उपयोग किया गया । कताई मशीनों में थोड़ा बहुत परिवर्तन करके ऊन और रुई के मिश्रण से सूत बनाये गये जिनसे कई प्रकार के निटेड एवं वोवेन वस्त्र परिधान विकसित किये गये । अंगोरा रैबिट हैयर एक बहुत कीमती ऊनी रेश है । इस रेशे में से कटीले बीज कोषों तथा गार्ड तन्तुओं को निकालने की यांत्रिक विधि का मानकीकरण किया गया । इस विधि के विकसित हो जाने से अब कटीले बीज कोषों एवं गार्ड तन्तुओं को अलग करने के लिए रासायनिक विधि से छुटकारा मिल जायेगा । अंगोरा रैबिट हेयर तथा कपास के मिश्रण से काफी महीन सूत बनाये गये जिससे आकर्षक टी–शर्ट तथा अन्य वस्त्र परिधानों की सिलाई की गई ।

रासायनिक संशोधित सूती कपड़ों की घर्षण विशेषताओं पर एक अध्ययन किया गया । इस अध्ययन के लिए विभिन्न मोटाई एवं भार वाले कोरे कपड़ों को चुना गया जिसमें ताने और बाने की संख्या भी भिन्न भिन्न ली गई । इन नमूनों का सबसे पहले विचिक्कणन किया गया फिर उनकी स्कवरिंग करके उन्हें विरंजित किया गया । विरंजन के बाद विभिन्न प्रकार की फिनिशिंग प्रक्रियायें जैसे शिकन अवरोधी, ज्वाला अवरोधी, बायोपालिशिंग, मर्सरीकरण आदि । विभिन्न दिशाओं और दशाओं मे दो कपड़ों के बीच घर्षण गुणांक का अनुमान लगाया गया । इसी प्रकार धातु एवं कपड़े के बीच घर्षण गुणांक को नापा गया । कोरे एवं फिनिशड कपडों के परीक्षण से प्राप्त आँकड़ों को एकत्र किया गया । ताने पर ताना और बाने पर बाना चलाकर मालूम लिये गये विभिन्न नमूनों के घर्षण गुणांकों में कोई अन्तर नहीं पाया गया । हल्के और औसत वजन वाले कपड़ों में ताने को बाने पर चलाकर नापे गये घर्षण गुणांक के मान अधिक पाये गये जब कि अधिक वजनी कपड़ों में इसके विपरीत परिणाम मिले थे । तीनों प्रकार के कपड़ों में सभी प्रकार के फिनिशिंग उपचारों के फलस्वरूप घर्षण में बढ़ोत्तरी पाई गई । यह बढ़ोत्तरी मर्सरीकृत कपड़ों में सबसे अधिक थी और बायोपालिश वाले कपड़ों में सबसे कम । धातु और कपड़े के बीच सबसे अधिक घर्षण हल्के कपड़ों में था और भारी कपड़ों में इसका प्रभाव सबसे काम पाया गया । ज्वाला अवरोधी एवं बायो फिनिश कपड़ों में धातु के साथ घर्षण का प्रभाव काफी अधिक पाया गया ।

प्राकृतिक रंगों से सूती रंगाई के साथ रंगबंधक एवं रंगबंधक विधियों का प्रभाव जानने के लिए एक अध्ययन किया गया जिससे पता चला कि रंगाई से पहले रंगबंधन लाभकारी हैं क्योंकि रंगाई बाद रंगबंधकों का उपयोग करने से कोई फायदा नहीं होता है । रंगाई के साथ साथ रंगबंधन से केवल हल्के रंग ही प्राप्त होते हैं । फिटकरी के साथ रंगाई से या पहले रंगबंधन क्रिया करने से लाल रंग उत्पन्न होते हैं जब कि राही क्रिया फेरस सल्फेट के साथ होने पर रंगाई करने से रंग गाढ़ा और पक्का होता है । मनजीठ से रंगाई करते समय रंगबंधन के समय pH का रंग के गाढ़ेपन पर काफी गहरा प्रभाव पड़ता है ।

कपास पर प्रतिबंधित कीटनाशी अवशेषों के आंकलन हेतु अनुकूल विलायकों के संयोजन से सफाई करने की विधि का मानकीकरण किया गया । इस विधि से विश्लेषित किये जाने वाले सार में मोम मार्जन को कम करने में मदद मिली । रुई को निश्चित मात्रा में तीन विभिन्न प्रकार के कीटनाशकों में डाला गया और फिर कीटनाशकों को मानक विधि द्वारा अलग किया गया । इस प्रयोग से पता चला कि कम से कम 5 ग्राम फ्लोरीसिल्म के उपयोग से अनुकूल लाभ प्राप्त हो सकता है और बहिस्राव पूर्ण रुप से मोम रहित हो जाता है ।

सूती, पालीएस्टर एवं सूती पाली एस्टर मिश्रित वस्त्रों की रंगाई मनजीशठा से की गई । तीनों प्रकार के कपड़ों पर रंग का गाढ़ापन लगभग समान पाया गया । पालीएस्टर के लिए 130 अंश से पर तनिक आम्लिक pH की आवश्यकता होती है जब कि सूती के लिए 180 अंश से पर उदासीन pH लाभकारी होता है । एक प्रयोग में विभिन्न अनुपात में मिश्रित (पालीएस्टर एवं रुई) मर्सरीकृत एवं अमर्सरीकृत वस्त्रों को चुना गया और उनको टैनिक एसिड एवं फिटकरी से बंधित करने के बाद तीन अलग अलग दशाओं में उनकी रंगाई की गई । इन सभी नमूनों के रंग प्रचालों एवं रंग के पक्केपन का मूल्यांकन किया गया । इस प्रयोग के परिणाम स्वरूप सिध्द हुआ कि सूती/पालीएस्टर मिश्रित वस्त्रों को प्राकृतिक रंग मंजीशठा से सफलतापूर्वक रंगा जा सकता है । मर्सरीकरण तथा हीट सेटिंग का रंग के पक्केपन पर कोई विशेष प्रभाव नहीं पड़ता है, परन्तु इनसे रग का गाढ़ापन बढ़ जाता है ।

सूती कपड़ों को प्लाजमा से उपचारित करने पर मालूम हुआ कि एमोनिया तथा डाइमिथाइलसिलाक्सेन से कपड़ों मे नमी खींचने की क्षमता कम हो जाती है । प्लाज्मा उत्पन्न करने के लिए 80W तथा 200W पावर का इस्तेमाल किया गया और अनावरण का समय 5 से 150 मिनट रखा गया । इस प्रयोग के लिए ड्रिल कपड़े को उपयोग में लाया गया था । हेक्सामिथाइल डाइसिलाक्सेन से प्लाजमा उपचार करने से कपड़े में नमी सीखने की क्षमता काफी कम हो गई इसलिए इन कपड़ों के स्वास्थ्कर रीगेन, वायु

पारगम्यता तथा जलप्रतिकर्णिता का परीक्षण किया गया । जिससे पता चला कि स्वास्थ्य रीगेन तथा वायु पारगम्यता पर इस उपचार का कोई प्रभाव नहीं पड़ता है, जबकि नमी खींचने की क्षमता बहुत कम हो जाने के बावजूद भी जल प्रतिकर्षिता परीक्षण में असफल हो जाते है ।

प्राकृतिक माध्यमों में कुसुम के रंजद्रव्यों की स्थिरता,कुसुम की पंखड़ियों की तात्विक रूपरेखा तथा रंगाई विशेषताओं का अध्ययन इसकी पाँच प्रजातियों पर किया गया । सामान्य प्रजातियों में रंग प्रबलता k/s का विस्तार 1.3 से 7.3 तक था जब कि कंटमय प्रजातियों मे यह मान 5.2 से 7.3 तक पाया गया । कुसुम पंखड़ियों के उपयोग का सशक्त रास्ता खाद्यपदार्थों की ओर नजर आता है जहाँ पर इनका उपयोग खाद्य योजकों के रूप में किया जा सकता है । यह खाद्य पदार्थों की पौष्टिकता एवं उनकी औषदीय मूल्य में वृध्दि करता है । AAS का उपयोग करके कुमुम की 10 प्रमुख प्रजातियों का तात्विक विश्लेषण किया गया । As और Hg की मात्रा किसी भी प्रजाति में नहीं मिली । पाँच प्रजातियों में Cd,Cr,Ni & Pb की मात्रा निर्धारित सीमा के अन्दर पाई गई जबकि As,Cd,Cr,Hg,Pb & Ni तत्व मौजूद नहीं थे । Cu & Zn आयुर्वेदिक दवाओं के लिए उपयोगी तत्व हैं जो सभी प्रजातियों में मौजूद पाये गये । इसके रंग के घोल में परिरक्षक मिलाकर रखने पर 60 दिन से भी अधिक इसका रंग बना रहता है । इस प्रयोग से मालूम हुआ कि सोडियम बेंजोएट का 0.01 % परिरक्षी के रूप में उपयोग करने से सूक्ष्म जैविक उत्पत्ति को रोका जा सकता है । ठोस रंजकों के भंडारण में भी इसी प्रकार के परिणाम मालूम हुये थे । कुसुम डण्ठलों के रासायनिक विश्लेषण से पता चला कि इनमें सेल्यूलोस की मात्रा काफी अधिक है और इनकी गुणवत्ता लकड़ी से मिलती जुलती है । प्रयोगशाला अध्ययन से मालूम हुआ कि इस डण्ठलों से पल्प, कागज पार्टिकल बोर्ड तथा फायबर बोर्ड सफलतापूर्वक बनाये जा सकते है । इनसे बने पार्टिकल बोर्ड की गुणवत्ता भारतीय मानक ब्यूरो के मानकों पर खरी उतरती है । बिना रेजीन का उपयोग किये हार्ड बोर्ड भी सफलतापूर्वक बनाये जा सकते हैं ।

प्रोपिओनिक अम्ल तथा खमीर के लाइव कल्चर का बिनौले पर "ए फ्लेवस" की उत्पत्ति पर प्रभाव जानने के लिए गहन अध्ययन किया गया । साथ ही साथ तेल एवं प्रौटीन की गुणवत्ता का भी परीक्षण किया गया । प्रौपिओनिक अम्ल और ईस्ट कल्चर से सौ सौ ग्राम बिनौलों को अलग अलग उपचारित किया गया और दोनों प्रकार के नमूनों को विभिन्न अवधियों के लिए उष्मायित किया गया । दो महीने के बाद पत चला कि जिन नमूनों को @ 0.75% प्रौपिओनिक अम्ल से उपचारित किया गया था उनमें "ए.फ्लेवस" की उत्पत्ति नहीं हुई थी । एच.पी.टी.एल.सी. का उपयोग करके "एफ्लाटाक्सिन" के मात्रात्मक उत्पादन का पता लगाया गया । "ए.फ्लेवस" संरोपित नमूनों के क्रोमैटोग्राम में प्रतिदीप्त पट्टियाँ की मौजूदगी मालूम पड़ी परन्तु प्रोपिओनिक अम्ल से उपचारित एवं "ए.फ्लेवस" संरोपित नमूनों मे यह पट्टियाँ मौजूद नहीं पाई गईं । अवयवीय मिश्र जीवाणु से प्राप्त पिचिया जाति का ईस्ट जीवाणु जिसको अवयवीय अवस्था में रखा गया था, वह "ए.फ्लेवस" जीवाणु की वृध्दि को रोकने के लिए प्रभावी पाया गया ।

बिनौले की खली से बड़े पैमाने पर पेप्टोन बनाने का प्रयास किया गया । इस प्रयोग में खली के विभिन्न रासायनिक घटकों जैसे नाइट्रोजन, ऐश, क्रूड फाइबर, लिगनिन, कार्बोहाइड्रेट आदि के मापांकों का पता कराके खली की गुणवत्ता को परखा गया । खली में प्रोटीन की मात्रा 60% पाई गयी । पेप्टोन की गुणवत्ता जानने के लिये प्रयोगशाला स्तर पर पेप्टोन का उत्पादन किया गया । क्रमशः 25, 75, 100 तथा 200 ग्राम खली लेकर यह अध्ययन किया गया । औसतन 65% पेप्टोन की प्राप्ति हुई । पेप्टोन में प्रौटीन की मात्रा लगभग 60% थी । इसके बाद थोडे बड़े पैमाने पर एक किलोग्राम खली लेकर यह प्रयोग सफलतापूर्वक पूरा किया गया ।

प्रीक्लीनिंग तथा पोस्ट क्लीनिंग से प्राप्त अपशिष्टों से मूल्य वर्धित चीजें बनाने के लिए नागपुर तथा अहमदाबाद के ओटाई कारखानों से बहुत से नमूने एकत्र किये गये । इस प्रकार प्राप्त अपशिष्ठों को यांत्रिक प्रक्रिया द्वारा कचरे निकालकर खूब साफ किया गया । साफ रुई को घूर्णी संपचित्र में क्षार के साथ 130 अंश से. पर 30 मिनट तक पचाया गया । इस क्रिया में "मैटीरियल लीकर" अनुपात 1:20 रखा गया था । पके

तन्तुओं को पहले अच्छी तरह धोया गया उसके बाद टू-स्टेप ब्लीचिंग प्रोसेस द्वारा विरंजित किया गया । विरंजित तन्तुओं की अवशोषकता, "ऐश" तथा "अल्फा सेल्युलोस" की मात्रा आदि का परीक्षण किया गया । प्रीक्लीनिंग से प्राप्त नमूनों की तन्तुलम्बाई अधिक है और वे अवशोषक रुई के रुप में इस्तेमाल करने के बहुत अनुकूल हैं । पोस्ट क्लीनिंग से प्राप्त नमूनों की तन्तु लम्बाई कम है और इनका उपयोग अच्छे किस्म के पल्प और आम कोटि के कागज बनाने हेतू किया जा सकता
है ।

ओटाई प्रशिक्षण नागपुर में लगे डीलिंटिंग संयत्र से प्राप्त कपास की विभिन्न प्रजातियों के बिनौलों के तन्तुओं से उच्च कोटि के पल्प बनाने के लिए प्रयोग किये गये । हाइब्रिड-6 कपास के बिनौले से प्राप्त तन्तुओं की गुणवत्ता काफी संतोषजनक रही । इनकी मात्रा, "डी.पी." तथा "अल्फा सेल्युलोस" की मात्रा एल.आर.ए. 5166 तथा जे. 34 की तुलना में अधिक पाई गई । सभी नमूने उच्च कोटि के पल्प एवं कागज बनाने के अनुकूल पाये गये । एक दूसरे अध्ययन मे विभिन्न प्रकार की ओटाईयों के कपास की डीलिंटिंग विशेषताओं पर प्रभाव जानने का प्रयास किया गया । कुल मिलाकर पता चला कि "सा-ओटाई " से प्राप्त बिनौलों में लिंटर की मात्रा सबसे अधिक थी इसके बाद "रोटोबार" तथा "डबल रोलर ओटाई " से प्राप्त बिनौलों का स्थान तीसरे नम्बर पर रहा । रोटोबार ओटाई में कपास बोंडे की मात्रा सबसे अधिक मिली और "डबल रोलर ओटाई " में सबसे कम । सा-ओटाई से प्राप्त बोंडों की मात्रा दोनों के बीच में थी ।

कपास की डण्डलों से बंधक रहित हार्डबोर्ड बनाने के लिए संगली में स्थित जोली बोर्ड लिमिटेड के यहाँ चार टन कपास की डण्ठलों पर व्यापारिक ट्रायल किये गये । इस काम को दो मुख्य भागों में बाँटा गया । एक में केवल कपास के डण्ठलों का उपयोग किया गया और दूसरे में कपास डण्ठल और बगास को बराबर मात्रा में मिलाकर हार्ड बोर्ड बनाने के प्रयास किये गये । कपास डण्ठल से बने बोर्ड की गुणवत्ता अच्छी थी परन्तु मिश्रित बोर्ड की तुलना में इसका रंग भूरा था । इन बोर्डों का विधिवत परीक्षण किया गया जो लिग्नोसेल्यूलोसिक पदार्थों से बने अन्य हार्ड बोर्डों के समतुल्य पाये गये और भारतीय मानक ब्यूरो के मापदण्ड पर खरे उतरे (BIS 1658-1977) । कपास के डण्ठलों को बगासे के साथ मिश्रित करके मुलायम बोर्ड भी बनाने का प्रयास किया गया । दोनों के बराबर के मिश्रण से बने बोर्ड की गुणवत्ता बहुत अच्छी थी जिसे आदर्श अनुपात के रुप में माना जा सकता है । इस बोर्ड का घनत्व 240 kg/m^3, "एम.ओआर." 21 kg/m^2 और मोटाई 11.6 मि.मी पाई गई थी ।

सेल्यूलोस पाउडर बनाने के लिए मुलायम नारियल के ऊपरी आवरण का नम अवस्था में एक हफ्ते तक अवायवीय बैच पाचन किया गया । अवायवीय आचरित तन्तुओं को क्षार में वाष्प से 30 मिनट तक पकाने के बाद हाइपोक्लोराइट से 30 मिनट तक विरंजित कियागया । सेल्यूलोस पाउडर प्राप्त करने के लिए विरंजित तन्तुओं को 2.5 N HCL से जलअपघटित किया गया । इस अध्ययन के परिणाम स्वरुप मालूम हुआ कि मुलायम नारियल के तन्तुओं से बने सेल्यूलोस पाउडर सहित माध्यम में यदि पेंसिलियम फ्यूनीकुलोसुम को उत्पन्न किया जाय तो सेल्यूलोस की सक्रियता अधिक रहेगी । व्यापारिक सेल्यूलोस की अपेक्षा इस प्रयोग में सेल्यूलोस सक्रियता अधिक पाई गई, जिससे पता चला कि नारियल से प्राप्त सेल्यूलोस की गुणवत्ता बहुत अच्छी है और इसका उपयोग "सेल्यूलोस इंजाइम" के उत्पादन में किया जा सकता है ।

सुपारी के महीन पाउडर को पानी के साथ (M:L of 1:30) कमरे के तापमान पर 30 मिनट तक निचोड़ा गया । इसके बाद निर्धारित तरल को प्राकृतिक रंजक मंजीरठा से रंगाई के लिए रंगबंधक के रुप में इस्तेमाल किया गया । सुपारी का वजन इस प्रकार निश्चित किया गया ताकि निचोड़ में 10 से 20% " टैनिन" रहे । सूती कपड़े को पहले टैनिन अम्ल के घोल में 10 मिनट तक डुबोया गया । इसके बाद 10% फिटकरी के घोल से उपचारित किया गया और अन्त में मानक विधियों द्वारा मंजीरठा से रंगा गया । "कम्प्यूटराइज्ड कलर मैचिंग" सिस्टम की सहायता से रंगे कपड़ों के रंग प्राचलों का मूल्यांकन किया गया । व्यापारिक टैनिन अम्ल के साथ

रंगे कपडे का रंग ललछोवाँ था जबकि सुपारी से प्राप्त टैनिन के इस्तेमाल से रंगे कपड़े से रंग ललछोवाँ नारंगी थी । इसके साथ साथ यह भी पता चला कि व्यापारिक टैनिन अम्ल के साथ रंगे कपड़े की तुलना में सुपारी से प्राप्त टैनिन के इस्तेमाल से कपड़े के रंग का गाढ़ापन अधिक होता है । इस प्रयोग से सिध्द होता है कि सुपारी से प्राप्त टैनिन का उपयोग प्राकृतिक रंजकों से सूती कपड़े की रंगाई हेतु सफलतापूर्वक किया जा सकता है । जैविक ढंग से मुलायम किये गये सुपारी की भूँसी को 160 अंश से. पर दबाव देकर अच्छी गुणवत्ता वाले बोर्ड भी बनाये गये जो प्राकृतिक बोर्ड की तरह नजर आते थे ।

सिरकाट ने कपास के डण्ठल को दबाकर काम्पेक्ट करने के लिए एक मशीन का विकास किया है । कपास के पूरे पौधे को इस प्रकार ढसा जाता है कि उसका झाड़दार हिस्से बीच में रहे और ढेर की क्षेतिज्य लम्बाई 4 फीट, ऊचाई 1 फुट और चौड़ाई 1 फुट रहे । इस प्रकार बने कपास प्रौधे के ढेर को तीन दाबक द्वारा खूब दबाया जाता है जो मजबूत पेंच की सहायता से चलाये जाते हैं । इस दाबक इकाई का कुल वजन 475 किलोग्राम होता है । इस दाबक से बनी कपास डण्ठल की गाँठ का कुल वजन 4.4 किलोग्राम और घनत्व 72 किलोग्राम/मीटर^3 होता है । इस प्रकार बनी गाँठ में कपास के पौधे काफी समानान्तर रहते हैं इसलिए चिपर मशीन द्वारा समान नाप के बिना किसी तकलीफ के कटते हैं ।

बिनौले के छिलके को पशुओं को खिलाने में इस्तेमाल करने के लिए एक अध्ययन किया गया । सूक्ष्म जैविक प्रोटीन की संवृध्दि करने के बाद दो टन बिनौले के छिलके एकत्र किये गये । 50 किलोग्राम के प्रत्येक बैच को 0.5 प्रतिशत सोडियम हाइड्राक्साइड और 50 पीपीएम मैंगनीज क्लोराइड से उपचारित किया गया एक विशेष प्रकार के बनाये गये क्रिया पाच में सात दिन तक किण्वन किया गया । इस प्रकार बना पदार्थ एन.डी.आर.आई करनाल भेजा गया । वहाँ पर इसे क्रास ब्रेड गायों को खिलाया गया । इस विशेष प्रकार से बने खिलवण में नाइट्रोजन की मात्रा में दो गुनी वृध्दि पाई गई और इसकी पाचकता में भी काफी सुधार हुआ ।

बार बार रुक रुक कर तलने से बिनौले के तेल में उत्पन्न होने वाली खराबी के बारे में अध्ययन किया गया । साथ ही साथ यह भी अध्ययन किया गया कि झाग अवरोधी एजेन्ट किस हद तक होने वाली खराबी को कम कर सकते हैं । इस प्रयोग के लिए पापड़ को बिनौले के तेल में तला गया । प्रयोग के एक भाग में पापड़ को बिनौले के तेल में एकांतर 14 दिन तक तला गया । प्रयोग के दूसरे भाग में बिनौले के तेल में 10 पी.पी.एम. "डाइ इथारल पाली सिलाक्सेन" (झाग अवरोधी एजेन्ट) मिलाकर पापड़ को तला गया । प्रत्येक बार तलने के बाद तेल की विस्कासिता और परआक्साइड वैल्यू को मालूम किया गया । परिणामस्वरुप मालूम हुआ कि हर बार तलने के बाद तेल की विस्कासिता बढ़ती जाती है और साथ ही साथ, पापड़ में अवशोषित तेल की मात्रा भी बढ़ती है । तलने का चक्र बढ़ाने से तले पदार्थ में मौजूद तेल की परआक्साइड वैल्यू की भी धीरे वृध्दि होती है । इस प्रयोग से पता चला कि झाग अवरोधी एजेन्ट के इस्तेमाल से तेल में होने वाली खराबी अपेक्षाकृत कम होती है । यदि झाग अवरोधी एजेन्ट का उपयोग न किया जाय तो तेल चार बार तलने के बाद बेकार हो जाता है जबकि झाग अवरोधी एजेन्ट के उपयोग से उसी तेल द्वारा 6 बार तक सुरक्षापूर्वक खाद्य पदार्थों को तला जा सकता है ।

कार्बनडाइआक्साइड का इस्तेमाल करके एस.एफ.ई. विधि द्वारा बिनौले के तेल को निकालने का प्रयास किया गया । इस अध्ययन में कम गासीपाल सहित अधिक तेल के निष्कर्षण हेतु एस.एफ.ई. के तीन प्राचलों अर्थात् तापमान, दबाव तथा निचोड़ने के समय का मानकीकरण किया गया । निष्कर्षण के प्रत्येक बैच में 10 ग्राम पिसी हुई गिरी का उपयोग किया गया और निकले हुये तेल की मात्रा का अनुमान भारात्मक विधि द्वारा मालूम किया गया । दबाव, तापमान तथा निचोड़ने के समय के अलावा घिसी हुई गिरी के कणों की नाप तथा उसमें मौजूद नमी की मात्रा भी तेल निष्कर्षण की क्षमता को प्रभावित करते हैं । इस अध्ययन में तेल का अधिकतम वसूली 17.26 प्रतिशत प्राप्त हुआ था जो बिनौले में मौजूद तेल की मात्रा का केवल 43 प्रतिशत है । तेल में स्वतंत्र गासीपाल की मात्रा 0.022 प्रतिशत से भी कम रही जो "एफ.डी.ए" द्वारा निर्धारित सीमा 0.045

प्रतिशत से काफी कम है । तेल का रंग स्वर्णिम पीला है जब कि सालवेंट एक्ट्रैक्टेड तेल का रंग गहरा भूरा होता है । इस अध्ययन से यह सिध्द हुआ कि कार्बनडाआक्साइड का उपयोग करके बिनौले से तेल निकालने की एस.एफ.ई तकनीक सबसे अधिक अनुकूल है । इसप्रकार निष्कार्षित तेल की गुणवत्ता बहुत अच्छी होती है और गासीपाल की मात्रा कम होने के कारण सफाई भी आसानी से कम समय में हो जाती है ।

एंजाइमी विधि द्वारा भी बिनौले से तेल निकालने का प्रयास किया गया । इस विधि में पहले बिनौले के गिरी को एंजाइमों के संयोजन से उपचारित किया गया फिर सामान्य तापमान पर उसका सालवेंट निष्कर्षण करके उसका अपकेन्द्रण किया गया । जब विभिन्न प्रजातियों के मिश्रित बिनौलों का उपयोग किया गया तब लगभग 50 प्रतिशत तेल की वसूली हुई । इसलिए गिरी के पाउडर को 18 से 72 घण्टे तक एंजाइम से उपचारित करके तेल निकालकर उनका प्राक्कलन किया गया । परिणामस्वरुप पता चला कि 24 घण्टे इंजाइम उपचार से 80 प्रतिशत तेल की वसूली हो सकती है । इंजाइमी तथा सालवेंट विधियों से निकाले गये तेलों के गुणधर्मों की जाँच पड़ताल करने से पता चला कि दोनों की गुणवत्ता लगभग समतुलनीय है । बिनौले की गिरी के इंजाइमी जलअपघटन के साथ साथ प्रोटीन का भी जलअपघटन हो जाता है जिससे अच्छी गुणवत्ता का पेप्टोन पाउडर प्राप्त किया जा सकता है । पेप्टोन का इस्तेमाल सूक्ष्मजैविकी माध्यमों में नाइट्रोजन स्त्रोत के रुप में जीव संवर्धन, किण्वन कारखानों तथा फार्मेसी में ऐन्टीबायोटिक उत्पादन हेतु किया जा सकता है । इसमें पेप्टोन की उपज लगभग 50 प्रतिशत पाई गई । ऐसे बनाये गये पेप्टोन के गुणधर्मों की तुलना अन्य पध्दति से प्राप्त पेप्टोन की तुलना में काफी समाधानकारक पाय गया । 80 प्रतिशत तेल प्राप्त होने के साथ साथ पेप्टोन जैसे मूल्य संवर्धित उत्पादन भी प्राप्त होते है इसलिए इस उपचार का महत्व सिध्द होता है ।

प्रौद्योगिकी हस्तातरंण : के.क.प्रौ.अनु.सं. के प्रौद्योगिकी समन्वय में मेसर्स बजाज स्टील इन्ट्रस्ट्रीज, नागपूर ने 616 डबल रोलर ओटाई यंत्र, 419 ॲटोफीडर, 10 पूर्व सफाई यंत्र, 33 कपास संक्शन यूनिट, 16 रुई प्रणाली, 6 रुई सफाई यंत्र का उत्पादन और विपणण किया इसमें 102 डीआर जीन्स, 102 ॲटोफीडर और 1 रुई संक्शन प्रणाली का निर्यात भी सम्मिलित हैं । रॅसपडार मशीन के साथ संलग्न तन्तु सफाई यंत्र के उत्पादन के लिए कें.क.प्रौ.अनु.सं. और मेसर्स मॅक-तेल इंजिनियरींग प्रा.लि., मुंबई के साथ एक करार किया गया ।

विस्तार गतिविधियाँ : रिपोर्ट की अवधि के दौरान यह देखा गया कि संस्थान के निदेशक एवं अन्य कई वैज्ञानिक कपास और वस्त्र परीक्षण की भारतीय मानक ब्यूरो की कई समितियों के सदस्य के रुप में और अतिरिक्त विट्रा, भा.क.नि., आय.सी.एम.एफ., यु.आय.सी.टी. आदि की कई सलाहक समितियों के सदस्य के रुप में अपना योगदान देते रहे है । इस अवधि के दौरान संस्थान की प्रमुख विस्तार गतिविधियाँ इस प्रकार थी

1. रेशे धागे और वस्त्र की गुणवत्ता पर राही और मरोसे मंद आंकड़े प्रदान करना ।
2. सलाहकार सेवा ।
3. उपयोगकर्ता के लाभ हेतु शोध परिणामों का प्रकाशन ।
4. विभिन्न प्रशिक्षण कार्यक्रमों द्वारा तकनीकी जानकारी का प्रसार ।

विभिन्न प्रकार के परीक्षणों हेतु परीक्षण गृह को लगभग 12000 रेशा, धागे और वस्त्र के नमूने प्राप्त हुए । मुख्यालय में वस्त्र व्यापार और उद्योग मे कार्यरत 66 व्यक्तियों के लिए कपास गुणवत्ता मूल्यांकन प्रशिक्षण पाठ्यक्रम चलाये गये । "एच.वी.आय" का उपयोग करनेवाले व्यक्तियों के लिए भी विशेष प्रशिक्षण पाठ्यक्रम चलाये गये । नागपूर के ओटाई प्रशिक्षण केन्द्र में भी लगभग 53 प्रायोजित व्यक्तियों को कपास ओटाई के विविध पहलुओ में प्रशिक्षण दिया गया । आर.आय.टी.इ एस. द्वारा प्रायोजित 8 व्यक्तियों के लिए परिष्कृत उपकरणों के प्रयोग एवं वस्त्र के विशिष्ट परीक्षण के लिए एक विशेष प्रशिक्षण पाठ्यक्रम आयोजित किया गया ।

1

Introduction

This seventy-ninth Annual Report of the Central Institute for Research on Cotton Technology (CIRCOT), pertains to the period April 1, 2002 to March 31, 2003.

CIRCOT was established by the Indian Central Cotton Committee (ICCC) in the year 1924 under the name Technological Laboratory of ICCC. The objectives then were to undertake spinning tests on various cotton strains received from agricultural departments in the country to assess their spinnability. These activities were carried out by the Institute in close co-ordination with the Departments of Agriculture of different states and Agricultural Universities located in major cotton producing tracts in the country. After the abolition of commodity committees including the ICCC the administrative control was passed on to the Indian Council of Agricultural Research (ICAR) and the name of the Institute changed to Cotton Technological Research Laboratory (CTRL). Since then the research activities were reoriented and strengthened towards increasing the production and quality of cottons in the country. Research on better utilisation of cotton and cotton agro-wastes was recently accorded priority in order to make cotton cultivation more remunerative, and to create employment opportunities for 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) with effect from April 1, 1991.

Mandate

- To participate in cotton improvement research by evaluating the quality of new strains evolved by agricultural scientists in India and giving them the necessary technological inputs to produce cottons meeting the quality requirements of textile industry.
- To undertake basic and applied research in post harvest technology for improving the quality of cotton fibres and finished products.
- To maintain an update of quality and performance of different varieties of cotton and by-products as well as of other ligno-cellulosic materials
- To undertake commercial testing of textile materials for the benefit of trade, industry and Government agencies and provide consultancy services.
- To develop new technologies for 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.

Achievements Made in the Recent Past

- A survey was carried out on the ergonomic status of ginning factories by collecting information on safety and health aspects of workers, causes of accidents, environmental and noise pollution and safety measures undertaken by the ginning industry. A critical analysis revealed that noise and vibrations caused by ginning and allied machines create health problems to the workers that need immediate attention. Modernisation seems to have resulted in reduced employment for women workers in ginning factories.

- A patent has been filed for the design and development of a modified double roller gin that could incorporate different ratios for cotton feeding time and ginning time unlike conventional DRs having a fixed ratio. This modification enables improved productivity with reduction in energy consumption.

- A tractor operated cotton stalk puller was designed and fabricated

- M/s. TRYTEX Machine Company, Coimbatore has been given the licence for fabrication of CIRCOT-TRYTEX Miniature Spinning system. This set of machines made available at one-fourth the cost of the imported ones has all the facilities for quick and easy selection of processing parameters. The quality of yarn produced using this system was found to favourably agree with that of full spinning trials.

- The Variable Speed Double Roller gin developed by CIRCOT is found to have good response from the industry. Since the heavy rollers and oscillating beater consumed most of the energy supplied to the machine, modifications have been effected by making the roller weigh less so that the energy consumed by the machine could be reduced.

- Lilliput gin, designed and fabricated at CIRCOT was modified by incorporating roller and moving knives made of nylon and also gears and mainframe manufactured by using a synthetic material. This gin weighing about 30 kg works on a half H.P. motor. The ginning percentage and fibre attributes were found to be unaffected by these modifications.

- In an effort to develop a package for effective management of a modern ginning factory, an assessment and comparison of power and human resource requirements in a semi-automatic and conventional ginning factory were made. The results indicated that automation brought down female work force in semi-automatic ginneries by about 13% and almost no female workforce in automatic ginneries. It is possible to

bring about considerable saving in power consumption by incorporating certain energy saving devices and proper machine installation lay out.

- Fabrication of a Stick Cleaning machine particularly useful for mechanically picked cotton has been completed. Repeated trials indicated that 80% trash could be cleaned up in a single pass. This machine could handle three quintals of seed cotton in one hour.

- Nearly 600 factories have been appraised of the benefits of modernisation and need for operating the machines with trained manpower to increase the productivity of ginning units and also to produce contaminant-free quality bales.

- As a technology partner in the All India Co-ordinated Cotton Improvement Project (AICCIP), CIRCOT continued to evaluate the quality parameters of cotton varieties/hybrids developed by the breeders before they were released for commercial cultivation. Thousands of samples were tested both at the headquarters and at the other regional stations, results of which were presented at the Annual Meeting. CIRCOT's intervention and strict insistence on quality norms have greatly improved the quality status of current Indian cottons.

- A new maturity index i.e. Percent Mature Fibres from Flexural Rigidity Index (PMFRI) has been developed which compared well with the various conventional measures of maturity. A relationship between the new maturity index and nepping potential has been established.

- Utilising the strong linear relationship between degree of thickening and Micronaire value, the range of Micronaire values that could be considered as ideal has been worked out for different cottons suitable for various count ranges wherein optimum maturity for the fibres is ensured. Micronaire value below this range could be considered to be indicative of immaturity for a given cotton.

- Analysis of different plant parts, and lint indicated that both toxic inorganic elements and gram-negative bacteria are present in good measure in the bract and leaves of cotton plant. Presence in lint although conclusive, was minimal. The concentration of inorganic elements and bacterial population was influenced significantly by agroclimatic conditions of growth. However soil profile was found to have least effect.

- A new fibre quality index has been formulated based on fibre properties on HVI mode of testing for predicting yarn quality.

- A study on parallelised yarn bundles revealed that a perfectly linear relationship existed between yarn bundle strength and the number of threads constituting the bundle. The parallelised bundle strength test was found to be a safe alternative to the

conventional lea test with enhanced accuracy of estimation.

- A Multipurpose Absorption Rate Meter (MARM) has been designed and fabricated that could be used to measure and compare the absorption capacity and wickability of fabrics made from natural and man made fibres. This highly sensitive and operator-friendly instrument can be used to estimate the wicking behaviour of yarns, paper and other commercial absorbents.

- CIRCOT's continued research efforts on the isolation and characterization of natural dyes have yielded the following results:

  - ✓ Marigold flowers could be used for dyeing cotton with yellow colour. The colour fastness of dyed fabric was found to be good. By using alum as a mordant the fastness property could be further improved.

  - ✓ With the help of cellulase enzyme, the dye content and the colour strength of the fabrics dyed with Manjith root extract could be enhanced.

  - ✓ Use of Xylanase and protease enzymes shows encouraging results as far as dye extraction is concerned from natural dye bearing plant material.

  - ✓ Employing powdered turmeric dye with any one of the three mordants *viz.* alum, ferrous sulphate and copper sulphate, the application procedure onto cotton fabric has been standardised.

- The biochemical scouring technique developed employing CIRCOT's microbial consortium for cotton and polyester fabric gave encouraging results during a large commercial trial in a finishing house.

- CIRCOT studies on application of cellulase enzyme on medium and coarse quality woven fabrics revealed that while strength, elongation and thickness of the fabrics decreased, softness and smoothness properties showed improvement with treatment.

- CIRCOT's microbial consortium could be used effectively for degumming lignocellulosic fibres. Three days of anaerobic treatment followed by open boiling in 4% alkali for 30 min ensured maximum gum removal with fibres possessing better strength and surface properties.

- Under the NATP programme on value addition to safflower petals, a yellow colour dye was isolated that could be used for dyeing cotton. Under optimum condition, about 26% of dye could be extracted from the petals.

- Optimum conditions for the production of lipase from *Candida cylindracea* were standardised. Maximum lipase production was in 8 h at 50 ^{0}C in the medium having pH 9.0 when supplemented with wheat bran and $CaCO_3$.

- CIRCOT's technology for converting textile mill waste into compost has been successfully transferred to M/s. Hanjer Agro and Biotech Energies Co. Op. Soc. Ltd., Surat. The firm clams to be producing around 100 tones of compost monthly and is able to sell at the rate of Rs. 2000/tonne.

- The following MOUs entered into between Director, CIRCOT and private organisations continued fruitfully:

  - ✓ M/s. Bajaj Steel Industries, Nagpur for fabrication and marketing of improved autofeeder, precleaner and post cleaner employed in ginning.
  - ✓ M/s. U.D. Patel and Co., Mumbai for commercial production and marketing of CIRCOT Variable Speed Double Roller Gin.
  - ✓ M/s. Precision Tooling Engineers, Nagpur for manufacture and marketing of CIRCOT's CLOY Gin, Lilliput gin and Ginning Percentage Balance.
  - ✓ M/s. Trytex Machine Co., Coimbatore, for manufacture of CIRCOT's Miniature Spinning System.

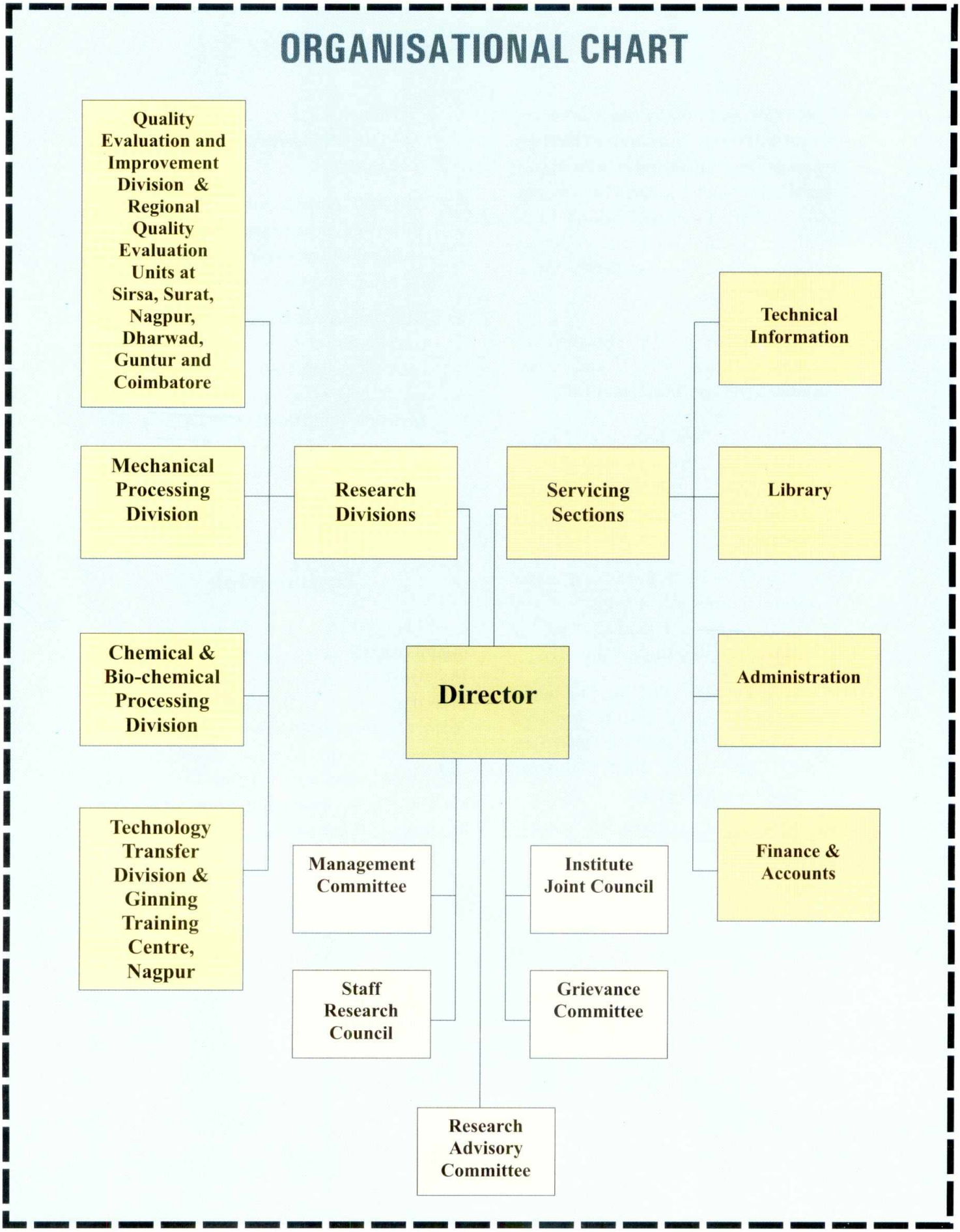
- CIRCOT continued its educational activities as a recognised centre for Mumbai University for guiding students for M.Sc. and Ph.D degrees.

- CIRCOT's accreditation by the National Accreditation Bureau for Testing and Calibration Laboratories (NABL) for the quality system maintained by the Institute continued successfully. The Institute is in the process of getting accredited by NABL under the new quality criteria of ISO/IEC 17025 - Standard for testing laboratories.

Organisation

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

ORGANISATIONAL CHART



Financial Statement

Expenditure and Receipts of the Institute during 2002-2003

A. Expenditure

Sl. No.	Head of Account	Expenditure (Rs. in lakhs)	
		Non-Plan	Plan
1.	Establishment Charges OTA	406.85 0.20	– –
2.	Travelling Expenses	5.00	6.00
3.	Works	10.00	20.00
4.	Other Charges	80.69	146.91
	Total	502.74	172.91

B. Receipts

Sl. No.	Head of Account	Amount (Rs. in lakhs)
1.	Analytical and Testing Fees	24.71
2.	Training	2.88
3.	Interest on TDR & STD	11.50
4.	Other receipts	18.86
	Total	57.95

Revolving Fund	6.17

Staff Position

As on March 31, 2003

Cadre	Sanctioned	In Position
Scientific	50	30
Technical	120	113
Administrative	48+1	48
Supporting + Canteen Staff	74+1	71+1
Total	**289+2**	**263**

2

Research Achievements

A brief account of the Progress of research during 2002 – 2003 at the headquarters and its various Regional Stations including the Ginning Training Centre, Nagpur, is given below:

CORE AREA I : IMPROVEMENT IN GINNING OF COTTON

Ergonomic Evaluation of Ginning Factories

A survey on fully automatic, semi automatic and conventional Indian Ginneries was carried out for manpower requirement, record of cases of accidents among the ginnery workers, effect of sound and dust pollution on the health of workers. Based on the survey, certain recommendations were drafted which could be circulated among ginneries in order to bring in the much needed improvement in this sector.

The manpower required is 21.02 man hr/bale in conventional factories where as 7.49 man hr/bale and 6.37 man hr/bale are being consumed both in semi automatic and automatic factories. A significant decrease of about 64.36% and 69.69% respectively in manpower requirement was noted for semiautomatic and automatic units over the coventional factories.

As against a share of 50 to 70 % of women employees in conventional units, semi automatic factories were found to employ only 15 to 20 % women. Automation has displaced the women workers largely. Since workers in ginneries were found to be untrained and unskilled, an urgent need is felt for human resource development in these units.

The sound level near the gin was found to vary from 87.0 dbA to 97.7 dbA for different models of gins under no load and from 86.6 to 97.7 under load condition. Sound level was observed to be more in case of normal size double roller gins than Jumbo size DR gins. Gearbox attached to gin was found to produce more sound than other elements of the gin. The noise generated by cleaners was noted to vary from 73.3 to 76.3 dbA near the machine, 66.6 to 72.0 dbA at 7.5 m away from the machine and 55.5 to 63.4 inside the ginning premises. The sound level near the press varied from 76.0 to 113.3 dbA. While in conventional units the sound level varied between 58.6 and 94.6 dbA, in automatic units a maximum value of 99.5dbA was noted. At the centre of gin house, the sound generated was found to vary between 93.7 and 98.5 in different factories. The more noisy locations were gin house, cyclone room, pre-cleaners, central platform and press house. In most of these places it was found to be above the

permissible limit of 85 dbA. The survey revealed that depending on the frequency, sound level and duration of exposure, noise creates hearing difficulties, headaches, irritation and annoyance to the workers. In long term, high noise may cause hearing loss as well.

Time weighted average (TWA) of dust concentration was found to be 0.23 mg/m^3 for Particulate Matter (PM) 2.5 at gin house in the conventional ginneries. In fully automatic factories the TWA of PM 2.5 of dust was noted to be 0.12 mg/m^3 in gin house and 0.13 mg/m^3 in press house. Lint opener was found to generate more dust than any other location.

Some of the recommendations that emerged from this survey are as follows :

- ✓ *Noise generated by gins can be controlled by minimising sound transmission and by noise source isolation or by employing proper enclosures for gins.*
- ✓ *The noise pollution act can be enforced upon ginneries for creating safe working condition for workers.*
- ✓ *Workers should avoid continued contact with any vibrating surface and use anti vibration gloves without fail.*
- ✓ *To protect workers from contacting respiratory diseases, employers should take precautions to limit the amount of respirable cotton dust in the air. Those working in areas having high noise or dust levels should use plugs or muffs and breathing aids such as dust masks.*

Development of a Package for Effective Management of Modern Ginneries

A modern ginning factory with automatic conveying and feeding of material both at the ginning and pressing stages needs to be run on scientific lines and managed effectively to keep the ginning cost at low level. With this in view, current, voltage and input power requirement of each system i.e. seed cotton suction, precleaning, suction system from precleaner to gin house, feeding system, ginning, lint conveying from gin house to pala house, and then from pala house to press house and during pressing were computed for several conventional and modern ginneries totaling twelve in number situated in Maharashtra. Energy requirement for various systems in modern ginneries and its conservation techniques are presented in brief below :

- ➢ Power requirement for transportation of seed cotton from heaps to precleaner varied from 30-50 hp. A lot of scope exists at this stage to reduce the power requirement.
- ➢ For conveying *kapas* from pre cleaner to gin house, the power needed depended on the placement of pre-cleaner and was found to vary from 15 hp to 30 hp. Air separator is not required in the case of trolley feeding system otherwise it is an essential element for all other types of feeding systems.
- ➢ Energy requirement for feeding *kapas* to auto feeders in all types of systems was noted to be more or less the same. The trolley feeding system saves on an

average 20 units per hour for 24 DR gins as the seed cotton suction gets stopped whenever it is not required.

- On a Jumbo DR gin, ginning *kapas* needs on an average 3.6 kWh power (i.e. 3.6 units per hour) and more than 90% of this energy is utilized only to overcome friction between roller and the fixed knife.
- Energy requirement for conveying lint from DR gins to post cleaner varied from 15-30 hp.
- For transferring lint from post cleaner to pala house the energy needed was found to vary from 10 hp to 15 hp. However, the belt conveyor system was found to use only 3-hp connected load.
- To convey lint from *pala* house to press house the energy required was found to range from 7.5 hp to 15 hp depending on the distance between press and *pala* house.
- It is required to install a real time cycle-to-cycle power factor connection system for better results and for effecting energy saving through reduced losses. Power requirement for a conventional press was found to be 30 units/h as against an automatic press consuming 60 units/h.
- The total energy requirement for a plant was also measured under this project. Energy requirement for a modern ginnery varied from 20-25 units/bale in comparison with that required for a conventional ginnery, which was noted to be only 9.3 units/bale.

Design and Development of a Seed Cotton Heap Maker

To mechanize the heaping operation in ginneries, a cotton loading/unloading machine has been designed and fabricated (Fig. 1) A performance evaluation of the machine was also undertaken. The major components of the machine are inlet flexible pipe, casing, impeller, perforated conical disc, electric motor, outlet GI pipe and trolley. The impeller of a normal centrifugal fan was suitably modified by incorporating a perforated disc in order to avoid the choking of cotton. Three sizes of perforations were tried to get maximum output efficiency.

Fig. 1 : *Seed Cotton Heap Maker*

A 3 mm hole size was found to be optimum without any choking at the inlet side of impeller. The cotton sucked at the inlet of a 300 mm diameter flexible pipe was conveyed to a height of 30 feet through a 30 feet tall, 300-diameter GI pipe. The capacity of the loading/unloading machine developed was found to be 2400 kg cotton/h. The fine trash removal efficiency by the machine was found to be on an average of 20.8 %. No measurable fibre damage was observed during the conveying of cotton through the machine. It was noted that it is possible to transport 30 quintal of seed cotton per hour, with apparently no vibration in the entire assembly during its operation. Although the machine was found to perform well, there is need to refine sucking and conveying efficiency apart from enhancing the capacity to about 50 to 60 quintals of seed cotton transportation per hour, as required by the ginners.

The significant findings of the project can be briefly summarised as follows :

- *Seed cotton cannot be directly fed inside the casing of centrifugal fans as the high impact force of the material causes damage resulting in fibre breakage.*
- *Normal centrifugal fans can be successfully converted into heap maker after carrying out modification in design of the impeller and casing assemblies.*
- *Even after attaching a 30 feet tall outlet pipe, the machine was found to be sturdy without any vibration.*
- *Before converting a simple centrifugal fan into heap maker, the space available inside the casing should be ensured so as to match the capacity required; otherwise choking is likely to occur.*
- *Eight mm hole size perforations on the disc although gave maximum output, the seed cotton was found to get choked after long run.*
- *Three mm hole size perforations on the disc gave optimum transportation without any choking.*
- *Attachment of a cone at the inlet side of impeller, increased the efficiency of transportation.*

Effect of Cylinder Type and Saw Band Type Pre-cleaners on Trash Content and Lint Quality

To assess the comparative performance of both inclined cylinder type and saw band type precleaners, an experiment was conducted with Surabhi cotton during the year. The cleaned seed cotton obtained from each trial along with control was ginned on double roller (DR) gins. The lint samples were analyzed on MAG-SITRA trash separator for trash content and by using High Volume Instrument (HVI), fibre properties *viz.* 2.5% span length, uniformity ratio, fineness and strength were measured. The data on fibre attributes including trash are given in Table 1.

Repeated trials indicated that on an average about 1 mm reduction in fibre length was noted for the lint obtained during ginning after precleaning by saw band type machine. The harsh opening by saw bands might be the reason for this reduction in

TABLE 1 : FIBRE ATTRIBUTES AND TRASH CONTENT OF GINNED LINT

Experiment / Properties	*Control*	*Cylinder cleaned*	*Saw band cleaned*
Trash content (%)	1.5	1.2	1.1
2.5% Span length (mm)	30.8	30.4	29.8
Uniformity ratio (%)	47.0	46.0	47.0
Micronaire value	2.8	3.1	3.4
Bundle tenacity (g/tex)	23.0	21.9	20.8

length. However, this aspect needs a thorough investigation with different varieties possessing range of fibre properties.

Optimization of Ginning Parameters for Lab Model Rotary Knife Gin

The design and drawings of a lab model Rotary Knife Gin have been completed. The present machine consists of a framework of size 40cm x 50cm x 90cm. A rotary knife of 5 cm diameter and 38cm long mounted at 35° from the horizontal plane through the centre of leather roller has six blades arranged at 30° from each other. The fixed knife is so mounted as to be tangential to the line of intersection at rotary knife and roller matching point. The speed of leather roller can be varied from 100 to 250 rpm with a drive taken from 2 hp motor mounted at the bottom. In one side of gin, roller drive assembly is fixed while on the other side the rotary knife drive assembly is mounted. Two-gear arrangements were provided so that the roller and rotary knife could be rotated in opposite direction. The speed of rotary knife was kept varying from 100 to 400 rpm.

The work on the framework with rotary knife, fixed knife and roller is completed. The seed grid reclamation assembly and cotton-feeding chute systems are under fabrication.

A Comparative Evaluation of Saw Ginning and Roller Ginning for all Length Classes of Representative Indian Cotton

Preliminary results obtained during a comparative performance assessment of roller ginning, saw ginning and rotary knife roller ginning indicate that fibre attributes such as 2.5% span length, length uniformity and fibre tenacity are better for lint obtained from rotary knife roller ginning followed by roller ginning. Saw ginning produced comparatively shorter and weaker fibres particularly for LRA.5166 and Sankar 6 although such a distinction was not observed in J.34. The HVI measurements are summarised in Table 2.

AFIS measurements carried out on the same samples yielded interesting results that are summarised in Table 3. Fibres obtained from rotary knife roller gining invariably had low short fibre content. Immature fibre content did not show any trend with respect to the ginning system employed. As expected, saw ginned fibres had higher neps. The nep content in fibres ginned both by roller ginning as well as rotary knife roller ginning did not show any significant difference. Preliminary results indicate that especially for long staple, rotobar ginning results in higher seed coat neps. This however needs further examination.

TABLE 2 : HVI MEASUREMENTS ON GINNED LINT

Cotton	Ginning System	Fibre Parameters			
		2.5% S.L. (mm)	*Uniformity ratio (%)*	*Micronaire value*	*Tenacity 3.2 mm (g/t)*
J.34	Rotobar	25.4	50	3.5	20.8
	Roller	25.2	50	3.6	20.7
	Saw	26.0	48	3.4	20.6
LRA.5166	Rotobar	28.6	48	3.8	20.4
	Roller	27.9	46	3.8	21.4
	Saw	27.2	46	3.5	19.6
Sankar 6	Rotobar	30.5	49	3.8	24.9
	Roller	29.7	46	3.8	23.9
	Saw	29.1	46	3.8	22.6

TABLE 3 : AFIS MEASUREMENTS ON GINNED LINT

Cotton	Ginning System	Fibre Parameters			
		SFC (W) % <12.7 mm	*IFC %*	*Nep count/g*	*SCN count/g*
J.34	Rotobar	9.0	12.1	208	34
	Roller	10.5	13.5	236	36
	Saw	10.9	12.8	277	38
LRA.5166	Rotobar	6.8	11.6	194	34
	Roller	10.0	10.3	150	16
	Saw	10.8	12.8	360	34
Sankar 6	Rotobar	9.3	13.3	215	38
	Roller	12.4	11.0	217	22
	Saw	7.1	9.2	229	20

Studies on Wear Characteristics of Leather Rollers and Knives used in Cotton Ginning Industry

With an objective to determine the rate of wear of leather rollers and knives used in DR gins and to find out their effect on the ginning output and fibre properties, a study was initiated to determine the break-even point of working life of roller. In order to suggest the ginners when to replace the roller so to make ginning more remunerative based on break even point of working life of both roller and knives, commercial trials were conducted to find out wear rate and its effect on ginning output. Simultaneously, in laboratory trial ginning output was measured at different predetermined roller diameters.

The roller diameters selected were 173.5, 162.5, 145.0, 132.0 and 113.5 mm. The percentage reduction in ginning output was observed to be 0, 6.0, 8.9, 11.2 and 52.5% respectively. In commercial trials the ginning output of the Double Roller gins designated as DR1 and DR2 was measured throughout the ginning season periodically. Changes in the roller diameter, ginning output, wear rate of roller and percentage reduction in ginning output were monitored. The rate of wear of the leather roller was found to vary between 0.028 to 0.054 mm/h. During the entire season the gins ran for about 1672 hours.

Table 4 summarises the data gathered in terms of reduction in ginning out put with diminution in roller diameter and the net loss in income and possible saving in loss of revenue by replacing rollers after 1000 hours of operation.

It is recommended that ginners should take care to replace the roller at appropriate time during the reason to increase their profit.

TABLE 4 : SAVING IN INCOME BY REPLACEMENT OF ROLLER AFTER 1000 HOURS FOR DR

Sl. No.	Working hours (h)	Cumulative working hour (h)	Roller Diameter (mm)		Ginning Output (kg lint/h)	% reduction in ginning output	Income loss Rs./ DR. h	Income loss Rs./ DR. h	Cumulative Income loss Rs./DR. h
			R1	R2					
1	0	0	171.7	174.0	73.0	0	0	0	0
2	235	235	160.3	161.1	67.7	7.26	9.00	2115	2115
3	392	627	148.3	144.6	66.3	9.17	11.40	4469	6584
4	350	977	135.0	134.1	64.6	11.51	14.30	5005	11589
5	23	1000	133.9	133.4	63.7	12.75	15.81	364	11953
Rollers replaced after 1000 working hours									
6	0	1000	171.7	174.0	73.0	0	0	0	11953
7	235	1235	160.3	161.1	67.7	7.26	9.00	2115	14068
8	392	1627	148.3	144.6	66.3	9.17	11.40	4469	18537
9	45	1672	146.6	143.2	66.1	9.45	11.73	528	19065

Statement Showing Saving in Income by Replacing Rollers at Right Time

Income loss per DR before roller replacement	Rs.	47457
Income loss per DR by replacing roller after 1000 hr.	Rs.	19065
Cost of two rollers	Rs.	2000
Net saving in Income from one DR gin by roller replacement	Rs.	28392
Net saving in Income from 24 DR gins by roller replacement	Rs.	681408

PROJECTS FINANCED UNDER TECHNOLOGY MISSION ON COTTON: MM II

Implementation of ICDP under MM II of Technology Mission on Cotton for Improvement of Ginning, Pressing and Extension Activities

During this period, the imported Rotary Knife Roller Gin (Fig. 2) was installed and the settings were standardized for ginning Indian cottons to get optimum outturn with less cut seed since the machine manufactured in U.S.A. is meant for ginning upland cottons.

The machinery for scientific processing of cottonseeds (Fig. 3) *viz.*, delinting, dehulling and seed crushing have been successfully installed. The trials on obtaining linters, seed hulls, cake and oil have been completed and linters are being analysed in the laboratory for preparing value added products. Degummer for sharpening the delinting machine has been procured and installed.

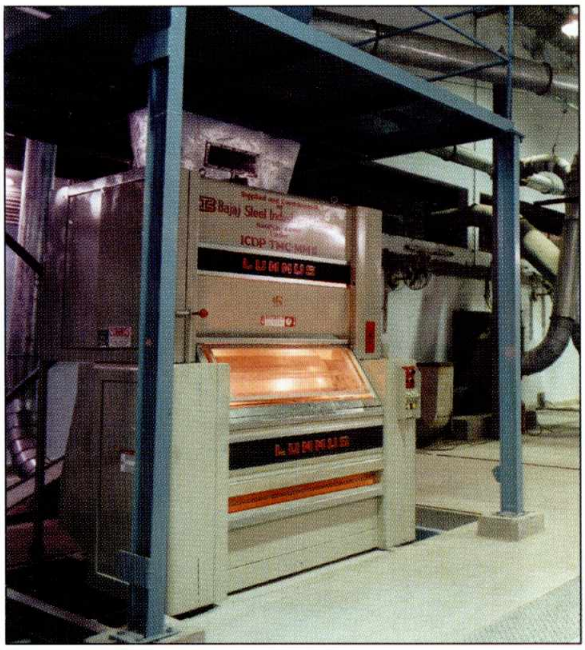


Fig. 2 : *Rotary Knife Roller Gin installed at GTC, Nagpur*

The construction of platform for storing cottonseed has been completed. Fire fighting system has been installed as per the requirement of modern ginning and pressing facility while the construction of platform with shed for storing seed cotton is in progress.

CORE AREA II : EVALUATION AND IMPROVEMENT OF QUALITY OF FIBRE, YARN AND FABRIC

This Core 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).

Fig. 3 : *Delinting, Dehulling and Seed Crushing Machines*

(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 received every year for technological evaluation from trials conducted under AICCIP by Agricultural Universities. The number of samples received during 2002-2003 for different tests from agricultural trials at the Headquarters is given in Table 5 and those tested at each of the Regional Quality Evaluation Units of CIRCOT are presented in Table 6. The number of cotton samples received and tested at CIRCOT under AICCIP for various quality parameters from different states is shown in Table 7.

The samples received were tested in the order of their receipt and reports were sent soon after the tests were over. The results on Trade Varieties and Standard Indian Cotton samples were reported in the form of Technological Circulars and a yearly compilation published as Technological Report for both Trade and Standard Varieties of Indian cottons.

TABLE 5 : NUMBER OF COTTON SAMPLES RECEIVED AT CIRCOT HEADQUARTERS FROM AGRICULTURAL TRIALS DURING 2000 - 2001 TO 2002 - 2003

Type of test	**Average for the quinquennium 1995-96 to 1999-00**	**2000-2001**	**2001-2002**	**2002-2003**
Fibre and Full Spinning	206	49	65	63
Fibre and Microspinning	1694	540	581	548
Microspinning alone	–	–	–	–
Full Spinning alone	–	–	–	–
Fibre Test alone	531	3332	1857	3858
Mill Test	9	–	–	3
Standard Cottons	18	29	33	36
Trade Varieties – Lint – *Kapas*	 21 27	87	45	47
Miscellaneous	9	–	–	–
Germplasm	–	–	–	550
Research	–	–	–	19
Total	2515	4037	2581	5124

TABLE 6 : NUMBER OF COTTON SAMPLES TESTED AT THE REGIONAL QUALITY EVALUATION UNITS DURING 2002-2003

Regional Quality Evaluation Units of CIRCOT	**Quality Parameters**		
	Fibre length (2.5% SL)	**Micronaire value**	**Fibre strength**
Coimbatore	9387	9387	9687
Dharwad	2319	2278	2126
Guntur	790	790	577
Nagpur	8653	8653	8653
Sirsa	5249	2655	2655
Surat	12150	12150	12146

TABLE 7 : NUMBER OF COTTON SAMPLES TESTED AT CIRCOT UNDER AICCIP DURING 2002-2003

State	Fibre and full spinning	Fibre and microspinning	HVI alone	Total
Punjab	6 (1)	42 (8)	201 (18)	249 (27)
Haryana	1 (1)	26 (4)	730 (43)	757 (48)
Rajasthan	15 (2)	–	69 (10)	84 (12)
New Delhi	–	49 (2)	700 (10)	749 (12)
Gujarat	10 (2)	19 (2)	941 (44)	970 (48)
Maharashtra	4 (3)	79 (8)	1322 (68)	1405 (79)
Madhya Pradesh	–	–	732 (35)	732 (35)
Karnataka	3 (2)	118 (7)	1123 (45)	1244 (54)
Andhra Pradesh	–	68 (8)	195 (15)	263 (23)
Tamil Nadu	–	143 (7)	24 (4)	167 (11)
Orissa	–	–	181 (11)	181 (11)
Total	39 (11)	544 (46)	6218 (303)	6801 (360)

Note : The numbers in brackets relate to reports issued.

All India Co-ordinated Cotton Improvement Project (AICCIP)

The All India Co-ordinated Cotton Improvement Project (AICCIP) was launched in 1967 with a view to improve the quality of Indian cottons through interaction of different institutes, Agricultural Universities and State Departments of Agriculture or other related Governmental agencies. The work plan included a multidisciplinary approach to identification of problems and working out solutions in areas concerning production, productivity and development of cottons with required quality suitable for industrial use. The institute's contribution in this project encompasses evaluation of fibre quality of all the samples generated in different trials and identifying only those that meet the desired quality attributes apart from yield and other management aspects as CIRCOT firmly believes that development of only those cottons that satisfy the requirements of industry particularly in terms of quality would be productive in the long run.

The headquarters at Mumbai and its Regional Units in cotton growing regions of India participate in fibre quality evaluation

under this programme. Mechanical processing, yarn manufacture and quality assessment are carried out at headquarters only and all the reports are processed in headquarters before submission.

The breeding material available with cotton breeders working in different parts of the cotton growing regions is systematically screened every year and only the promising ones are considered for further trials. Maintenance of germplasm, Initial Evaluation Trials (IET) and Preliminary varietal Trials (PVT) form part of the preliminary stages of screening while coordinated trials constitute the Advanced Trials under this project. The lint samples from preliminary stages are only subjected to the assessment of fibre parameters. On the other hand in case of Advanced (coordinated) Trials, fibre parameters along with spinning (full/micro) performance are monitored.

India is a vast country having wide range of agro-climatic conditions. Particularly, the beginning of the rainy season is widely different from south to the north and hence the period of sowing of cotton differed from zone to zone leading to varied breeding trials. Owning to these factors, the country is divided into three distinct zones such as North, Central and South. The zones and their respective states are given below :

Zones	States
North	Punjab, Haryana, Rajasthan, Uttar Pradesh and New Delhi
Central	Madhya Pradesh, Maharashtra and Gujarat
South	Andhra Pradesh, Karnataka and Tamil Nadu

This thirty-sixth AICCIP Annual Report summarises the test results on fibre and spinning performance of 6788 lint samples zone-wise. The relevant Technical Reports were presented in the Annual Workshop held on 22-24th March, 2003 at Central Institute for Cotton Research (CICR), Nagpur. The zone-wise summary of the work carried out under various breeding trials is presented below :

NORTH ZONE

G. hirsutum Trials

Under the normal plant type Br.04 (a), the samples were received from Abohar, Faridkot, Hisar, Ludhiana and Sriganganagar. Table 8 summarises the results indicating the promising strains.

It is encouraging to note that LH. 1903, F. 1794 (both from Ludhiana) performed well at 40s count. Likewise, F.1861 and HS. 1226 also showed good performance at 30s counts.

Preliminary Varietal Trial – Br.03

Samples received from Abohar, Faridkot, Hisar, Ludhiana and Sriganganagar were evaluated for fibre properties. Results indicated that strains LH. 1961 and LH. 1900, showed better combination of fibre properties (LH. 1961 at all locations). Some of the strains like F. 1946, Pusa, 4515, H. 259, F. 1895, CSH. 33, CA. 52 and CA. 899 showed better length and fibre fineness but poorer strength (Tenacity). No strain was found promising.

G. arboreum Trial

Samples under Co-ordinated Varietal

TABLE 8 : PROMISING STRAINS IN BR.04 (a) TRIAL (NORTH ZONE)

Location	No. of Sample	Ranges of				Count	Promising Strains
		2.5% SL (mm)	*Micronaire value*	*Mature fibre %*	*Bundle tenacity 3.2 mm gauge (g/t)*		
Abohar	5M	24.1 - 28.0 (25.8)	4.4 - 4.9 (4.8)	81 - 85 (84)	18.2 - 22.4 (20.8)	30s	LH.1903, RS.2098, F.1861
Faridkot	6M	23.3 - 26.6 (25.1)	3.8 - 4.7 (4.3)	73 - 84 (78)	17.9 - 21.5 (19.8)	30s	F.1794, RS.2098
Hisar	14T	24.1 - 27.5 (26.0)	4.4 - 5.8 (5.0)	–	18.4 - 22.5 (20.3)	–	–
Ludhiana	6M	24.3 - 28.0 (25.6)	4.8 - 5.5 (5.0)	80 - 88 (85)	19.2 - 21.9 (20.7)	20s 30s 40s	RS.2098, F.1861 HS.253, LH.1903, F.1794, HS.1226 LH.1903, F.1794
Sriganganagar	8F	24.0 - 28.1 (25.6)	4.2 - 5.1 (4.6)	75 - 87 (80)	18.7 - 23.4 (21.0)	20s 30s	– F.1861, F.1794, LH.1918, HS.1226

Note : F - Full Spinning; M - Microspinning; FT - Fibre test alone

Figures in bracket indicate average values.

Trial were received from Faridkot, Hisar, Ludhiana, Sirsa and Sriganganagar. These were evaluated for fibre properties and spinning performance. The results indicate that almost all of them showed shorter fibre length and were very coarse. They exhibited lower strength as a result of which no strain could be spun even to 20s count.

Hybrid Trials

Intra-hirsutum-Hybrid Trial Br.05(a)

Samples were received from Faridkot, Hisar, Ludhiana, Sirsa and Sriganganagar for the trial (Table 9).

The hybrids such as HHH.287, BCHH.6317, LHH.899, CSHH.198, RajHH.52, FHH.94, Navkar 5 have shown good combination of essential fibre properties. Further, hybrids RajHH.52, HHH.281, Navkar 5 and CSHH.198 showed good fibre properties at many locations.

Rest of the samples in general had medium fibre length with low strength. Fibres received from Faridkot and Ludhiana were spinnable to 30s count whereas Sirsa samples could be spun to 20s count.

Desi Hybrid Trial Br. 25

Samples from this trial were received from Faridkot, Hisar, Ludhiana and Sriganganagar. These were evaluated for their fibre properties and spinnability.

Almost all of them were quite shorter in length, finer and poorer in strength. As a result none of them could be spun even to 20s count.

CENTRAL ZONE

G. hirsutum Trials

Co-ordinated Varietal Trial Br.04

Samples were received from Junagadh, Talod and Surat; likewise from Akola, Bharuch, Indore and Khandwa for Br.04 (a) and Br.04(b) respectively.

In general, Br.04(a), samples were of medium fibre length, coarser fibres having good fibre strength whereas Br.04(b) fibres gave shorter length, average fineness and lower strength. However, GJHV.337, H.1230, GJHV.163, NH.72, CCH.727 and KH.117, GIV.78, CNHH, KH.32, KH.111, NH.545, KH.120 possessed favourable combination of fibre properties.

Preliminary Varietal Trials Br.03

Under Br.03(a), samples were received from Junagadh, Talod, Surat and Akola; likewise under Br.03(b), samples were received from Bhawanipatna, Bharuch, Indore and Khandwa. Some of the promising varieties were F.1946, GSHV.7159, AKH.8363, AKH.8940, RH.101, KH.122, IH.35, GBHV.139, IH.63 and GBHV.144.

Samples from Akola under Br.03(a) and from Indore under Br.03(b) had shorter length and were finer whereas, in all other centres, the fibres were of medium length having average fibre fineness. In all cases, fibre tenacity was poorer except for samples from Talod and Bhawanipatna.

G. arboreum Trial

Co-ordinated Varietal Trial Br.24

Samples received from Akola, Amreli,

TABLE 9 : PROMISING STRAINS IN BR.05 (a) - 1 TRIAL (NORTH ZONE)

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Abohar	5M	23.7 - 28.0 (25.9)	4.2 - 4.3 (4.2)	64 - 78 (72)	20.4 - 22.3 (21.3)	30s	RajHH.52, HHH.281, HHH.287 Navkar 5
Hisar	14FT	25.4 - 31.3 (27.9)	3.9 - 5.1 (4.5)	–	19.7 - 26.4 (23.2)	–	–
Hisar	16FT	24.6 - 28.8 (27.1)	3.6 - 4.9 (4.2)	–	19.7 - 23.1 (21.1)	–	–
Ludhiana	5M	24.2 - 28.1 (26.3)	4.9 - 5.2 (5.1)	73 - 84 (78)	21.9 - 24.0 (22.8)	30s	HHH.281, Navkar 5, HHH.224 CSHH.198, RajHH.52
Sirsa	7M	21.7 - 26.2 (24.3)	3.8 - 4.6 (4.2)	75 - 83 (78)	17.8 - 22.9 (20.2)	20s	FHH.94
Sriganganagar	6FT	24.3 - 28.7 (26.7)	3.9 - 4.8 (4.4)	–	18.4 - 21.4 (19.9)	–	–

Note : FT - Fibre test alone; M - Microspinning

Figures in bracket indicate average values.

Bhawanipatna and Khandwa were tested under this category. Fibres were coarser, had shorter length and poorer strength.

However, the promising strains are MDL.2452, AKA.9431, PA.402, DLSA.17, GAM.54, KWA.7, PA.262 and GAM.53. In particular, varieties such as KWA.7, MDL.2452, DLSA.17, PA.262 from Amreli exhibited good CSP values for 20s count.

Hybrid Trials

Br.05(a)-1 Trials

Samples were received from Ahmedabad, Ganganagar, Phulmbri, Pachamwadegaon, Junagadh and Surat and for Br.05(b)-1, they were received from Dharwad, Phulmbri, Bhawanipatna, Ganewadi and Khandwa (Table 10).

In both these trials, samples were subjected to evaluation of fibre quality and spinning performance. Most of the hybrids were found to be of medium length possessing average fineness and low bundle tenacity. However, hybrids from Dharwad were shorter in length, quite immature with lower tenacity.

The hybrids from Ahmedabad, Pachamwadgaon, Surat, Ganewadi exhibited good fibre properties. These hybrids, such as PRCHH. 10, Navkar 144, KXHH. 144, Selvam. 42, DHH. 509, PSCH. 504, DHH. 224 and RAHH 93 were spinnable to 40s count and yielded promising results. Similarly, the fibre quality parameters for PRCHH. 10, AHH. 90-2, DHH. 509, PSCH. 504, SNSCH. 108, RAHH. 93 exhibited favourable combination and found worth promoting.

Br.05(a)-II and Br.05(b)-II Trials

Under this category samples were received from Ahmedabad, Akola, Aurangabad, Phulambri and Somathane for Br.05(a)-II and for Br.05(b)-II, from Akola, Aurangabad, Bangalore, Bhawaipatna and Khandwa.

The samples under this trial were subjected to fibre quality evaluation as well as spinning performance. It has been observed that these are long staple cottons having lower strength. However, some of the hybrids such as Vikram, MLCH. 313, PSCH. 801, Mahabeej 203, and NCHH. 99 performed well at 40s count.

The hybrids of Br.05(b)-II had medium staple length with poorer strength. Hybrids such as PAC. 10133, NCHH. 570 and NFHH. 95/464 had promising performance at 30s count. Hybrids from Aurangabad and Bhawanipatna exhibited good combination of fibre properties.

Fibre properties of strains such as M.1301, MLCH.313, NCHH.99, PSCH.801 from Br.05(a)-II and NTHH.439, NFHH.95/464, NFHH.920, PAC.10133, NCHH.570 showed favourable attributes and hence found promising.

Desi Hybrid Trial Br.25

Among the samples received from Akola, Aurangabad, Bharuch and Bhawanipatna for this trial, some of the hybrids such as ADCH.1, ADCH.3, GSGDH.2, Swadeshi. 5 were found to be possessing favourable combination of fibre attributes and worth further study.

TABLE 10 : SUMMARY DATA OF BR.05 TRIAL (CENTRAL ZONE)

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Br.05 (a) – 1							
Ahmedabad	12 FT	26.3 – 34.1 (28.2)	4.2 – 5.3 (4.5)	–	21.5 – 25.6 (23.5)	–	–
Gangapur (Aurangabad)	12 M	26.1 – 30.8 (27.4)	3.4 – 4.1 (3.7)	61 – 82 (70)	19.2 – 22.8 (21.5)	40s	PRCHH.10, Navkar 144, KDCHH.144
Phulambri (Aurangabad)	5 M	26.6 – 33.1 (29.0)	3.2 – 4.0 (3.7)	58 – 67 (63)	20.1 – 24.4 (21.9)	40s	Selvam 42, DHH.509, PSCH.504
Pachamwadgaon (Jalna)	5 FT	28.4 – 30.2 (29.4)	3.6 – 4.1 (3.9)	–	21.2 – 25.1 (22.8)	–	–
Junagadh	12 FT	25.4 – 31.7 (27.5)	4.2 – 5.1 (4.6)	–	17.5 – 23.9 (20.9)	–	–
Surat	12 FT	26.2 – 32.9 (28.3)	4.4 – 5.7 (4.9)	–	19.0 – 25.9 (23.1)	–	–
Br.05 (b) – 1							
Dhamod (Aurangabad)	12 M	21.6 – 28.3 (24.4)	2.4 – 3.1 (2.7)	34 – 67 (49)	17.1 – 21.7 (19.3)	30s	DHH.224, RAHH.93
Phulambri (Aurangabad)	5 FT	26.0 – 31.2 (28.5)	3.3 – 4.5 (3.7)	–	20.9 – 22.9 (21.9)	–	–

TABLE 10 : CONTD.

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature Fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Bhawanipatna	14 FT	27.2 – 34.1 (29.3)	3.7 – 5.1 (4.5)	–	20.5 – 25.3 (22.8)	–	–
Ganewadi (Jalna)	5 FT	24.7 – 27.7 (26.3)	3.0 – 4.0 (3.6)	–	20.6 – 24.6 (22.1)	–	–
Khandwa	12 FT	23.0 – 29.4 (25.9)	3.4 – 5.8 (4.0)	–	17.5 – 24.2 (20.5)	–	–
Br.05 (a) – II							
Ahmedabad	7 FT	25.6 – 34.3 (29.8)	4.1 – 5.0 (4.5)	–	22.7 – 26.2 . (24.7)	–	–
Akola	7 FT	23.2 – 31.9 (28.2)	3.9 – 4.6 (4.3)	–	19.9 – 24.2 (21.9)	–	–
Aurangabad	7 FT	28.3 – 34.0 (30.5)	3.1 – 4.7 (3.8)	–	21.6 – 25.2 (22.8)	–	–
Phulambri (Aurangabad)	5 M	28.7 – 34.2 (30.7)	3.3 – 4.2 (3.8)	74 – 83 (79)	20.5 – 23.0 (21.9)	40s	Vikram, MLCH.313, PSCH.801
Somthana (Jalna)	7 M	26.7 – 30.7 (28.9)	3.1 – 4.3 (3.8)	51 – 74 (69)	19.2 – 22.8 (21.1)	40s	Vikram, Mahabeej 203, MLCH.313, NCHH.99
Br.05 (b) – II							
Akola	7 FT	23.5 – 28.3 (26.3)	3.2 – 4.0 (3.6)	–	18.6 – 21.6 (19.8)	–	–

TABLE 10 : CONTD.

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature Fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Akola	7 FT	24.0 – 27.4 (26.4)	2.8 – 4.1 (3.5)	–	17.7 – 22.8 (20.0)	–	–
Akola	7 FT	23.3 – 27.0 (25.1)	3.2 – 4.2 (3.7)	–	15.8 – 20.3 (18.9)	–	–
Aurangabad	10 M	24.5 – 29.7 (17.8)	3.2 – 4.3 (3.7)	50 – 78 (63)	19.8 – 23.3 (21.3)	30s	PAC.10133, NCHH.570, NFHH.95/464
Aurangabad	6 FT	27.2 – 31.4 (29.2)	3.5 – 4.8 (4.0)	–	23.0 – 25.4 (23.9)	–	–
Bangalore	7 FT	22.7 – 27.7 (25.5)	2.7 – 3.4 (3.1)	–	19.3 – 22.5 (20.5)	–	–
Bhawanipatna	9 FT	27.7 – 33.4 (30.1)	4.0 – 4.7 (4.4)	–	21.8 – 24.5 (23.1)	–	–
Khandwa	7 FT	22.7 – 29.4 (26.5)	3.6 – 3.9 (3.7)	–	19.6 – 24.8 (22.2)	–	–
Dharwad	14 M	25.8 – 32.2 (27.9)	3.2 – 4.5 (3.7)	67 – 86 (75)	18.1 – 22.8 (20.6)	40s	RAHH.90, PRCHH.5
Guntur	5 FT	26.2 – 29.8 (28.0)	3.4 – 4.6 (4.0)	–	19.8 – 24.8 (20.8)	—	–
Mokila (Hyderabad)	5 M	26.2 – 29.3 (27.9)	3.8 – 4.3 (4.0)	62 – 75 (74)	19.9 – 21.6 (20.8)	40s	RAHH.93, AHH.90-1, PSCH.407

TABLE 10 : CONTD.

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature Fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Br.05(a)-II							
Adoni	13 M	27.1 – 32.3 (29.0)	2.9 – 4.0 (3.5)	50 – 89 (66)	22.5 – 26.5 (24.5)	50s	All except control
Shioni	13 FT	22.5 – 27.1 (24.7)	2.5 – 3.1 (2.8)	–	18.7 – 22.6 (21.0)	–	–
Bangalore	14 FT	22.1 – 25.4 (24.4)	3.0 – 3.9 (3.4)	–	18.3 – 23.1 (20.9)	–	–
Guntur	5 M	25.4 – 30.5 (27.5)	2.6 – 3.7 (3.1)	53 – 59 (57)	21.2 – 23.7 (22.5)	40s	MLCH.106, SUCHH.77, PCHH.200, RCH.138
Bonkur (Jalna)	5 FT	24.4 – 28.9 (27.1)	3.6 – 4.0 (3.8)	–	19.4 – 22.0 (20.5)	–	–
Rannebennur	13 M	23.4 – 31.7 (27.5)	2.6 – 4.4 (3.2)	44 – 83 (57)	19.3 – 23.4 (21.6)	40s	NTHH.9811, Mahabeej 203, RCH.138 , NCHH.569

Note : FT - Fibre test alone; M - Microspinning

Figures in bracket indicate average values.

Inter-Specific Hybrid Trial Br.15

Samples received from three locations, namely Aurangabad, Bhawanipatna and Rahuri were subjected to fibre quality evaluation. In general, these were extra long, fine, possessing high fibre strength. However, DHB.410, RHB.387, DHB.825 could be spun upto 80s count.

G.herbaceum Trial

Co-ordinated Varietal Trial Br 34-1

Samples were received from Bharuch, Khedbrama, Surat, Ahmedabad and Arnej. All of them had shorter length, coarser and poorer in bundle tenacity. However, GSHV.1012/90, GSHV.384/92, GCGV.330, GCHV.3820 had comparatively better performance.

SOUTH ZONE :

G. hirsutum Trials

Co-ordinated Varietal Trial Br.04

Under Br.04 (a) trial, samples were received from Guntur alone. These were in all five strains and subjected to fibre quality evaluation as well as spinning performance. GSHV-97/113, CNH. 301, RAH. 11 and ARB. 701 varieties performed well at 40s count. Similarly, ten strains under Br.04(b) were received from Dharwad. CPD.448, CPD.731, CINH.32, CPD.431 had satisfactory performance at 30s count (Table 11).

Preliminary Varietal Trial Br.03

There were only five samples from Guntur under Br.03(a) and only eight samples received under Br.03(b) from Dharwad. Samples of Br.03(a) were characterised by medium staple length with fine fibres and exhibited average strength. Two varieties such as CVH-526612 and GJHV. 370 had good fibre properties and could be spun to 30s count. The samples of Br.03(b) were medium staple, with lower strength and hence could not be promoted.

G. arboreum Trial

Co-ordinated Varietal Trial Br.24

There were eight samples from Dharwad for this trial. These were subjected to fibre quality evaluation and spinnability. Varieties such as KWA.21, GAM.67, PA.402, DLSA.24, DLSA.17, showed satisfactory spinnability at 20s count.

Hybrid Trials Br.05

Intra-hirsutum Hybrid Trials Br.05(a)-I

Samples for Br.05(a)-I, Br.05(b)-I, Br.05(a)-II and Br.05(b)-II received from Waligonda, Dharwad, Guntur, Mokila, Bonkar and Rannebennur were analysed for fibre quality parameters and spinnability (Table 12). In general, they were of medium staple length with finer fibres having average bundle strength. These were spinnable to 40s count except samples from Dharwad, which could be taken only to 20s count. However, the promising varieties were JKCH. 99, NSPHH.5, CH.1035, PSCH.504, KDCH.32, NCHH. 207, SNSCH. 112, DHH.246, AHH. 90-4, NTHH. 2001, RAHH. 992, having good spinnability at 40s count.

Intra - hirsutum Hybrid Trial Br.05(b)-I

Samples were received from Sangalkal, Bangalore, Dharwad, Guntur and Mokila stations. Most of the samples had medium staple length possessing finer fibres and

TABLE 11 : PROMISING STRAINS IN BR.04 TRIAL (SOUTH ZONE)

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Br.04 (a)							
Guntur	5 M	25.3 – 29.1 (27.1)	3.5 – 4.1 (3.6)	65 – 75 (68)	19.7 – 22.6 (21.2)	40s	CNH. 301, ARB. 701, RAH.111, GSHV. 97/113
Br.04 (b)							
Dharwad	10 M	25.6 – 28.7 (26.8)	3.7 – 4.9 (4.2)	66 – 83 (75)	16.7 – 20.7 (19.5)	30s	CPD. 448, CPD. 731, CPD. 431

Note : M - Microspinning

Figures in bracket indicate average values.

TABLE 12 : SUMMARY DATA OF BR.05 TRIAL (SOUTH ZONE)

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Br.05 (a) – 1							
Waligonda	18 M	25.9 – 32.5 (28.6)	3.8 – 4.9 (4.3)	71 – 86 (78)	19.2 – 23.7 (21.8)	40s	JKCH.99, NSPHH.5, CH.1035, PSCH.504, KDCH.32, NCHH.207, SNSCH.112, DHH.246
Dharwad	17 M	21.5 – 28.2 (24.9)	3.4 – 4.2 (3.7)	53 – 80 (66)	16.3 – 20.6 (18.2)	20s	NSPHH.5, CH.1035, AHH.90-4, PSCH.504,KDCH.32, NTHH.2001, NCHH.207, SNSCH.112
Guntur	5 M	26.9 – 29.9 (28.1)	2.7 – 3.2 (3.0)	53 – 66 (59)	21.0 – 23.1 (21.8)	40s	RAHH.992, AHH.90-4, NSPHH.5, NTHH.2001
Mokila	5 M	29.5 – 32.9 (31.6)	3.6 – 4.1 (3.8)	64 – 80 (72)	21.3 – 22.8 (22.1)	40s	JKCH.99, PSCH.504, NCHH.207, NTHH.2001, SNSCH.112
Bonkur	5 FT	26.1 – 28.1 (26.9)	3.0 – 4.5 (3.8)	–	20.7 – 23.8 (22.1)	–	–
Rannebennur	10 M	25.7 – 32.5 (28.5)	2.5 – 4.6 (3.2)	42 – 83 (56)	18.9 – 23.1 (20.9)	40s	NSPCHH.5, CH.1035, PSCH.504, NTHH.2001,SNSCH.112, DHH.246
Br.05 (b)-I							
Sangalkal (Aurangabad)	15 M	23.8 – 28.7 (26.0)	3.0 – 3.9 (3.6)	67 – 76 (71)	17.4 – 25.2 (19.9)	30s	AHH90-1, Paras Krishna, PSCH.407, DHH.224, RAHH.99, PRCHH.5, DHH.223, DHH.263, PAC.10133
Bangalore	14 FT	21.9 – 27.0 (23.5)	2.9 – 3.5 (3.2)	–	17.6 – 22.4 (19.5)	–	–

TABLE 12 CONTD.

Location	No. of sample	Ranges of				Count	Promising strains
		2.5% SL (mm)	*Micronaire value*	*Mature fibre %*	*Bundle tenacity 3.2mm gauge (g/t)*		
Dharwad	14 M	25.8 – 32.2 (27.9)	3.2 – 4.5 (3.7)	67 – 86 (75)	18.1 – 22.8 (20.6)	40s	RAHH 90, PRCHH 5
Guntur	5 FT	26.2 – 29.8 (28.0)	3.4 – 4.6 (4.0)	–	19.8 – 24.8 (22.0)	–	–
Mokila	5 M	26.2 – 29.3 (27.9)	3.8 – 4.3 (4.0)	62 – 75 (74)	19.9 – 21.6 (20.8)	40s	RAHH 93, AHH 90-1, PSCH 407
Br05(a)-II							
Adoni	13 M	27.1 – 32.3 (29.0)	2.9 – 4.0 (3.5)	50 – 89 (66)	22.5 – 26.5 (24.5)	50s	All except control
Shioni	13 FT	22.5 – 27.1 (24.7)	2.5 – 3.1 (2.8)	–	18.7 – 22.6 (21.0)	–	–
Bangalore	14 FT	22.1 – 25.4 (24.4)	3.0 – 3.9 (3.4)	–	18.3 – 23.1 (20.9)	–	–
Guntur	5 M	25.4 – 30.5 (27.5)	2.6 – 3.7 (3.1)	53 – 59 (57)	21.2 – 23.7 (22.5)	40s	MLCH 106,SUCHH 77, PCHH 200, RCH 138
Bonkur	5 FT	24.4 – 28.9 (27.1)	3.6 – 4.0 (3.8)	–	19.4 – 22.0 (20.5)	–	–
Rannebennur	13 M	23.4 – 31.7 (27.5)	2.6 – 4.4 (3.2)	44 – 83 (57)	19.3 – 23.4 (21.6)	40s	NTHH 9811, Mahabeej 203, RCH 138 , NCHH 569

Note : Figures in bracket indicate average values.

average strength, spinnable in the range of 30s to 40s counts. Hybrids such as RAHH.90, PRHH.5, RAHH.93, AHH.90-1 and PSCH.407 showed good spinning potential at 40s count; whereas Paras Krishna, DHH.224, RAHH.99, DHH.223, DHH.263 and PAC.10133 performed well only at 30s count.

Intra-hirsutum Hybrid Trials-Br.05(a)-II

Samples were received from Adoni, Shioni, Bangalore, Guntur, Bonkur and Rannebennur. It was observed that samples of Adoni centre performed very well at 50s count, whereas, Guntur and Rannebennur samples were spinnable to 40s count only. Samples of Shioni and Bangalore had shorter fibre length, fine fibres and exhibited average strength. Therefore, these could be spun to30s count.

Strains such as MLCH.106, SVCHH.77, PCHH.200, RCH.138, NTHH.9811, Mahabeej 203 and NCHH.569 could be spun to 30s count with satisfactory CSP values.

Inter-specific Hybrid Trials Br.15

Samples were received from Aurangabad and Dharwad. These were subjected to fibre quality evaluation and spinning performance. They were of extra long, very fine exhibiting good strength. Hybrids such as Sandocot HB.5, DHB.410, RAHB.61 were spinnable to 50s count. Likewise those from Dharwad such as DHB 410, RACHB.9658, RAHB.61, DHB.806 were spinnable to 60s count and gave excellent CSP values.

National Trials

To improve the quality and increase production, these trials are undertaken wherein, samples from all the three zones are tried at an all India level and screened for their yield and fibre properties. The details of these trials are as follows :

Initial Evaluation Trial Br.02(a)

Under this trial samples received from 10 locations were found to be medium staple, average fineness and strength and could be spun to 30s count. Some of the strains like CA.29, HS.260, L.755, CSH.52, LH.1968, TCH.1452, Pusa 935, GSHV.97-469, F.1945, RHC.1094, CCH.342, RS.2257 have shown good combination of fibre properties which could be spun even to 40s count. In general samples from Rahuri centre fared well among all.

Initial Evaluation Trial Br.02(b)

Samples from six locations were received under this trial. Samples of Akola centre gave very poor fibre quality particularly bundle strength. Samples from Dharwad and Khandwa were medium staple with average fineness and strength and could be spun to 30s count. Samples of Bhavanipatna and Bharuch gave good combination of fibre properties spinnable to 30s count as compared to other centres. The strains KH.132, GBHV.151, ARB.2002, PH.348, HS.261, F.1906, GBHV.137, Mahabeej 2001, H.1265, TCH.1661 have shown favourable combination of fibre attributes and could be spun even to 40s count.

Initial Evaluation Trial Br.22(a/b)

Samples were received under this trial from 11 locations. Most of the samples were

found to be of short staple with coarser fibres of very low bundle strength. Some samples like KWA.24, GAM.69, DLSA.304, DLSA.302, PAIG.8/8, PA.304, AKA.9126, CINA.305 gave fibres that could be spun to 30s count. However, samples from Sirsa, Faridkot and Sriganganagar centres possessed poor fibre attributes.

Intra-hirsutum Hybrid Trial Br.05(a)-I

Under this trial samples were received from 23 locations (Table 13). At about 19 centres the samples were found to be of medium staple; average fineness and low bundle strength and could be spun to 30s count. The samples from Coimbatore centre showed superior fibre quality among all whereas those from Sirsa. Faridkot and Sriganganagar centre showed inferior quality. The hybrids VICH.15, Paras 99, Nandi 314, DHH.258, SNSCH.109, ARCHH.5612, TCHH.2634, PSCH.505, CCHH.10555, BSS.380, CNHH.348, Mahabeej 107, Krishi Ratan, Rakshe, NCHH.558, RIL.124, SCHH.151, TSHH.1138, RHH.1287, RajHH.618, performed well in one or more locations and could be spun even to 50s count.

Intra-hirsutum Hybrid Trial Br.05(a)-II

The samples received from 13 locations (Table 13) under this trial were found to be of medium staple but finer possessing average strength capable of spinning in the range 30s - 40s count. Samples from two centres *viz.* Guntur and Coimbatore showed superior fibre quality whereas samples of Fridkot were found to be inferior. Hybrids such as Amar Astra, NCMHH.34, ARCHH.5642, Daftari 29, SCHH.22, HHH.320, PRD.206, TCHH.12, NTHH.2003, Navkar 85, MLCH.310, CAHH.99, AHH.953, NBHH.3107, VICH.33 were found to be promising with fibres having favourable combination of properties that could be spun to 40s count.

Intra-hirsutum Hybrid Trial Br.05(b)-I

Under this trial samples received from 15 locations (Table 13) were found to be of medium staple but finer and poorer in strength and could be spun to 30s count. Some of the hybrids worth mentioning are CH.1035, PSCH.504, Selvam Sundaram, KDCMH.9905, Paras 9, Amardipti, GTHH.108, ZGHH.301, NSPHH.9, SCHH.151, SNSCH.96, NTHH.2002, CSHH.4311, ARCHH.6474, GSHH.1808, Nandi 312, NCHH.559, Nandi 405, Mahabeej 112, which could be spun to 40s count. However, hybrids from Dhamnod and Amreli centres have shown very poor fibre quality compared to other centres.

Intra-hirsutum Hybrid Trial Br.05(b)-II

Samples were received from seven locations under this trial (Table 13). The lint samples were found to be of medium staple but finer possessing average strength in general. The hybrids such as Daftari 29, JICH.6, MRCH.6703, GGMSH.6, NTHH.2003, NCHH.405, GSGHH.2, GCMSH.5, KDCMH.9821, SCHH.22, RCHH.5640, have shown good combination of fibre properties at one or more locations and could be spun to 40s count.

Intra-hirsutum Hybrid Trial Br.15

Most of the samples received from 13

TABLE 13 : SUMMARY OF NATIONAL TRIALS

Trial	No. of locations	Range of			Remarks
		2.5% SL (mm)	*Micronaire value*	*Bundle tenacity at 3.2mm gauge (g/t)*	
Br.05(a)-I	23	23.5-35.1	2.5-6.3	15.1-30.9	1. Out of 23 locations, in 19 locations the samples were found to be of medium staple length, average in fineness and bundle strength and could be spun to 30s count. 2. Samples from Coimbatore centre showed superior fibre qualities among all whereas, Sirsa, Faridkot and Sriganganagar centre showed inferior fibre quality. The hybrids VICH. 15, Paras 99, Nandi 314, DHH. 258, SNSCH.105, ARCHH.5612, TCHH.2634, PSCH.505, CCHH.10555, BSS.380, NSPHH.6, JRF.6, GSHH.2106, JKCH.10, Sandocot 808, K.888, CNHH.348, Mahabeej 107, Krishi Ratan, Raksha, NCHH.558, RFL.124, SCHH.151, TSHH.1138, RHH.1287, RajHH.168 showed excellent combination of fibre properties in some locations and spinnable even to 50s.
Br.05(a)-II	13	23.9-34.3	2.4-5.7	18.3-27.9	1. The samples were found to be of medium staple. These could be spun to 30s to 40s count. 2. Samples from Guntur and Coimbatore showed superior fibre qualities as compared to other centres. 3. Hybrids such as Amar Astra, NCMHH.34, ARCHH.5642, Daftari.29, SCHH.22, HHH.320, PRD.206, TCHH.12, NTHH.2003, Navkar.85, MLCH.310, CAHH.99, AHH.953, NBHH.3107, VICH.33, showed good combination of fibre properties and could be spun to 40s count.

Trial	No. of locations	Range of			Remarks
		2.5% SL (mm)	*Micronaire value*	*Bundle tenacity at 3.2mm gauge (g/t)*	
Br.05(b)-I	15	23.4-35.0	2.3-5.1	16.2-28.2	1. Samples from most of the centres were found to be of medium staple length, finer and average in strength spinnable to 30s count. 2. Hybrids worth mentioning were CH.1035, PSCH.504, Selvam, Sundaram, KDMH.9905, Paras 9, Amar Dipti, GTHH.108, ZGHH. 301, NSPHH.9, SCHH. 151, SNSCH.96, NTHH.2002, CSHH. 4311, ARCHH.6474, CSHH.1808, Nandi 312, NCHH.559, Nandi 405, Mahabeej 112, which could be spun to 40s count. 3. Hybrids from Dharwad and Amreli have shown very poor fibre quality.
Br.05(b)-II	7	22.8-31.5	2.6-4.9	18.2-25.1	1. Samples from all the centres were found to be of medium staple, finer possessing average strength. 2. The hybrids such as Daftari.29, JICH.6, MRCH.6703, GCMSH.6, NTHH.2003, NCHH.405, GSGHH.2, GCMAG.5, KDCMH. 9821, SCHH.22, RCHH.5640, showed good combination of fibre properties at one or more locations and these were spinnable to 40s count.
Br.15	13	27.8-39.0	2.2-4.3	21.4-39.3	1. Most of the samples found to be extra long staple, finer with good strength. These could be spun to 60s count. 2. The hybrids like RAHB.7, Amar Yogi, KDCHN.32, RHB.0488, PSCHB.911, GSHB.658, NTHB.181, MRC.6928, DHB.280, DHB.879, JKHB.211, NCHB.251,

Trial	No. of locations	Range of			Remarks
		2.5% SL (mm)	*Micronaire value*	*Bundle tenacity at 3.2mm gauge (g/t)*	
					HSHB.737, have shown excellent fibre properties at one or more locations and could be spun to 80s count. 3. Samples from Talod and Surat were superior while from Raichur and Medak inferior in quality.
Br.25	11	17.2-29.2	3.6-7.8	14.0-25.4	1. In general, *Desi* Hybrids were short staple, coarser and characterised as lower in strength. 2. Samples from Sriganganagar and Faridkot were poorer in fibre quality whereas from Akola and Aurangabad were of superior quality as compared to other locations. 3. Hybrids such as MRDCH.224, ADCH.7, CINHH.101, BACH.6, Mahabeej 48, exhibited good combination of fibre properties and they could be to 20s count.
Br.34	2	18.7-24.8	4.1-6.3	15.1-19.6	1. Samples were found to be of short staple, coarser and with poorer strength. 2. Comparatively superior varieties were G.SHv.364/98, G.BHv.215, D.DHc.15, G.CHv.360 and G.BHv.202

locations under this trial (Table 13) were found to be extra-long staple fibre possessing high strength and could be spun to 60s count. Some of the hybrids like RAHB.7, Amar Yogi, KDCHB.32, RHB.0488, PSCHB.911, GSHB.658, NTHJB.181, MRC.6928, DHB.280, DHB.879, JKHB.211, NCHB.251, GSHB.737 have displayed good fibre properties at one or more locations and could be spun even to 80s count. Samples from Talod and Surat were found to be superior while those from Raichur and Medak were not upto the mark.

Desi Hybrid Trial Br.25

Under this trial the samples were

received from 11 locations (Table 13). In general Desi Hybrids were found to be short stapled, coarser possessing very low strength. Samples from Sriganganagar and Faridkot were very poor in fibre quality whereas those of Akola and Aurangabad were better as compared to other locations. Some of the hybrids such as MRDCH.224, ADCH.7, CINAA.101, NACH.6, Mahabeej, DH.48, showed good combination of fibre properties and could be spun to 20s count.

Co-ordinated Varietal Trial Br.34

The samples received from Bharuch and Surat (Table 13) under this trial were found to be of short staple, coarser with low strength. The varieties GSHv.364/98, GBHv.215, DDHa.15, GCHv.350, GBHv.202 were found to be comparatively superior in quality.

National Elite Varietal Trial, NEVT

Under this trial samples received from nine locations were found to be of medium staple with fairly high Micronaire and low strength capable of spinning to 20s-30s. The samples of Akola centre gave very low Micronaire value indicating immaturity. Among all, the samples from Surat, Bhawanipatna and Guntur gave good combination of fibre properties as compared to other locations, which could be spun to 40s, count. The varieties like CNH.36, MCU.12, G.Cot.18, Narasimha, L.604, LH.1556, H.1117, Sumangala, Vikas, PKV Rajat, KC.2, Pusa 8-6, RS.810 have shown favourable combination of fibre properties at one or more locations.

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

Evaluation of Quality of Major Trade Varieties Grown in Different Parts of the Country

During this season 53 trade variety samples were received from different locations. The fibre and yarn tests were carried out on all these samples and test reports were issued. Samples of DCH.32 were received from seven places, Brahma from four places and NHH.44 from three places. Out of these fibre and yarn properties of DCH.32 were the best from Kiruvatti; the Brahma sample from Guntur was superior to others. NHH.44 sample from Saundatti was better than other two samples as regards to fibre and spinning performance. A detailed analysis has been given in Technological bulletin on Trade varieties.

Evaluation of Quality of Major Standard Varieties Grown in Different Parts of the Country

During this season 40 standard cotton varieties grown under ideal conditions were received from different Universities. The fibre and yarn tests were carried out on all the samples and the test reports were issued. Results of some of the samples were compared with the previous season values. It was noted that no deterioration in the fibre properties is noted for most of the samples but, incase of some of them fibre and yarn properties were superior to the previous season. Only Deviraj from Junagadh and Hybrid 4 from Surat showed some reduction in fibre length, bundle strength and CSP

values. A detailed analysis has been presented in technological bulletin on Standard Cottons.

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

Effect of Moisture Stress on the Yield and Quality of Cotton with Special Reference to Short Fibre Content and Trash

This investigation aims to evaluate the physical properties with special emphasis on short fibre content of promising cottons in advanced trials and to find out the extent of variations in fibre properties under normal and moisture stress conditions.

Twenty-four genotypes of *G. hirsutum* from different parts of the country were evaluated in this trial in rainfed as well as irrigated conditions. The crop growth was satisfactory with no major pest or disease problem. Two irrigations were given to that part of the experiment. The data for the soil moisture content is given in Table 14.

All the 144 samples were tested and statistically analysed for yield and quality characteristics. The differences in yield and quality between irrigated and rainfed conditions were not significant as revealed from the results. Normally the cotton plant undergoes stress situation when the moisture content is less than 15% in the soil. The selected varieties are drought resistant from the All India trials. Though there was marginal stress situation by the end of November, the impact was not seen. The probable reason could be that the boll maturation was completed by that time.

Study of Variation in the Quality of Lint according to the Position of Seed in the Locule

This study was undertaken to ascertain the influence of position of seed in the locule on the quality of fibres collected from them.

About 200 bolls were collected in each variety. Seeds were collected according to their position in the locule. One seed each from tip, middle and base positions was collected from each locule. The lint was separated and analysed for fibre properties. The seeds were sown during June 2002. After

TABLE 14 : PERCENTAGE SOIL MOISTURE AT DIFFERENT DEPTHS FOR IRRIGATED AND RAINFED PLOTS

Depth	At the time of sowing (20-6-02)		After first irrigation (6-10-02)		After second irrigation (29-11-02)		After harvest (23-1-03)	
	Irrigated	*Rainfed*	*Irrigated*	*Rainfed*	*Irrigated*	*Rainfed*	*Irrigated*	*Rainfed*
0-15 cm	28.3	28.3	23.4	17.7	25.3	13.7	12.1	9.7
15-30 cm	28.1	28.1	23.2	18.4	23.5	15.4	14.6	8.8
30-45 cm	29.0	29.0	24.7	18.1	26.0	12.6	11.5	8.9

harvesting the fibres properties were evaluated.

(i) Design : RBD
(ii) Rep: 3

The details of the treatments are given below.

Varieties	Position of the seed
1. G Cot. 23	1. base
2. G Cot. 19	2. middle
	3. tip

There was a gradual increase in seed weight from tip to base position in both the varieties. Micronaire Value was higher at base position in G Cot. 19. Number of neps increased for the lint at tip in both the varieties. Visible Foreign Matter (VFM) (%) got increased at tip position in both the varieties. Germination percentage was lower for the seeds of G Cot. 19 at tip position.

The samples were collected and tested for chief fibre properties with HFT-9000 system. Between the varieties, the variations were highly significant for all the characteristics. But the variations were not significant for different positions of the seeds. Both the economic characteristics and quality parameters were not significant in the three positions for both the varieties. There was a tendency for numerical decrease in fibre strength and increase in Short Fibre Index from base to tip position for the variety G Cot. 23.

Evaluation of Germplasm Accessions on the basis of Seed Coat Neps Content

During the current year 104 *G.hirsutum* and 12 *G.barbadense* strains have been identified out of 900 and 150 *G.hirsutum* and *G.barbadense* accessions respectively. The Fibre attributes along with seed coat neps have been measured.

Projects under Technology Mission on Cotton : MM-I

Identification and Development of Promising Genotypes from Introgressed Materials

Samples were received from four locations *viz*., Sriganganagar, Hisar, Dharwad and Surat. In all 535 samples were tested for fibre properties.

The fibre samples of eight out of 55 at Sriganganagar, seven out of 60 at Hisar, one out of 336 at Dharwad and nine out of 84 at Surat possessed the required fibre qualities. Samples of Dharwad were poorer in strength and gave lower length values. Samples from Surat were coarser. Samples from Hisar possessed lower strength whereas, those from Sriganganagar were coarser and had poorer strength.

Identification and Development of Diploid Cotton with High Yield and Fibre Quality Suitable for High Speed Spinning

Samples received from Dharwad (12), Khandwa (26), Hisar (27), Sriganganagar (22) and Sirsa (26) were tested to obtain the values of fibre attributes. Using the CIRCOT norms they were graded very good, average and poor. The region-wise result is as follows :

1.	Sirsa	:	None of the samples satisfy the Norm because of lower strength
2.	Sriganganagar	:	-do-
3.	Hisar	:	-do-
4.	Khandwa	:	4 samples PA.255, PAIG.81, DLSA.202 and KWAN.1 can be classified as Very Good and PA. 402, PA. 405, J. Tapti as average
5.	Dharwad	:	Samples AH (9), AH (42), AH (65) come under very good category Samples AH (1), AH (3), AH (4), AH (14), AH (20), AH (32), AH (37 & 38), AH (40 & 41), AH (45), AH (51), AH (55), AH (58) , AH (63 & 64) fall under average category.

Improvement of Medium Long and Extra Long Staple Fibre Suitable for High Speed Spinning

Samples were received from three locations *viz.*, Coimbatore, Delhi and Surat. In all 555 samples were tested for fibre properties and the results were sent to the concerned breeders.

One hundred and eighteen samples received from Coimbatore as a lot gave good values of 2.5% span length (nearly 30.0 mm and above) but lack in Micronaire value or strength as per the fibre quality norms. Only, one sample could satisfy the quality norms. In another lot of 347 samples from Coimbatore not a single sample gave the desired fibre attributes. The entire sample had very low strength (below 20.0 g/t) and very low Micronaire value (below 3.5) and fell far away from objectives of the project.

Thirty-four samples of this project from IARI, New Delhi also showed very low value of strength not matching with the basic objectives of the project. Fifty-six samples from Surat center were also not satisfying the required quality attributes. Most of them were under medium-long staple range possessing high Micronaire value and strength-wise do not satisfy fibre quality norms.

Projects under Revolving Fund Scheme of ICAR

Preparation and Marketing of CIRCOT Calibration Cotton

During the period under report, four samples one each of extra long, long, medium staple and coarse calibration cottons were prepared and introduced in the HVI and Conventional sets to meet the customer demand. The work of preparing Check Cotton was taken up. Calibration Cotton Users' meet was organized at Rajapalayam as a part of CIRCOT-Industry interface. During the year, 808 containers were sold. The total revenue generated was Rs.5,74,661/-. The consistent trend in the upward swing of the sales figures was not only maintained but was given a consider-

able boost by the vigorous publicity campaign launched availing the opportunities afforded by the users meet.

The first installment of Rs. 4,00,000/- was paid to ICAR during April 2002 while the second installment of Rs. 4,00,000/- during April 2003.

The table given below brings out the popularity of CIRCOT Calibration cottons.

Period	No. of containers sold
1997-98	243
1998-99	249
1999-00	353
2000-01	387
2001-02	490
2002-03	808

Projects under the AP Cess fund Scheme of ICAR

Quantitative Analysis of Toxic Inorganic Elements and Gram-negative Bacteria in Soil, Cotton Plant materials, Lint and Processing Dust

A prominent variety from each zone along with LRA.5166 was collected from different locations. In all 30 sets of samples were collected.

XRFS has been used for the analysis of inorganic elements in samples. XRFS is calibrated and quantified for different elements using standard method. The concentration of elements up to ppm level is thus obtained for each sample.

Elemental concentration

Fe has higher concentration in lower parts of cotton plant as compared to top and middle. Irrespective of the year of cultivation, the trend of variation in elemental concentration among the plant parts remained the same. The elemental concentration varied significantly due to agro-climatic conditions. Variation in plant parts was found to be independent of the elemental concentration profile of the soil.

SEM results

SEM micrographs for LRA.5166 sample showed surface distribution of bacteria. All the plant parts are densely populated except for the lint. The leaves close to soil as well as bract and rind harboured higher numbers of Gram-negative bacteria, which was confirmed by enumerating viable counts by dilution plate technique.

Microbiological results

Gram-negative bacterial population in the variety LRA.5166 was maximum for bract sample followed by rind. There was not much difference in the population in other plant parts. The geographical location appears to alter the population of gram-negative bacteria. A detailed work on the location effect and elemental concentration is being undertaken.

There may not be any relation to the soil bacterial population and the phyllosphere population as they are not systemic whereas there could be a direct relationship on the elemental concentration in soil and plant

parts. As elemental concentration in bottom region is high the bacterial population also is high.

It is the total endotoxin content (dead or alive bacteria), which is responsible for byssinosis. The viable bacterial count is however enumerated and represented as CFU/g. Presence of *Methylobacterium* was detected. *Beijerinkia* outnumbers other gram-negative bacteriae, in all samples analyzed. In this case too bract showed maximum population.

A few gram-negative bacteria are identified and classified up to their genus level as *Enterobacter, Beijerinkia* and *Methylobacter.*

Physico-Chemical and Structural Characteristics of Banana Pseudostem Fibre

Fifty-seven varieties of banana pseudostem obtained by hand scrapping have been tested for their mechanical properties. Generally, the fibres of the same variety could be distinguished as thick and thin visually hence they were tested separately. Significant findings under this project could be summed up as follows :

- The tenacity values show a high of 60.8 g/tex and a low of 32 g/tex.
- The breaking strain values range from 1.7% to 3.7%.
- The tex of the thick fibres is seen to be almost double than that of the thin fibres within a variety, the highest being 10 tex and the lowest 2.6 tex.
- The modulus values range from 7829 Mpa to 20083 Mpa.
- Tenacity and modulus values are not affected by the thickness of the fibres.
- Within a particular variety, the variation is found to be very less.

A small modification has been made in Raspador fibre extractor (Fig. 4) to suit the extraction of fibers from banana pseudostem. Also, a fibre cleaner has been developed to remove non-fibrous material from the fibres extracted by Raspador. These two in combination give fibres, which are as good as hand-extracted fibres for mechanical

Fig. 4 : *Raspador Fibre Extractor*

properties. They have better whiteness index, soft silky feel with silvery appearance (Fig. 5). The amount of fibres extracted per machine in a day can be more than 5 Kg. If a number of machines are used in banana plantations, large quantity of good quality banana fibres can be made available at cheaper rate for preparation of fancy articles as well as textiles.

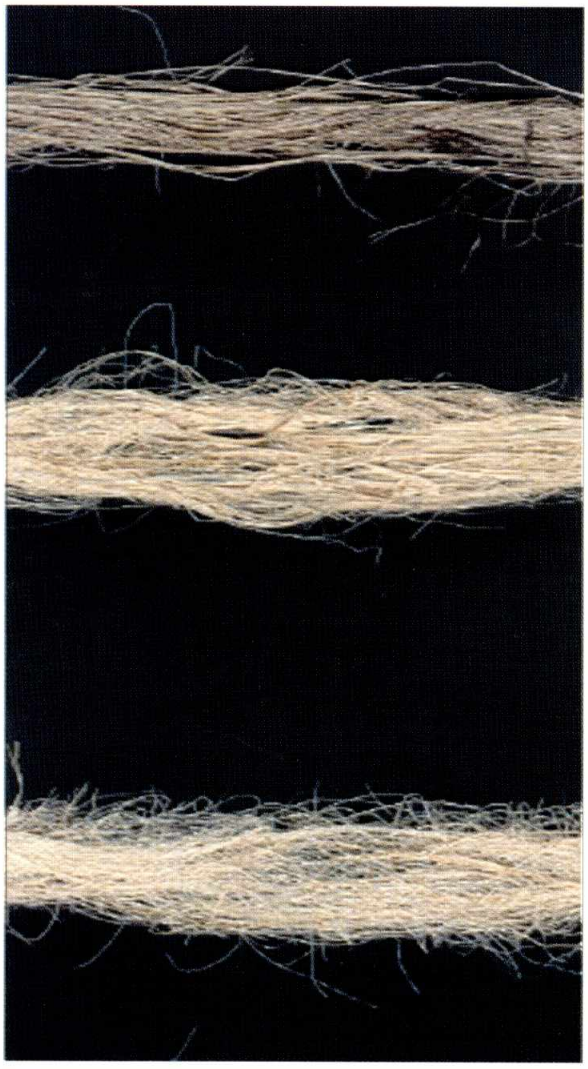


Fig. 5 : *Fibres extracted from (Top) Unmodified Raspador (Middle) Modified Raspador (Bottom) Modified Raspador and passed through Fibre Cleaner*

Developing Artificial Neural Network Models for Cotton Ring Yarn Quality Engineering

A computer programme based on Artificial Neural Network (ANN) models has been developed and named as Cotton Performance Evaluation System (COPES). Using this package one can predict spinnability and yarn properties from the knowledge of cotton fibre properties. It can be used to optimize cotton selection and to reduce production cost. COPES can predict yarn properties such as:

- Yarn evenness (U%)
- Thin places per kilometre (-50%)
- Thick places per kilometre (+50%)
- Neps per kilometre (+200%)
- Yarn tenacity (at test speed of 500 metres/minute)
- Elongation at break (at test speed of 500 metres/minute)
- Yarn hairiness (hairs above 3mm length)
- Lea CSP
- Highest standard count

Two sets of ANN models were developed for each property. One set requires High Volume Instrument (HVI) fibre properties only and the other set takes into account additional parameters like mature fibre and trash percentage. The cotton fibre properties that are required for the prediction are:

- 2.5% span length
- Uniformity ratio
- Short fibre index

- Micronaire
- Bundle strength
- Bundle elongation at break
- Mature fibre percentage
- Trash percentage

In case of HVI based ANN model prediction, the last two fibre properties are not required. However, more of these properties included better is the prediction. The programme provides interface for entering fibre properties (Figure 6 and 7).

The interface also allows to visualise CIRCOT CSP norms for a particular count used for prediction. Just a click of a button, one can get standard CSP values and judgment can be made whether that particular count is meeting CIRCOT norms.

The range of fibre properties used in the model building is given in Table 15. COPES prediction has been validated using results from CIRCOT trials (Table 16).

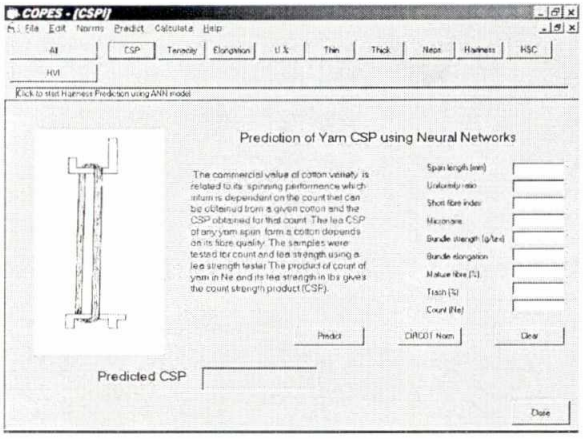


Fig. 6 : *Interface for Predicting Yarn CSP*

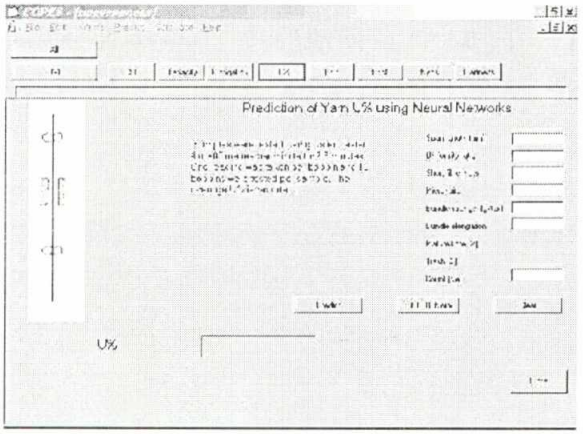


Fig. 7 : *Interface for Predicting Yarn Unevenness*

TABLE 15 : FIBRE PROPERTIES

Fibre property	*Mini-mum*	*Maxi-mum*
2.5% Span Length (mm)	21.8	34.6
Uniformity Ratio (%)	43	53
Short Fibre Index (%)	4.6	23.7
Micronaire value	2.8	5.4
Bundle Strength (g/tex)	16.9	26.1
Bundle Elongation (%)	3.0	6.5
Mature Fibre (%)	63	85
Trash (%)	2.3	10.6

TABLE 16 : VALIDATION RESULTS OF MODELS

Yarn property	*Mean absolute error*	*Corre-lation coefficient*
Unevenness	0.61	0.90
Thin places	135	0.87
Thick places	166	0.94
Neps	968	0.81
Tenacity	0.67	0.83
Elongation at break	0.24	0.80
Hairiness	7	0.60
Lea CSP	65	0.92

The agreement between prediction and observation has been noted to be good. It can be observed that mean absolute error of majority of the yarn properties predicted are less than that of confidence intervals of mean values normally found in actual testing. The degree of accuracy not only depends on the quality of algorithms but also on the measurement accuracy, particularly in terms of reproducibility between different test instruments and sample size. Plots of predicted versus measured for lea CSP and thick places for range of cottons that varied in fibre properties are shown in Figures 8 and 9.

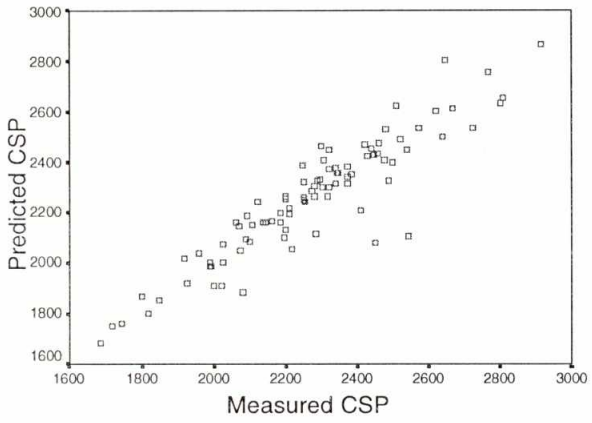


Fig. 8 : *Predicted vs. Measured Yarn CSP*

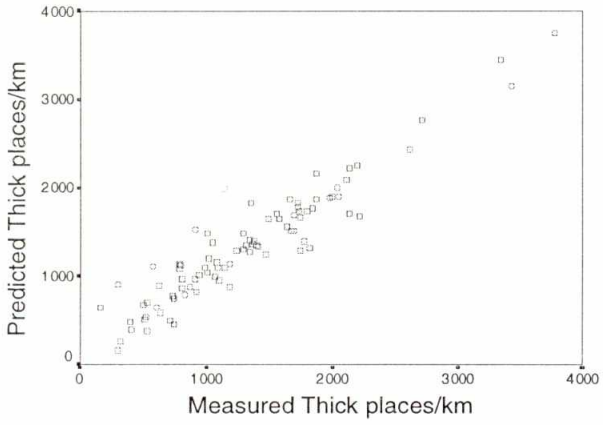


Fig. 9 : *Predicted vs. Measured Thick Places/Km*

Presently in AICCIP preliminary trials, HVI results and FQI values are provided for cotton breeding scientists. It is suggested that along with fibre results predicted count and Lea CSP may be given. This will help them to plan their research on the basis of the quality requirements of the end product.

Relationship between Lea Strength and Parallelised Yarn Bundle Strength for Commercial Cotton Yarns

Earlier studies conducted on standard and trade varieties showed that there exists a linear relationship between lea strength and parallelised yarn bundle strength and, CV% of parallelised yarn bundle strength is considerably lower than that of lea strength. This study is now extended to commercial cotton yarns in order to establish the influence of processing conditions and yarn manufacturing on the relationship between lea strength and parallelised yarn bundle strength.

Fifty commercial samples spun to different counts of 20s, 24s, 30s, 40s, 50s, 60s, 70s, 80s, 90s and 100s were procured. Out of these 26 samples have been tested for both lea-strength and parallelised yarn bundle strength. For bundle strength, a bundle of 160 threads was taken for test. The bundles were prepared on the specially fabricated instrument and tested on lea tester using special jaw fabricated for the bundle strength tests to avoid slippage (Fig. 10). For lea strength, Statex Lea tester was used. From the analysis of the data on lea strength and corresponding parallelised yarn bundle strength it is observed that the relation ship between them is perfectly linear with correlation coefficient r = 0.9982 (significant

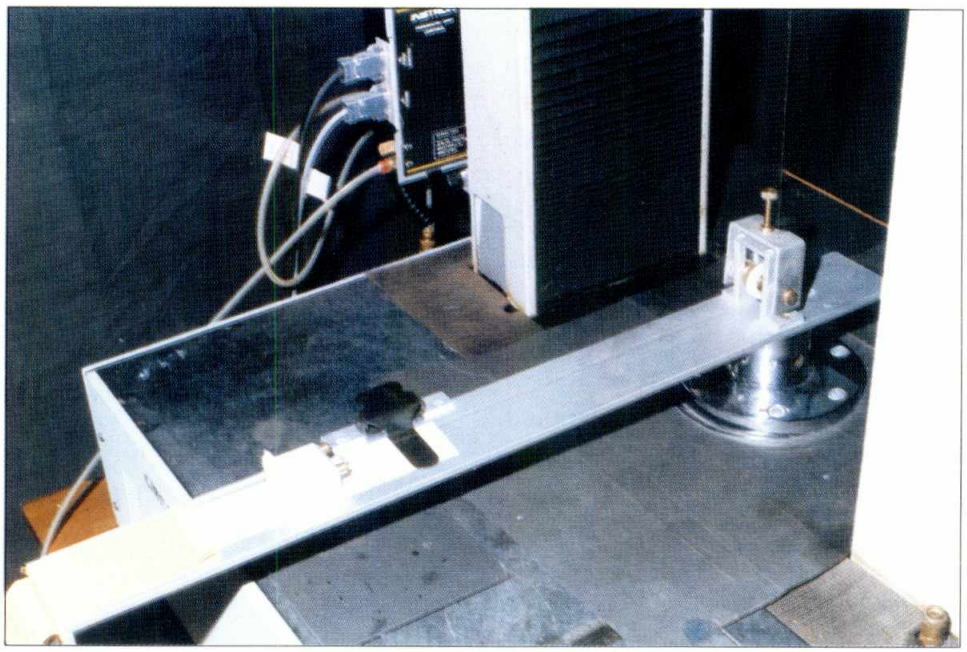


Fig. 10 : *Special jaw fabricated for yarn bundle strength test*

at 1%) and the CV% of parallelised yarn bundle strength is considerably lower than that of lea strength.

Norms for Uster Evenness (U%) and Imperfections for Yarns Spun at Central Institute for Research on Cotton Technology (CIRCOT)

In all 621 yarn samples possessing counts varying from 20s to 60s were tested for CSP, U%, thin and thick places and neps. Values for each property corresponding to a given yarn count were arranged, in ascending order and cumulative frequency distribution for each was found. From the cumulative frequency distribution curve, values corresponding to 5%, 25%, 75%and 95% and above 95% levels are classified as V. Good, Good, Average, below Average and Poor. Norms for CSP, U%, thin & thick places and neps for counts 20s, 30s, 50s and 60s are shown in Table 17.

The norms suggested are for the yarns spun on the present CIRCOT spinning system. Any yarn from AICCIP samples spun on CIRCOT spinning system can be evaluated for its performance for each of these properties individually and in a combined manner. This way, amenability of a fibre sample for spinning performance can be estimated, helping the breeders to decide about the suitability of the cotton for the end product.

Assessment of Performance, Testing and Refinement of CIRCOT Miniature Spinning System

The progress made during this year is summarized as follows :

A. *Incorporation of a PLC (Programmable Logic Controller) drive systems for both CIRCOT Miniature Carding Machine and Sliver to Yarn Spinning Machine*

In CIRCOT miniature carding machine,

TABLE 17 : NORMS FOR U% AND IMPERFECTIONS

Count 20s

Properties	V good	Good	Average	Below average	Poor
C.S.P	>2418	>2239	>2002	>1767	< 1767
U%	<13.1	<14.5	<16.6	<18.6	>18.6
Thin places	<30	<146	<477	<1060	> 1060
Thick places	<246	<670	<1197	<1979	> 1979
Neps	<355	<716	<1855	<2837	>2837

Count 30s

Properties	V good	Good	Average	Below average	Poor
C.S.P	>2479	>2307	>2020	>1883	<1883
U%	<14.0	<15.3	<17.7	<19.2	> 19.2
Thin places	<87	<211	<774	<1323	>1323
Thick places	<406	<892	<1606	<2254	> 2254
Neps	<781	<1348	<2568	<4436	>4436

Count 40s

Properties	V good	Good	Average	Below average	Poor
C.S.P	>2530	>2356	>2069	>1904	<1904
U%	<14.5	<15.7	<18.4	<20.1	> 20.1
Thin places	<140	<285	<904	<1481	>1481
Thick places	<787	<1184	<2092	<2821	>2821
Neps	<1278	<1943	<3339	<4982	>4982

Count 50s

Properties	V good	Good	Average	Below average	Poor
C.S.P	>2634	>2443	>2231	>2105	<2105
U%	<15.1	<16.5	<18.9	<20.3	> 20.3
Thin places	<203	<391	<882	<1440	>1440
Thick places	<1104	<1467	<2251	<3061	> 3061
Neps	<1820	<2425	<4051	<6066	>6066

Count 60s

Properties	V good	Good	Average	Below average	Poor
C.S.P	>2825	>2611	>2234	>1875	<1875
U%	<15.6	<17.0	<19.4	<21.4	> 21.4
Thin places	<250	<450	<1025	<1450	>1450
Thick places	<1050	<1750	<2717	<3550	>3550
Neps	<1600	<3000	<5050	<9000	>9000

the setting of main processing parameters like total draft, rpm of cylinder, doffer and lickerin has been made programmable *via.* the PLC system using a HMI (Human-machine Interface). A similar system has also been incorporated in CIRCOT miniature ring frame machine for easy setting of main processing parameters like total draft, break draft, twist per inch and spindle speed. The installations of both the units have been completed and the control programmes tested and verified. Schematic diagrams of PLC Programme for CIRCOT Miniature Carding Machine and CIRCOT Miniature Ring Frame are given in Fig. 11 and 12.

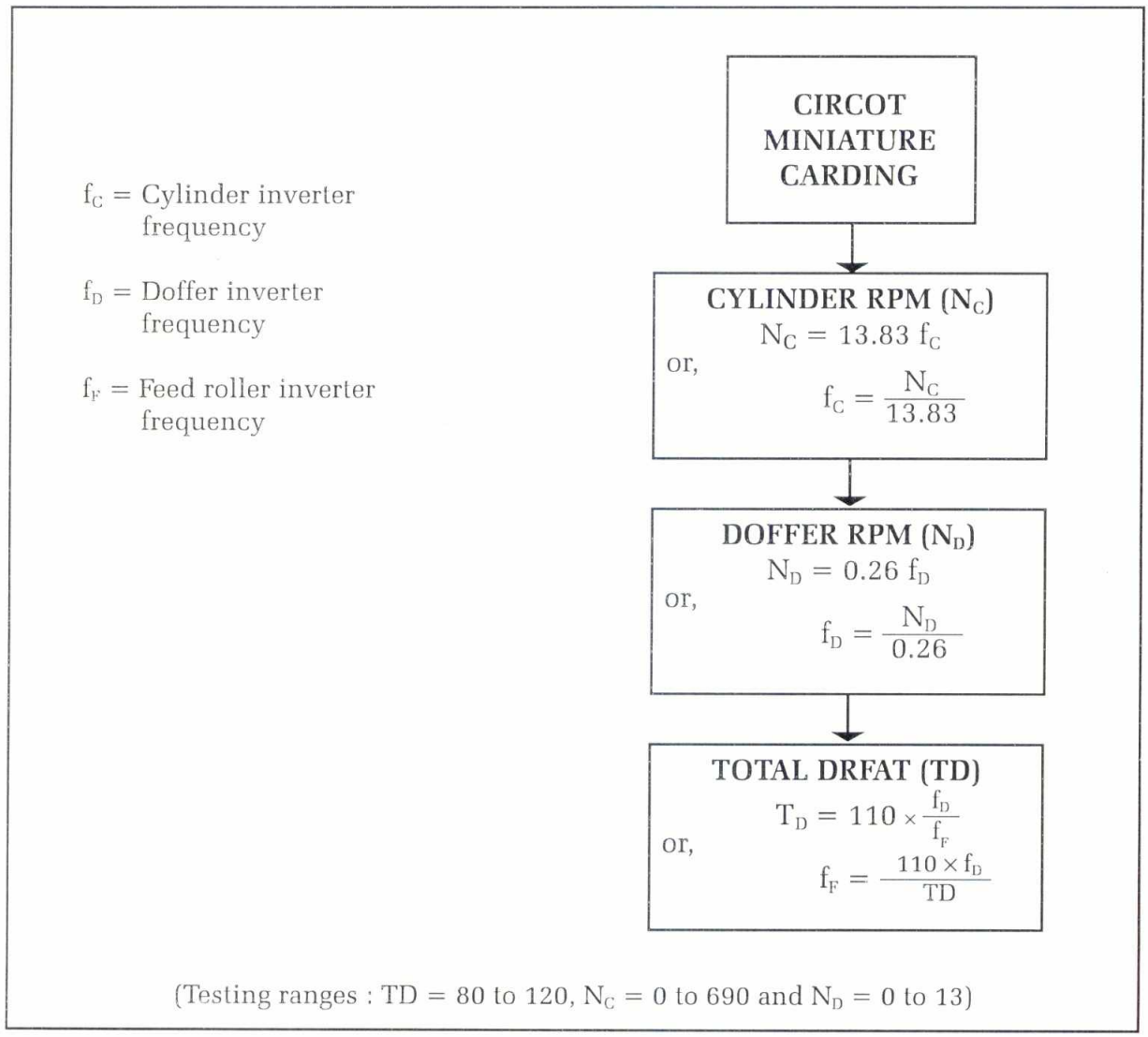


Fig. 11 : *Schematic Diagram of PLC Programme for CIRCOT Miniature Carding Machine*

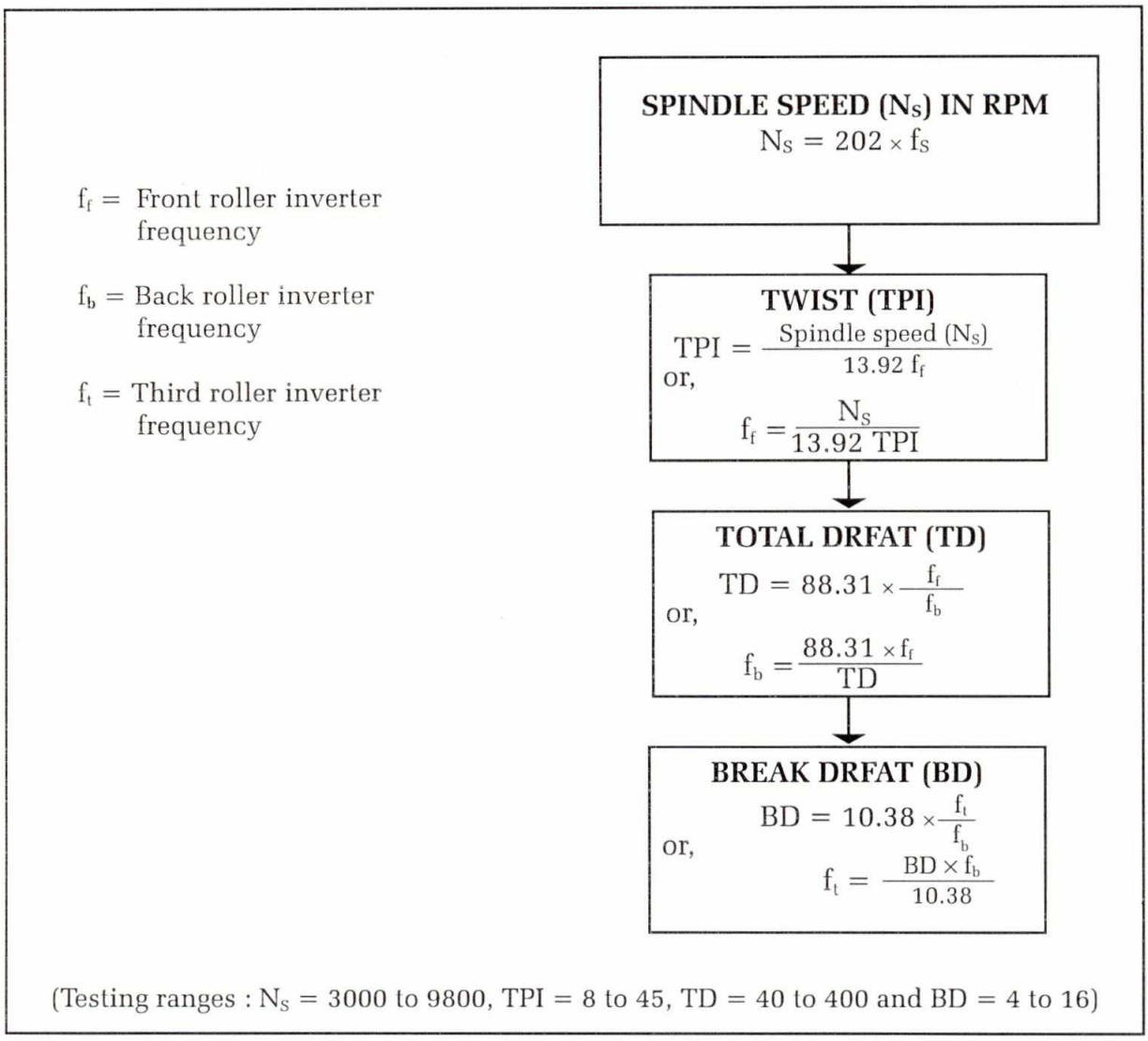


Fig. 12 : *Schematic Diagram of PLC Programme for CIRCOT Miniature Ring Frame*

B. *Comparison of yarns spun on CIRCOT Miniature system vis-à-vis CIRCOT Microspinning system:*

Twenty-two cotton samples were processed on miniature spinning system so as to produce yarns from 30s to 80s Ne. The same samples were also subjected to CIRCOT improved micro-spinning process. The twist level in both the sets of yarns was kept same as far as possible. The miniature spinning yields yarn with lower strength values ranging from 2.7 lbs to 8.3 lbs and the difference increases with the increase in yarn fineness. A correlation coefficient of 0.77 was observed between the two systems of spinning in case of CSP (Table 18).

TABLE 18: COMPARISON OF LEA CSP FOR YARNS SPUN ON CIRCOT MINIATURE SYSTEM VIS À-VIS CIRCOT MICROSPINNING SYSTEM

Sr. No.	Cotton sample	Microspinning					Miniature spinning			
		Nominal count	Actual strength	Actual			Actual strength	Actual count	CSP	CCSP
				Count	CSP	CCSP				
1	F.025375	20	116.0	20.3	2358	2371	111.7	19.5	2173	2152
2	DDH (REP. R1)	30	77.9	30.8	2398	2423	74.9	30.9	2314	2341
3	DDH (REP. R2)	30	81.1	30.6	2481	2499	81.3	28.9	2348	2314
4	NHH.44	30	60.1	30.2	1815	1821	58.2	30.8	1792	1816
5	RHH.0492	30	54.4	29.5	1603	1587	58.1	31.5	1831	1877
6	F.030329	30	79.2	29.7	2350	2340	68.8	29.5	2031	2016
7	F.0201252	30	81.4	29.4	2395	2377	64.9	30.0	1950	1950
8	F.201253	30	89.7	29.3	2624	2601	79.3	29.6	2344	2330
9	X (REP. R1)	40	52.8	40.3	2129	2136	45.2	41.3	1864	1894
10	X (REP. R2)	40	53.7	40.0	2149	2150	48.7	40.3	1964	1972
11	DHH.246	40	60.7	40.4	2451	2460	59.5	38.1	2269	2225
12	DHH.509	40	59.3	40.6	2407	2421	57.0	41.2	2348	2377
13	G Cot. Hy 10	40	57.6	41.7	2402	2442	54.2	39.6	2148	2140
14	F.0201251	40	56.5	42.0	2372	2420	51.8	39.3	2037	2021
15	DCH.32 (REP.-R1)	60	45.8	61.3	2809	2822	38.7	61.1	2361	2372
16	DCH.32 (REP.R1)	60	49.5	60.5	2995	3000	39.9	59.7	2381	2378
17	DCH.32	60	41.4	61.2	2534	2545	39.9	59.7	2381	2378
18	BCHB.6188	60	55.3	57.8	3196	3174	46.5	60.2	2797	2798
19	G Cot. Hy. 6	60	43.0	61.2	2633	2645	37.7	60.3	2275	2278
20	MGR.R1	80	40.3	79.2	3194	3194	28.3	80.0	2267	2267
21	MGR.R2	80	37.1	81.6	3021	3021	28.5	81.6	2325	2325
22	MGR.R3	80	35.6	81.4	2898	2898	26.0	83.0	2157	2157
	Average	36.87	67.2	37.3	2358	2367	62.0	37.0	2134	2136

Count Range	Correlation Coefficient
20s – 40s	0.757
60s – 80 s	0.334
Overall correlation	0.770

Development of a Low-cost Sliver Making Machine for Value Addition to Cotton at Rural Level

Two of the investigators of the project visited five villages near Akola (Maharashtra State) for the purpose of carrying out an initial survey work. The livelihood of the villagers depends on agriculture and the main crop is cotton. In the villages, cotton yarns are used by small-scale cottage industries for manufacturing products like towel, lungi, duster cloth, chaddar, cotton-carpet, children garments, dyed yarn for selling, etc. There is a great demand for cotton yarn by these industries within the village itself. However, these industries face always short supply of yarn. They have to go to far off places like Mumbai and Coimbatore for sourcing their yarn. Thus, the cost of the yarn increases due to transportation and overhead charges. Due to short supply of yarn, such cottage industries many times remain closed. Thus, there is an urgent need to make available cotton yarn in the village itself on a regular basis and at an affordable price.

The short survey showed that there is a need for developing appropriate spinning machines for processing cotton at village level for producing better quality yarn with higher productivity level. The price of these machines should be low as far as possible. It was also noted that sliver making is the biggest problem for the villagers. Hence it is felt that a low cost carding machine should be developed first for application at village level which will produce good quality sliver.

Projects under AP Cess Fund of ICAR

Processing of Cotton-Ramie Blends on Short Staple Spinning Systems

Large scale knitting trials of cotton-ramie (65:35) blended 30s yarn was successfully carried out at a commercial unit. The knitting was done on a 24-gauge double jersey circular knitting machine. In addition to plain interlock, peanut design was also produced. The former was made on a 30 inch diameter machine equipped with 36 feeder running at 18 rpm while the peanut design was knitted on a 24 inch diameter machine having 24 feeder running at 20 rpm. The working of the yarns was quite satisfactory. The knitted fabrics were then scoured, bleached, washed and printed at an export oriented process house. Various types of knitwear garments have also been produced as exhibits (Fig. 13). The significant findings of the project are summarised as follows:

A blend ratio of 65:35 for cotton : ramie was found to give adequate CSP for spinning into ring yarns. Spinning of coarser and finer counts from 16s to 40s Ne on ring frame was also successfully carried out by blending ramie sample degummed under optimum condition with medium to long staple cottons. During bulk trials, full spinning machines were used and the trials were successful. Though the quality of cotton-ramie blended yarns was poorer compared to cotton yarns, no notable difference in fabric formation was observed. Knitting performance of the blended yarns on a laboratory scale was satisfactory while that on commercial knitting machines was promising. Weaving as weft on handloom and powerloom was also satisfactory. Air-

Fig. 13 : *Various types of knitwear garments*

permeability of blended fabric was higher than 100% cotton fabric indicating the suitability of cotton-ramie blends for apparel fabrics. Higher absorbency of blended fabrics also indicates their suitability for towelling and other dress materials. Cloudiness and accumulation of trash particles were found more in blended fabrics. This was mainly due to significantly higher U% and total imperfections in blended yarns. With careful bleaching and finishing of these fabrics (Fig. 14), it was possible to rectify most of these shortcomings.

Thus by improved degumming method coupled with appropriate modification in the spinning process and proper selection of cotton, finer cotton-ramie yarns can be produced by adopting commercial cotton spinning system. These yarns can be used for production of fabrics on commercial machines. These fabrics can be used for inner and outer wear garments, and good quality towelling and home textiles. This will help to widen the usage of ramie fibre.

Development of Cotton-Wool Blended Yarns Employing Short Staple Spinning Systems for Production of Fabrics for Various Applications

The possibilities of blending indigenously developed finer but shorter wool, namely Avivastra wool and one specialty hair fibre, namely Angora Rabbit Hair with cotton and producing good quality yarns and fabrics adopting commercial cotton spinning systems have been established. Bulk spinning, industrial weaving, chemical processing and garment making trials of Avivastra wool and cotton blended yarns have been conducted

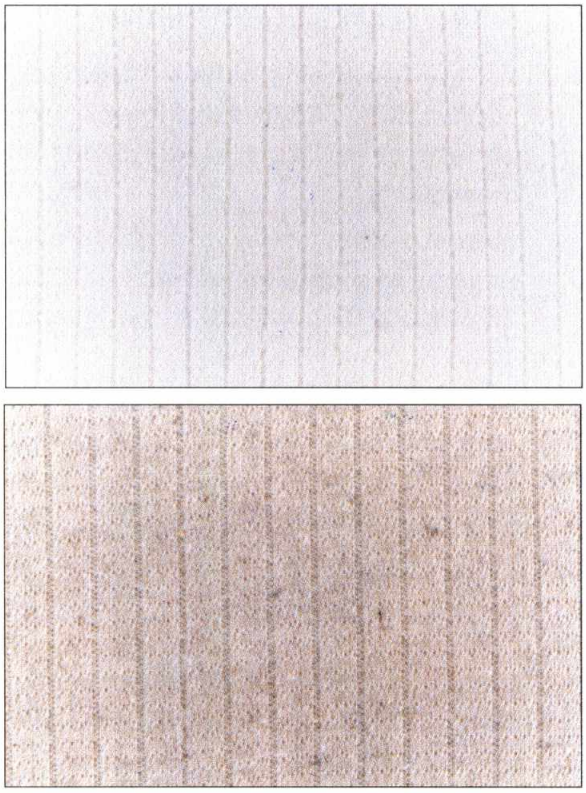


Fig. 14 : *Bleached and finished knitwear*

successfully. Industrial knitting and chemical processing trials of Angora rabbit hair and cotton (30:70) blended yarn (30s Ne) have been successfully carried out and plain and tuck knits and collar and rib fabrics were produced. Various types of garments like full shirts, Jackets, trousers have been made as exhibits from Avivastra wool and cotton blend and shirts from Angora rabbit hair and cotton blended yarn (Fig. 15).

A technology has been identified/ developed for utilisation of indigenously developed short but fine wool in blends with cotton through short staple spinning system, popularly known as cotton spinning system for production of finer quality fabrics and novel varieties of value-added woven and knitted garments. Hitherto, there was no appropriate utilisation of indigenously available short wool and Angora rabbit hair. Mechanical methods for removal of burrs from wool and guard fibres from Angora rabbit hair have been standardised replacing fully the chemical treatment for their removal.

Frictional Characteristics of Chemically Modified Cotton Fabrics

Grey cotton fabrics of plain weave having three different thickness, weight/sq. cm and threads per inch were chosen for the investigation. Based on fabric weight, these

Fig. 15 : *Shirts from Angora rabbit hair and cotton blended yarn*

three fabrics could be designated as light, medium and heavy. These samples were initially desized, scoured and bleached. Then they were subjected to finishing treatments such as Wrinkle Free finish with DMDHEU, Flame retardant finish with Gloguard Ne. Biopolishing, mercerization with NaOH and KOH both in slack and stretched states. Using Instron Tensile Tester fitted with specially designed (at CIRCOT) attachment, fabric-to-fabric frictional coefficient for various conditions was measured such as warp moves warp, weft moves weft, warp over weft and weft over warp. With the aid of Kawabata FB4 Surface Tester metal to fabric frictional coefficients were estimated for control (grey fabric) and fabrics subjected to chemical treatments. Tests were conducted at standard atmospheric conditions i.e. 65 $\pm$ 2% Rh and 27 $\pm$ 2°C.

From the data gathered the following inferences could be arrived at :

I Fabric to Fabric

A) General :

- Heavy weight fabrics registered higher coefficient of friction (0.776) followed by medium weight (0.703) and light weight fabrics (0.699)
- There is no appreciable difference in frictional coefficient whether warp moves warp or weft moves weft. This is true for all the three types of fabrics
- Movement of warp over weft results in higher values of coefficient of friction in the case of light and medium weight fabrics while the reverse is true in the case of heavy fabric.

B) Influence of Chemical Treatments:

- All the treatments enhance frictional coefficient . This is valid for all types of fabrics as well as all types of movements.
- Mercerization leads to considerable increase in coefficient of friction (about 28%) while Biopolishing to least (about 11%).
- Magnitude of increase in the coefficient of friction after treatment is the highest for medium weight fabrics followed by heavy and then light fabrics.

II Metal to Fabric

A) General :

- Coefficient of friction between metal to fabric is highest in light weight fabric and least for heavy fabric. This is just reverse to fabric-to-fabric frictional behaviour.

B) Influence of Chemical Treatment:

- Chemical treatments enhance the frictional coefficient
- Effect (increase) is more pronounced in heavy weight fabric (16.4%)
- Flame retardant finished and Biopolished fabrics show considerable increase in coefficient of friction after treatment of about 37% and 24% respectively.
- Data clearly reveals that metal to fabric frictional behaviour differs from fabric to fabric-frictional behaviour.

C) Relationship between Coefficient of Friction and Primary Handle Value

- There exists good inverse relationship between coefficient of friction and

Fukurami which reflects the fullness and softness of fabric. This holds good for lightweight fabric (r = -0.698 significant at 5% level) and for medium fabric (r = -0.737 significant at 5% level).

- For heavy weight fabric there exists a very high inverse relationship between coefficient of friction (μ) and Koshi which is measure of stiffness (r = – 0.915) significant at 1% level) as well as Hari which is a measure of antidrape stiffness (r = – 0.932), significant at 1% level).

CORE AREA III : FINISHING AND DYEING OF COTTON WITH NATURAL AND ENVIRONMENT FRIENDLY AGENTS

Effect of Mordants and Mordanting Methods on Cotton Dyed with Natural Dyes

Investigations on the influence of mordants and mordanting methods on the performance properties of cotton dyed with manjith (Fig. 16) revealed that :

- ✓ Only premordanting was found to be suitable as there was almost no dye pick up in postmordanting. Simultaneous mordanting resulted only in lighter shades.
- ✓ Premordanting with alum produced red shades and aluminium content of mordanted fabric varied from 14 - 1506 ppm depending on mordanting conditions like temperature, addition of certain chemicals to mordanting bath, pretreatment with tannic acid, etc. Depending on aluminium content, colour strength of the dyed fabric also varied from 1.16 - 7.63.

Fig. 16 : *Cotton dyed with manjith*

- ✓ Iron content of ferrous sulphate premordanted samples ranged from 420-816 ppm depending on mordanting conditions. These samples were of violet colour and their redness values were much lower than those of alum premordanted samples.
- ✓ Cotton samples premordanted with copper sulphate under different conditions contained copper to the extent of 195-843 ppm. In contrast to higher colour strength obtained for turmeric with copper mordant, these samples on dyeing with manjith had low colour strength values (0.76 – 1.99). Extractable copper contents of manjith dyed samples however were much lower and well within the eco-limits.
- ✓ Washfastness of manjith dyed samples ranged from fair to moderate, lightfastness was moderate to good and rubbing fastness was very good. Except bringing about some improvement in

washfastness with copper and iron mordants, mordanting did not have much effect on colourfastness properties.

- ✓ Use of mercerised fabric not only improved the colour strength of dyed fabric but it also improved the washfastness.
- ✓ Mordanting pH plays a very important role in determining the colour strength of fabric upon subsequent dyeing with manjith.

Monitoring of Banned Pesticide Residues on Cotton

Cleaning up procedures for the pesticide residues were standardized through suitable combination of solvents. This procedure resulted in minimizing the elution of cotton wax in the extract to be analysed for pesticides. However, the crucial parameter *viz.* the percentage recovery of pesticides adopting the above technique is to be evaluated.

Known amounts of three of the reference pesticides were incorporated in a given weight of cotton lint and the pesticides were extracted as per standard procedures. In order to optimize the amount of Florisil to be used in the final elution of the extracted sample, 3.0 and 5.0 g quantity of Florisil were employed. A TLC run showed that a minimum of 5g Florisil is required to obtain an effluent totally free of cotton wax. The final extracts in duplicate were sent to BTRA for the analysis of the recovered pesticides using GC-ECD. The calibration of the equipment was carried out using the pesticide standards supplied by CIRCOT. An analysis of chromatograms revealed that a recovery of 36.4%, 26.9% and 80.7% could be obtained for Lindane, Aldrin and DDT respectively from the extracts obtained using 5 g of Florisil. A recovery of 25.6%, 31.5% and 85.3% were observed for extracts obtained using 8g of Florisil in the cleaning up operations.

Dyeing of Cotton : Polyester Blended Fabrics with Natural Dyes

To develop dyeing procedure for polyester : cotton blended fabric with natural dye, it was necessary to see that dye produced similar shades on both types of fibres. Therefore, to find out suitable natural dye, 100% polyester and 100% cotton fabrics were dyed with a number of natural dyes *viz.*, dolu, kamala, lac, catechu, manjishtha, berberine and al. Manjishtha was found to produce similar shades on both types of fibres and hence it was selected for dyeing blended fabrics.

To optimise the conditions, dyeing of polyester and cotton was carried out at different pH, temperature and time. Polyester required slightly acidic pH and a temperature of 130° C, whereas for cotton neutral pH and a temperature of 80°C were found to be optimum.

Unmercerized and mercerized fabrics with different blend ratio of polyester and cotton *viz.*, 37:63, 70:30 and 80:20 were used in the experiments. Fabrics were mordanted with tannic acid and alum before dyeing. Dyeing was carried out using three different sets of conditions (Fig. 17) as given below:

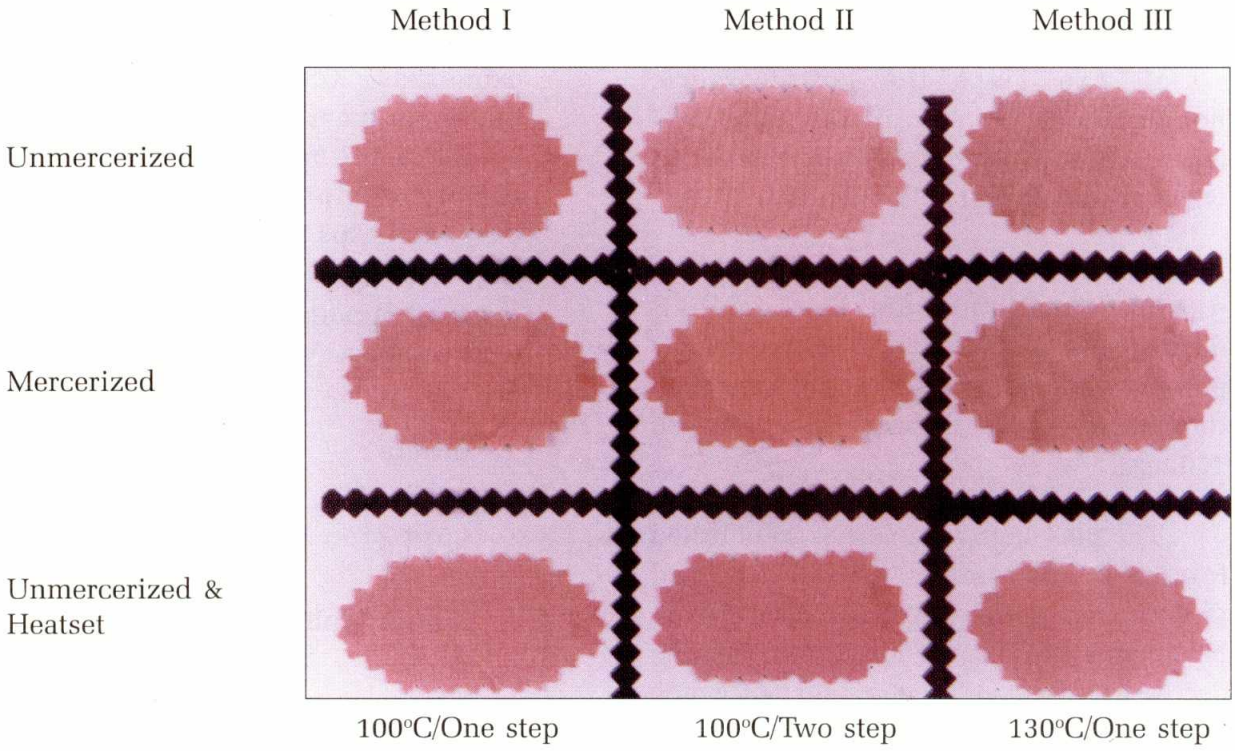


Fig. 17 : *Cotton : Polyester blended fabric dyed with manjishtha under three different methods*

Method I : One step dyeing at boiling temperature and neutral pH.

Method II : Two step dyeing at boiling temperature; in step I dyeing was carried out at neutral pH and in step II dyeing was carried out at acidic pH.

Method III: One step dyeing at 130° C at neutral pH.

All the dyed fabrics were evaluated for colour parameters and fastness to washing, perspiration and light.

To investigate the effect of heat setting temperature on colour, unmercerized - mordanted - dyed fabrics were cured at 200°C. The fabrics were evaluated for colour parameters.

Following were the significant findings made from the data collected.

1. Polyester-cotton blended fabric can be dyed successfully with natural dye manjishtha.
2. Mercerisation or heat setting does not affect various colourfastness properties.
3. Mercerisation improves the colour strength of fabrics.
4. Post heat setting of unmercerised-dyed fabrics improved the colour strength, when polyester component was higher in blend.

Water Repellency of Cotton Fabric by Plasma Treatment

In a series of experiments conducted to

find out suitable gas to produce plasma which can make the cotton fabric nonabsorbent to water, it was found that ammonia and dimethylsiloxane reduced water absorbency of cotton fabric.

Cotton drill fabrics were exposed to plasma from ammonia, hexamethyl-disiloxane and their mixtures. 80w and 200w power were used for producing plasma, with the time of exposure varying from 5 min to 150 min.

The plasma treated fabrics were tested for water absorbency, wickability and viscosity. Samples treated with plasma from hexamethyldisiloxane showed considerable decrease in water absorbency and hence they were further tested for moisture regain, air-permeability and water repellency (cone test). It was observed that these treatments did not affect moisture regain and air permeability. Though, these samples showed considerable decrease in water absorbency, they failed to pass water repellency test. Therefore, it is suggested that though these treatments could not impart water-repellency to cotton fabrics they can be used for developing specific end-use products.

EXTERNALLY AIDED PROJECT

Value Addition of Safflower Petals for Natural Dyes and Herbal Health Care Products

During the period under report studies on the dyeing characteristics of five varieties of safflower, elemental profile of safflower petals and stability of Safflower Pigments were carried out and the results are presented below:

- ✓ Dye content in terms of colour intensity expressed as K/S value varied from 1.3 to 7.3. In non-spiny varieties the K/S values ranged from 5.2 to 7.3. JSI-7 variety exhibited highest colour intensity. This data will be useful in grading of safflower petals in the dyeing industry. Various shades of cloth dyed with safflower yellow dye is given in Fig. 18.

	Variety	K/S values
1	JSI-7(New)	7.3
2	NARI-6	5.2
3	JSI-103	5.4
4	BHIMA (Spiny variety)	1.3
5	JSI-97	6.0

- ✓ One of the potential avenues for the utilization of safflower petals is in the form of food additives to enhance the nutritive and medicinal values of the products (Fig. 19). In this context

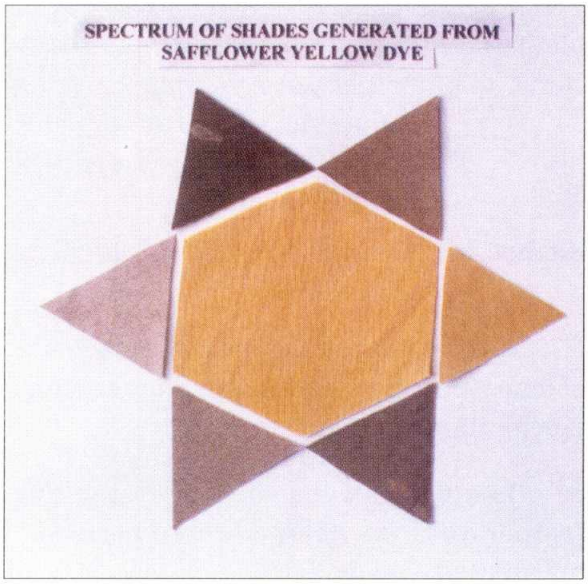


Fig. 18 : *Different shades of cloth dyed with safflower yellow dye*

knowledge of the profile of various elements assumes importance. A detailed elemental analysis was carried out employing AAS on ten important varieties of safflower, which is presented in Table 19.

From the above table the total absence of As and Hg in all the varieties is worth noting. Cd, Cr, Ni & Pb are present in quantities well within the prescribed limit for various food preparation in 5 of the 10 varieties studied. The elements As, Cd, Cr, Hg, Pb and Ni were absent. The elements Cu and Zn which are known for their beneficial effects in herbal medicines are present in all the varieties studied. The element Cu is in

Fig. 19 : *Safflower petal incorporated food products*

TABLE 19 : ELEMENTAL COMPOSITION OF SAFFLOWER PETALS (in ppm)

Variety	Weight of sample (g)	Dilution factor	As	Cd	Cr	Cu	Hg	Ni	Pb	Zn
JSI-1	0.5	100	-	1.0	10.4	23.2	-	1.6	21.6	30
JSI-2	0.5	100	-	-	5.6	20.6	-	1.6	12.6	33.6
PBNS-12-1	0.5	100	-	0.2	22.6	23.4	-	4.6	23.4	34.6
PBNS-12-2	0.5	100	-	0.4	-	16.4	-	3.0	0.8	33.0
SHARDA-1	0.5	100	-	2.4	-	14.4	-	3.0	-	32.4
SHARDA-2	0.5	100	-	-	-	42.2	-	1.6	-	28.6
JSI-97-1	0.5	100	-	1.6	8.4	24.8	-	8.4	-	32.4
JSI-97-2	0.5	100	-	-	2.6	22.4	-	2.6	-	37.2
JSI-103-1	0.5	100	-	-	1.6	17.8	-	1.6	-	26.4
JSI-103-2	0.5	100	-	-	3.0	18.0	-	3.0	-	25.2
ANNE-1	0.5	100	-	-	-	46.0	-	-	-	26.0
ANNE-2	0.5	100	-	-	-	28.6	-	-	-	26.2
NARI-SH-1	0.5	100	-	-	-	19.8	-	-	-	20.4
NARI-SH-2	0.5	100	-	-	-	12.6	-	-	-	16.0
JSI-7-1	0.5	100	-	-	-	22.4	-	-	-	21.2
JSI-7-2	0.5	100	-	-	-	17.4	-	-	-	14.4
NARI-6-1	0.5	100	-	-	-	4.8	-	-	-	7.0
NARI-6-2	0.5	100	-	-	-	13.4	-	-	-	25.4
BHIMA-1	0.5	100	-	-	-	8.4	-	-	-	8.8
BHIMA-2	0.5	100	-	-	-	10.4	-	-	-	7.2

the range of 5-40 ppm and Zn in the range of 7-37ppm. The above data will be useful for the formulators of herbal healthcare products from safflower petals.

- ✓ In order to promote safflower pigments, especially safflower yellow as food colour, information on their stability to heat and also their keeping quality in aqueous phase is needed. The storage of 1% and 0.1% of yellow dye solutions containing permitted quantities of a preservative under ambient conditions showed satisfactory stability of the colour for over 60 days period. It was also found that 0.01% of sodium benzoate as preservative is sufficient to prevent microbial growth. It was observed that 1% dye solutions retained 90% of the original colour under ambient conditions. Similar trend was noted in storage studies of the yellow dye in solid form. A detailed study on purified red and yellow pigments showed that carthamine red is thermolabile and in aqueous solutions degradation occurs even at room temperature. Red pigment showed a degradation of 30% at room temperature and 60% around 100°C. Yellow pigment showed around 20% degradation at the end of 12 h at 60°C

- ✓ The chemical analysis of safflower stalk showed it to be a cellulose rich raw material with properties closer to wood. The laboratory trials undertaken to prepare pulp, paper, particle board (Fig. 20) and fiberboard proved successful. The properties of the particleboard conformed to IS standards. The hard board prepared through the wet process without using any resin also proved successful. The overall results showed

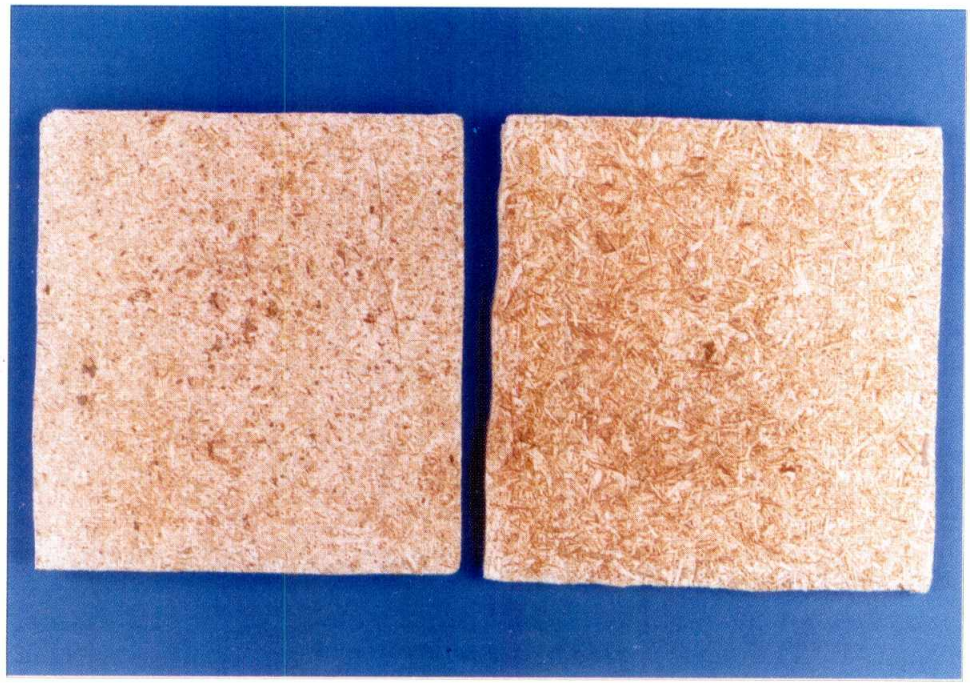


Fig. 20 : *Particle board from safflower stalks*

the potential of safflower stalk as an alternate source of lignocellulosic material for pulp and board industry.

CORE AREA IV : UTILISATION OF COTTON PLANT RESIDUES FOR PRODUCTION OF VALUE ADDED PRODUCTS

Prevention of Aflatoxin Producing Microorganisms in Cottonseeds during Storage

The cottonseed quality undergoes deterioration during storage due to the proliferation of microorganisms particularly when the humidity goes up. This affects the quality of cottonseed meal. When there is production of aflatoxins by the growth of *Aspergillus flavus*, the meal becomes useless. The USDA has prescribed aflatoxin tolerance limit of 6 ppb for feed and 4 ppb for food while in India it is 1000 ppb for feed and 30 ppb for food.

Bench scale trials were undertaken on the effect of propionic acid and live culture of yeast on the growth of *A. flavus* and the subsequent effect on the quality of oil and protein. Hundred gram seeds in each case were treated with either propionic acid or yeast culture and incubated for different periods. Samples were scored at the end and observed for the growth of *A. flavus*. Measurements were also made for the oil content, protein content and acid value. At the end of 2 months period it was noticed that there was no growth of *A. flavus* in the samples treated with propionic acid @ 0.75%. There was no significant change in the oil content, protein content and acid value either.

The detection of aflatoxin production was also carried out qualitatively using high performance thin layer chromatography (HPTLC) using the fluorescence detector. Presence of fluorescence bands were detected in the samples inoculated with *A. flavus* and not in the ones treated with propionic acid but inoculated with *A. flavus*. One yeast culture identified as *pichia sp.* recovered from the microbial consortium maintained under anaerobic conditions has been found to be effective in arresting the growth of *A. flavus*.

Scale-up Studies on the Preparation of Peptone from Cottonseed Meal

Commercially available cottonseed meal was analysed for various chemical constituents *viz.* nitrogen, ash, crude fibre, lignin, carbohydrate as per standard methods. It was observed that meal is of good quality with 60% protein content. Laboratory scale preparation of peptone (Fig. 21) from meal was carried out to find out quality of

Fig. 21 : *Peptone from cottonseed meal*

peptone. The trials were carried out with 25, 75, 100 and 200 g of meal. On an average 65% peptone was recovered. Protein content was 60% and solubility of peptone was total. Scale up trials with 1 kg cottonseed meal was successfully completed.

Preparation of Value-added Products from Wastes Collected from Ginneries

In modernized ginning factories cotton is subjected to precleaning and post cleaning operations to get clean trash free cotton. During these operations along with the trash about 2% to 5% of good quality cotton fibres are lost. Several samples pertaining to precleaning and post cleaning operations were collected from ginneries in Nagpur and Ahmedabad. They were mechanically cleaned to remove trash and recovered cleaned fibres were digested in a rotary digester with alkali (2% to 3% depending upon the cleanliness of the fibres) at 130°C for 90 min. at a material to liquor ratio of 1:20. The cooked fibres were washed thoroughly and then bleached employing a two-step bleaching process. Bleached samples were evaluated for various properties like ash content, alpha cellulose content, water absorbency, etc. (Table 20) Samples obtained from pre cleaners having longer fibre length were suitable for use as absorbent cotton, while those from post cleaners having shorter fibre length could be utilised for the preparation of high-grade pulp and good quality paper.

Trials were also undertaken to standardise processing parameters and to prepare high grade pulp from linter samples obtained from different varieties of cottons (H.6, LRA and J. 34) in a pilot delining plant installed at GTC, Nagpur (Table 21). The linter samples were mechanically cleaned to remove trash and then subjected to chemical processing (3% alkali, 130°C for 90 min at m:l of 1:20). The digested linter samples were bleached using hypochlorite and hydrogen peroxide. Bleached linter samples were evaluated for properties like ash content, alpha cellulose content, water absorbency and D. P.

From the results (Table 22) it could be

TABLE 20 : PROPERTIES OF PULPS PREPARED FROM GINNERY WASTE

	(Pre-cleaned waste)* B	(Post-cleaned waste)* C	(Pre-cleaned waste)** D	(Post-cleaned waste)** E
Trash (%)	23	14	20	30
Yield (%)	63	67	63	53
Alpha cellulose (%)	98.6	98.2	98.6	96.7
Moisture (%)	6.5	6.7	6.2	6.4
Ash (%)	0.11	0.13	0.15	0.19
Absorbency (Sec.)	2.6	5.5	5.3	7.6

*Note : *Samples from Surat **Samples from Nagpur*

noted that the quality of linters obtained from H.6 cotton was quite satisfactory having higher yield, alpha cellulose content and D. P. as against the other two. All the samples were found suitable for utilisation as high-grade pulp and for the preparation of good quality paper. Further standardization is necessary for reduction in ash content and to improve the quality of linter pulp.

In another experiment, trials were undertaken to study the effect of different types of ginning on delinting characteristics of cottons in a pilot delinting plant. Three cotton samples LRA., J. 34 and H.6 were ginned at GTC, Nagpur on D. R., Rotobar and Saw ginning systems (Table 23). Seed samples obtained from these ginning systems were subjected to delinting in a pilot delinting plant installed recently at GTC, Nagpur. The linter samples collected from these cottons were mechanically cleaned and the data on various parameters was collected. In general, it was observed that saw ginned cottons gave highest percentage of linters followed by Rotobar and then D.R. Rotobar ginned seeds recorded maximum percentage of *kapas* bonda, followed by saw gin samples and D.R. gin. Linter waste percent was in general more in Rotobar samples.

Commercial Trials on Preparation of Fibre, Hard Boards from Cotton Stalks

Large scale trial on preparation of binderless hard boards from cotton plants stalks was conducted at M/s. Jolly Boards Ltd., Sangli, by processing four tonnes of cotton stalks.

The material was chipped on klockner chipper. The efficiency of chipping was almost five times (about 2 tonnes per hour) due to baling of cotton stalks and the chip

TABLE 21 : PROPERTIES OF LINTER SAMPLES OBTAINED FROM PILOT DELINTING PLANT

Cotton	Trash (%)	Linters (%)	Bleached Linters %		Moisture (%)	Ash (%)	α-cellulose (%)	Absorbency (Sec.)	D.P.
			On entire sample	On linters					
H.6	16.7	83.3	67.3	82.3	6.5	0.54	81.2	10.0	549
LRA	24.2	75.8	54.7	72.1	6.3	0.51	73.0	4.3	422
J.34	25.5	74.5	43.0	60.4	6.3	0.57	75.6	3.9	483

TABLE 22 : PROPERTIES OF HIGH GRADE LINTER PULP

Bleached Pulp Yield (%)	Moisture (%)	Ash (%)	α-cellulose (%)
68	6.2	0.12	98.7

TABLE 23 : EFFECT OF DIFFERENT TYPES OF GINNING ON DELINTING CHARACTERISTICS OF COTTONS IN A PILOT DELINTING PLANT

Sr. No.	Product	LRA (100 kg)			J.34 (100 kg)			H.6 (100 kg)		
		DR	*Rotobar*	*Saw gin*	*DR*	*Rotobar*	*Saw gin*	*DR*	*Rotobar*	*Saw gin*
1	Delinted seed	90.0	96.0	89.2	91.6	88.6	86.0	88.4	80.4	87.2
2	Linter	5.8	5.4	6.0	4.6	4.4	7.6	6.6	7.4	8.0
3	*Kapas* Cleaner Waste	1.0	0.4	0.6	0.4	0.4	0.4	1.0	1.2	1.0
4	Linter Waste	2.8	1.8	2.8	2.0	2.2	4.0	2.4	3.0	1.8
5	*Kapas* Bonda	0.4	4.4	1.0	0.6	3.0	1.0	0.4	4.8	1.0

size was also uniform which has helped in homogeneous digestion and freeness of pulp. Trials were conducted to prepare boards with blending of pulp of cotton stalk and bagasse in 50:50 proportion and 100% cotton stalks.

The quality of boards was good and was brown in colour as compared to boards from bagasse (Fig. 22). The density of the board was about 947 kg/m^3 and the average thickness was 2.6 mm with bending strength 520 kg/m^2. The consistency of pulp was 2.0% with 14 DS freeness and 27.0% solid content.

Fig. 22 : *Hardboards from cotton stalks prepared by blending with bagasse*

The trial was conducted on the machine parameters set for board preparations from wood as raw material. For hard boards from cotton stalks the speed of the conveyors had to be modified for proper water drainage and wet mat formation of cotton stalk pulp. Two press load each of 25 boards of 16' x 4' size were pressed with total press cycle of five minutes. The boards were quite strong and darker in colour due to black specs of bark of cotton stalks.

The boards were tested as per BIS and were conforming to the BIS 1658 - 1977 meant for Testing of Hard Boards from Ligno-cellulosic materials.

These boards could be used for partitioning, panelling, as display boards, etc.

Properties of Hard Boards from Cotton Stalks:

1)	Solid content of pulp	27%
2)	Freeness of pulp in seconds	14 DS
3)	Wet lap thickness	12.5 mm
4)	Thickness of Board	2.6 mm
5)	Density	9.47 kg/m^3
6)	Bending strength (Average)	520 kg/cm^2
7)	Water absorption	60%

Soft Boards from Cotton Stalks :

Soft boards are fibre boards of homogeneous or laminated nature made of wood or lignocellulosic material with a nominal thickness not less than 9 mm, density not exceeding 400 kg/m^3, thermal conductivity upto 5.6 k cal. cm/m^2 h°C. They are used for display boards, for insulation purpose, as joint filler in construction, etc.

About 3 tonnes of cotton stalks were collected from MAU, Parbhani and transported to a factory in Aurangabad. Trials were conducted on preparation of softboards from cotton stalks by blending with bagasse in different proportions and bitumen sizing at the pulp stage (Fig. 23).

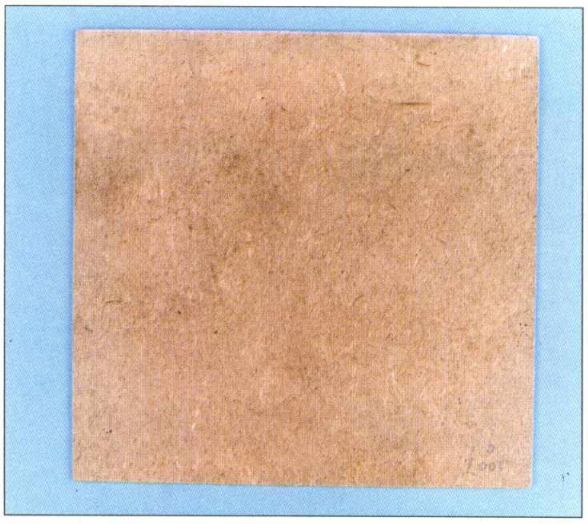


Fig. 23 : *Softboards from cotton plant stalks blended with bagasse*

The quality of boards prepared with 50:50 bagasse and cotton was good and appears to be ideal, with 240 kg/m^3 density, 21 kg/m^2 MOR and with 11.6 mm thickness.

Project under ICAR Working Group to Identify Areas of R&D for Value Added Products for Coir Diversification

Preparation of Cellulose Powder from Coir Waste

Tender coconut outer cover in wet condition was subjected to anaerobic treatment for one week under batch digestion. The anaerobically treated fibres were steam cooked in alkali for 30 min followed by bleaching with hypochlorite for 30 min. The bleached material was hydrolysed with 2.5N HCL for 20 min to obtain cellulose powder. The analysis of raw material is given in Table 24 and recovery and moisture regain values are given in Table 25.

Table 26 gives cellulase production in terms of filter paper activity. It is clear from the table that cellulase activity is higher

TABLE 24 : ANALYSIS OF RAW MATERIAL

Constituents (%)	Carpet Coir Waste	Tender Coconut Waste
Moisture	11.1	86.0
Ash	2.3	2.2
Lignin	40.2	26.2
Holocellulose	47.1	40.3
Ether Extractives	1.8	2.0
Pentosans	7.5	12.5
Nitrogen	0.7	1.0

TABLE 25 : CELLULOSE RECOVERY AND MOISTURE REGAIN

Parameters	Coir (Tender Coconut)	Coir (Carpet Waste)
Cellulose powder recovery (%)	29.0	24.5
Moisture Regain (%)	10.0	10.2

TABLE 26 : CELLULASE ACTIVITY BY PENICILLIUM FUNICULOSUM

Source	Filter paper activity (μg/ml)
Commercial cellulose	900
Cellulose powder from carpet waste	1770
Cellulose powder from tender coconut waste	2340

when *Penicillium funiculosum* is grown in a medium containing cellulose powder as carbon source prepared from tender coconut coir waste. In both cases cellulase activity is considerably higher than commercial cellulose which indicates that the product is superior and can be used for the production of cellulase enzyme. The higher accessibility of cellulose for enzyme absorption might have been responsible for the increased cellulase activity in the case of tender coconut.

Preparation of Value Added Products from Arecanut and its Husk

(a) Utilisation of Arecanut Extract for Dyeing of Cotton

During the reporting period in order to examine the utilisation of tannins present in arecanut for dyeing of cotton, experiments were carried out to compare the performance of tannins derived from arecanut against that commercially available. A chemical analysis of the arecanut received from the regional station of CPCRI at Vittal indicated the presence of tannins measured in terms of (+) catachin to be around 10%.

Finely powdered arecanut was extracted with water at M:L of 1:30 at room temperature for half an hour. The decanted liquid was used for the dyeing studies carried out with natural dye Manjistha at 10% shade using tannic acid and alum as mordants. In the above experiments, tannic acid was taken both at 10% and 20% level. The initial weight of the arecanut was so adjusted as to yield 10% and 20% tannin content in the extract. The cotton fabric was dipped in tannic acid solution for 10 min., padded and then treated with alum solution containing 10% alum. The above mordanted fabric was dyed with Manjishtha as per standard procedures (Fig. 24). The dyed fabric was

Fig. 24 : *Cotton fabric dyed with Manjishtha using commercial tannic acid*

evaluated for colour parameters employing computerised colour matching system.

The colour parameters of various dyed samples are given in Table 27. It is noted that the samples dyed using commercial tannic acid were reddish in colour whereas samples dyed using arecanut derived tannin were reddish - orange in colour. Higher colour strength was indicated for samples dyed using arecanut derived tannins as compared to the commercial tannic acid.

The above results seem to suggest that tannin extracted from arecanut could be used for dyeing of cotton with natural dyes. However the economics of using arecanut as source of tannin would largely depend upon the subsequent organoleptic evaluation of the tannin-free arecanut residue for regular beetle leaf chewing purpose.

(b) Preparation of Pulp and Paper from Arecanut Husk

Arecanut husk was cooked in 16% alkali and kraft paper was prepared. Simultaneously biosoftened arecanut was cooked in 8% alkali and kraft paper was prepared. As the quality was not upto the mark studies are underway in blending arecanut husk pulp with other long fibre pulp for preparing paper sheets.

(c) Preparation of Binderless Boards from Arecanut Husk

Biologically softened arecanut husks were pressed at 160° C in a steam heated hydraulic press. The boards are of good quality with natural finish (Fig. 25). Systematic studies are underway.

Fig. 25 : *Hardboards from arecanut husk*

TABLE 27 : COLOUR PARAMETERS OF MANJISHTHA DYED SAMPLES

Tannic Acid Content	K/S	λ max nm	L	a	b	c	h
Commercial 10%	2.7	510	57.20	35.01	8.21	35.96	13.20
Commercial 20%	4.2	510	51.95	38.38	9.32	39.50	13.65
Arecanut 10%	3.3	510	52.97	28.97	12.85	31.70	23.92
Arecanut 20%	3.9	510	51.32	32.73	11.33	34.64	19.09
Commercial Control	0.2	510	82.46	0.32	21.44	21.45	89.16
Arecanut Control	0.2	510	81.80	4.77	12.48	13.36	69.10

Projects under the Technology Mission on Cotton : MMF1 of MMI

Utilisation of Cotton Plant Byproduce for Value Added Products

(a) Utilisation of Cotton Plant Stalks

Design and Fabrication of Hand Operated Cotton Stalk Compacting Machine

A hand operated cotton stalk compacting machine has been fabricated. Cotton stalks (whole plants) arranged in such a way that the bushy part comes to the centre in a total horizontal length 4' in, height of 1' with 1'width are pressed downwards by means of three compacting units wherein each unit is driven by screw shaft. Provision has been made to tie the pressed material with gunny or coir ropes manually by providing slits in the side plates on either side (Fig. 26). The material is pressed to a height of 4" during baling and after releasing the pressure, it has been noticed that the final height comes to about 6". The unit weighs about 475 kg. The average density of the bale is 72 kg/m^3 with a weight of 4.4 kg. It has also been observed that the stalks are nearly parallelised indicating the possibility of obtaining uniform chips when the bundles are fed through drum chipper normally employed for chipping woods in hard board making factories. Trials on compaction have been completed on 2 tonnes of material received from GAU, Surat and compared with manual bundling. Chipping trials are planned by the end of March 2003 or early first week of April, 2003 at M/s. Jollyboard Ltd. near Miraj.

(b) Utilisation of Cottonseed Hulls for Animal Feed after Enriching with Microbial Protein

Based on preliminary trials for finding out the digestibility of cottonseed hulls

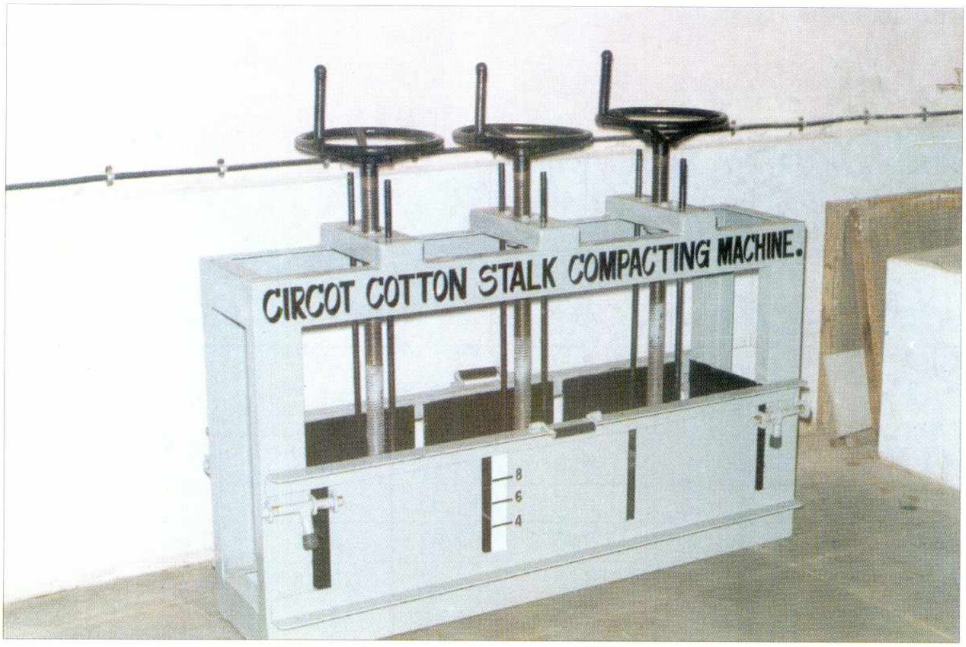


Fig. 26 : *Cotton stalk compacting machine*

undertaken at the University of Agricultural Sciences, Dharwad on cross bred cows, (around one year old) actual feeding trials have been undertaken during 2002-03 on lactating cross bred cows at National Dairy Research Institute, Karnal.

Preparation of Enriched Cattle Feed

Two tonnes of cottonseed hulls were procured from M/s. Coromandel Agro Products and Oil Ltd., Chirala, Andhra Pradesh for this study. In each batch, about 500 kg of cottonseed hulls were treated with 0.5% sodium hydroxide and 50 ppm manganese chloride in a substrate to water ratio of 1:1 containing CIRCOT's microbial consortium as inoculum. The fermentation was carried out in a specially constructed reaction vessel for 7 days. The enriched material was sent to NDRI, Karnal for undertaking feeding trails on cross-bred cows.

A two fold increase in nitrogen content and a marked improvement in digestibility of the fermented product were noted.

The details of the feeding trials are given in Table 28 and the composition of feed in Flow Diagram (Fig. 27).

The weight of the animals varied from 325 kg to 400 kg to start with. The conventional feed has been replaced with cottonseed hulls upto 50% and the animals were fed thrice daily.

To start with, the average milk yield of each animal was about 10 litres during each milking time. The data on the metabolic

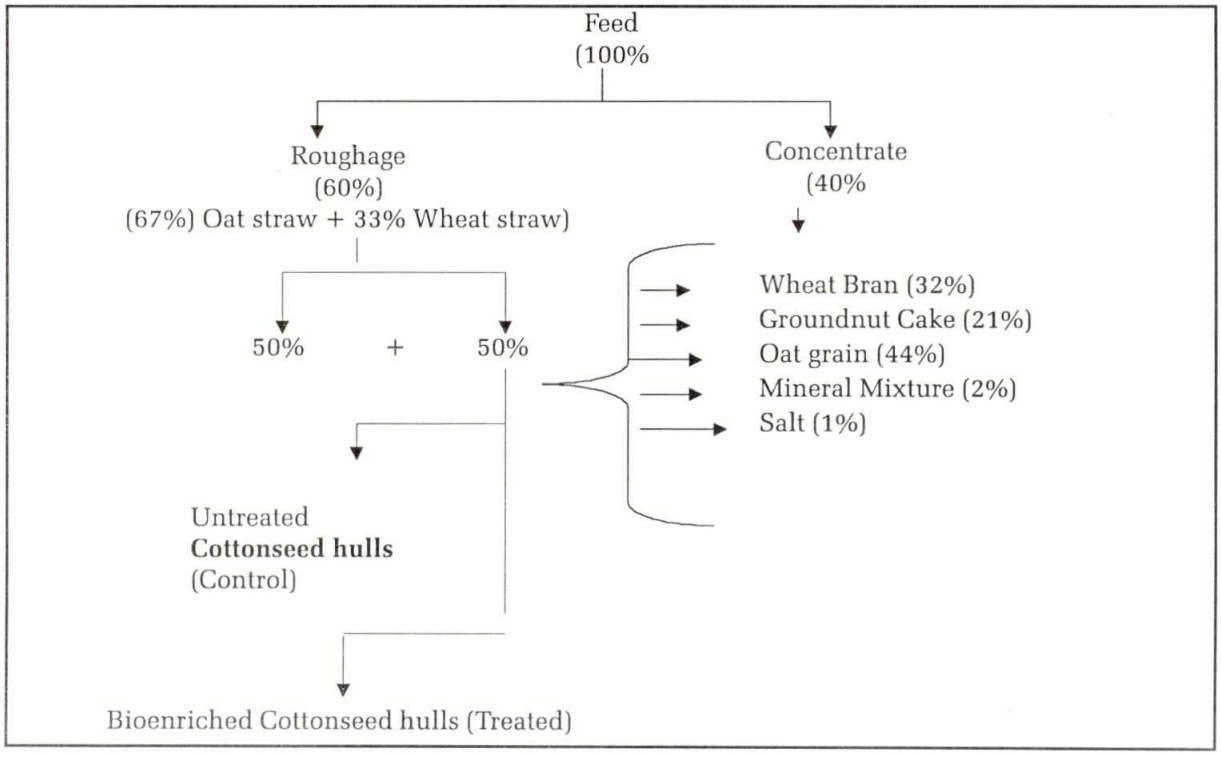


Fig. 27 : *Composition of feed*

TABLE 28 : FEEDING TRIALS ON CROSS-BRED COWS

Age of the animals	4 Years
Body weight	Around 400 kg
Lactation stage (After calving)	135 Days
Average milk yield	10 Litres/one time
Treatments	Two (10 Animals in each group)
Feed	60 : 40 Roughage : Concentrate

trials, analysis of milk and other parameters were carried out.

The results indicated that both *In Vitro Dry Matter Digestibility* (IVDMD) and *In Vitro Organic Matter Digestibility* (IVOMD) were maximum at 66% replacement of enriched cottonseed hulls in diet. The dry matter of treated hulls was marginally high i.e.8.36 kg/day as against 7.70 kg in the case of untreated hull.

No significant increase in milk yield was noted between untreated and treated hulls. Cottonseed hulls being poor quality roughage, significant increase in milk yield was not noticed with the bioenriched product. When the same method was tried to enrich soya hulls, results obtained were significantly better indicating that the method is adaptable for various roughages.

QUANTITATIVE AND QUALITATIVE IMPROVEMENT OF COTTONSEED OIL (MMA-5)

In day-to-day practice whenever deep-frying is carried out, the oil used for frying is not subjected to continuous heating but after a particular time interval. Trials were conducted to study the extent of damage caused to cottonseed oil during intermittent heating of cotton seed oil at the time of frying and the effect of antifoaming agent in minimizing the deterioration.

Frying of papad in cottonseed oil was carried out to assess the effect of repeated frying on oil as well as on the fried food. Two sets of experiments were conducted.

In the first experiment, papads were fried on alternate days for a period of 14 days using cottonseed oil (control). In another experiment the above trials were repeated using cottonseed oil with 10 ppm of dimethyl polysiloxane (an antifoaming agent). Peroxide value and viscosity of oil were determined after each frying. Oil uptake of the fried food was also determined after extracting oil from the fried food. Results indicated that there was gradual increase in the viscosity of the oil with each frying. The oil uptake by the fried food also increased with each frying. Peroxide value of oil in the fried food also increased progressively with increase in the number of frying cycles. The results indicated (Table 29) that deterioration of oil was more pronounced in control sample as compared to the oil having anti-foaming agent. The control oil became unfit for frying and consumption after 4^{th} use i. e. after 8 days. On the other hand the oil having anti-foaming agent could be used upto 6^{th} frying cycle (12 days) without any deleterious effect on the quality of fried food. Addition of 10 ppm of anti-foaming agent could increase the life of the cottonseed oil by 50% during intermittent frying.

TABLE 29 : PROPERTIES OF COTTON SEED OIL DURING INTERMITTENT FRYING WITH AND WITHOUT ANTI-FOAMING AGENT

Age of oil used days	Viscosity (Centi stokes)		Oil uptake of the fried food (%)		P. V. of the fried food		Organoleptic grading of fried food	
	1	2	1	2	1	2	1	2
Fresh oil	58.5	58.5	5.8	5.7	15.0	15.0	A	A
2	60.3	59.4	6.3	5.9	17.7	16.8	A	A
4	62.8	61.6	7.7	6.7	20.5	18.9	B	A
6	66.1	63.2	9.0	7.7	22.0	20.1	B	A
8	69.7	66.2	10.5	8.9	25.3	22.7	C	B
10	75.2	68.4	12.0	9.3	26.9	24.3	C	B
12	82.3	74.6	13.3	12.1	29.7	25.8	D	C
14	86.9	78.2	15.7	13.8	32.2	26.9	D	C

Note : 1 = Control, 2 = With 10 ppm antifoaming agent

Supercritical Fluid Extraction (SFE) of Cotton seed Oil

Supercritical Fluid Extraction (SFE) using carbon dioxide is a recent and popular technique for oil extraction due to its high extraction efficiency, short extracting time, lower refining requirement and no chemical residues or contaminants in the extracted oil. Therefore, trials were undertaken to extract oil from cottonseeds using this technique. For this purpose SPEED-SFE model of Applied Separations, USA, an equipment available at UICT, Mumbai was used. Attempts were made to optimise three parameters of SFE namely temperature, pressure and time of extraction to obtain good yield of oil with minimum gossypol content. Each of these parameters was varied at three levels, pressure at 350, 450 and 550 bar, temperature at 60 °C, 70°C and 80 °C and time of extraction at 1, 2 and 3 h. Flow rate of gas was maintained at 0.2 l/min, and particle size of cotton kernels also remained constant in all experiments. Extractions were carried with 10 g of dehulled and ground kernels per batch of extraction. The extracts were collected in about 50 ml n-hexane in a collection vial kept in an ice bath. The extracts were concentrated on a rotovac system (40-45 °C and 200 mm Hg for 10-15 min) to a volume of about 3-5 ml and further concentrated to remove the solvent completely by a gentle nitrogen stream. The yield of the oil was estimated gravimetrically.

Table 30 gives the data on the amount of oil extracted with increasing pressure and temperature. The efficiency of oil extraction besides pressure, temperature and contact time depends on the particle size and moisture content of the oil seeds. In the present study the maximum oil yield was 17.26 % (at 560 bar 80 °C, 2 h). This amount of oil was only about 43 % of the total oil in the cottonseeds (as estimated by soxhlet method). Operational limitations of the SFC equipment did not allow pressure to be built in the range of 15000 psi (1020 bar) for greater

TABLE 30 : EXPERIMENTAL PROGRAMME AND RESULTS OF SFE OF COTTONSEED OIL

SFE Run No.	Pressure (bar)	Temp. (°C)	Time (h.)	% of Total Oil extracted [a]	% Gossypol extracted in the oil [b]
1	350	60	2	2.15	0.007
2	350	70	1	2.25	0.008
3	350	70	3	2.76	0.008
4	350	80	2	2.97	0.009
5	450	60	1	2.99	0.011
6	450	60	3	5.27	0.012
7	450	70	2	7.05	0.012
8	450	70	2	7.23	0.012
9	450	70	2	7.68	0.012
10	450	80	1	8.17	0.013
11	450	80	3	10.95	0.014
12	550	60	2	11.63	0.016
13	550	70	1	15.60	0.019
14	550	70	3	31.91	0.019
15	550	80	2	43.16	0.022

a : mean of 2 individual determinations, values obtained with respect to total oil content as estimated by Soxhlet
b : % gossypol extracted in the oil was determined by estimating its content in the defatted cotton meal after extraction and subtracting the value thus obtained from the content of gossypol in the cotton meal prior to extraction (0.752 %)

oil recovery. The free gossypol present in the oil was quite less (0.022) than that is present in the solvent extracted oil (0.243) and well within the FDA specified limits (0.045 %) under all experiments. The colour of the oil was golden yellow as against dark brown in solvent extracted oil.

From this study it could be concluded that SFE technique using carbon dioxide is most suitable for extraction of oil. The extracted oil is of good quality and requires minimum refining due to presence of less gossypol. The yield of cottonseed oil can be improved at a pressure higher than 550 bar, in the temperature zone of 70-80°C and extraction time of 2-3 h. Further work needs to be done in an equipment having facility for applying higher pressure.

Enzymatic Extraction of Oil from Cottonseeds

Conventionally, oil from cottonseed meal is extracted by expeller or solvent methods or by a combination of both the methods. Attempts are being made to extract oil enzymatically from cottonseed. In enzymatic process, cottonseed meal treated with a combination of enzymes, is subjected to solvent extraction at room temperature and thereafter to centrifugation. Three

separate layers are obtained, top solvent layer containing oil, aqueous layer with soluble protein, carbohydrates, etc and bottom layer forming solid residue *i.e.* unhydrolysed protein. The oil from the solvent layer is separated out by distilling the solvent.

Earlier studies with cottonseed meal showed that 60% oil could be recovered by enzymatic method. However recently, when cottonseed kernel powder of mixed varieties was hydrolysed enzymatically, 50 % oil recovery was obtained. Therefore, kernel powder was treated with enzymes for 18 to 72 h and extracted oil was estimated. The results showed that 80% of the total oil could be recovered in 24 h of enzymatic treatment of the kernel powder (Table 31). The properties of enzymatically extracted and solvent extracted oil (Conventional method) were studied and found to be comparable (Table 32)

TABLE 31: EFFECT OF INCUBATION PERIOD ON OIL EXTRACTION FROM COTTONSEED KERNEL

S. No.	Incubation Period (h)	Oil Recovery (%)
1	18	67
2	24	80
3	48	71
4	72	67

The cottonseed kernel contained 42 % of crude protein. During enzymatic hydrolysis of cottonseed kernel powder, protein also gets hydrolysed by the enzyme papain. The aqueous layer, which contained hydrolysed protein when concentrated under vacuum, yields a good quality peptone in powder form. The Peptone finds applications in microbiological media as a nitrogen source for the growth of organisms and in fermentation industry and pharmaceuticals for the production of antibiotics. The peptone yield was found to be around 50%. The properties of peptone thus prepared when compared with other peptones were found acceptable (Table 33).

Thus, enzymatic extraction method apart from giving 80% oil recovery, also yields a value added product, viz., peptone simultaneously. Further work to enhance oil recovery is in progress.

CORE AREA V : DEVELOPMENT OF ENTREPRENEURSHIP FOR UTILISATION OF CIRCOT TECHNOLOGIES

Under this thrust area, items like training, commercial testing, transfer of technology, consultancy are dealt with. The details are as follows :

TABLE 32 : PROPERTIES OF ENZYMATICALLY EXTRACTED OIL FROM COTTONSEED KERNEL

S. No.	Treatment	Iodine value	Peroxide value	Saponification value	Unsaponifiable matter (%)
1	Enzymatically Extracted oil	104.6	2.805	191.4	1.85
2	Control	106.3	0.585	193.6	1.32

TABLE 33 : PROPERTIES OF PEPTONE

S. No.	Peptone (Source)	Total nitrogen (%)	Amino nitrogen (%)	Degree of hydrolysis (%)	Yield (%)
1	Cottonseed Kernel powder - Enz. Ext. for oil	8.3	1.9	22.1	50.0
2	Defatted cottonseed meal powder for peptone preparation	9.7	2.8	28.9	68.0
3	Cottonseed Meal (Sheffield)	8.7	2.9	33.3	–

Training :

CIRCOT Training Programme :

(a) Quality Evaluation of Textile Fibres for Breeders, Traders and Textile Industry Personnel

During the period under report sixty-six members belonging to Trade and Textile Industry were imparted training on fibre quality evaluation in two batches.

(b) Training in Ginning Technology for Fitters, Operators and Managers at GTC, Nagpur

At the Ginning Training Centre at Nagpur, regular training programmes are conducted for the benefit of gin operators and management staff on various aspects of ginning, material handling and other issues. Fifty-three members drawn from different factories benefited by this programme which was conducted in 13 batches.

(c) Training on Sophisticated Instruments:

Specialised Training Programme was conducted for twelve people on the use of HVI and AFIS.

(d) Specialised Training Course for Sponsored Personnel from RITES

A specialised training course was organised for eight sponsored trainees on Quality Assessment of Textiles.

In all, the revenue generated by training programmes during the year worked out to Rs. 2.9 lakhs.

Commercial Testing :

Details are given in Chapter 5.

Transfer of Technology and Consultancy :

Details are given in Chapter 3.

3

Technology Assessed and Transferred

The ultimate goal of any research is that its fruits have to find way in time to the user community at large. CIRCOT too apart from developing newer technologies in the field of post harvest technology for cotton and eco-friendly processing of textiles has been channelising its energies for transferring techno-economically viable technologies to appropriate user groups. Continuous monitoring of the already transferred technologies with a view to liaison with the end user and upgrading them based on requirements has been given top priority in CIRCOT technology transfer agenda. This chapter summarises briefly the technologies that has been developed during the reporting year, consultancies under taken by the Institute and attempts made for popularisation and commercial adoption of viable technologies and processes at user level.

Transfer of Technology

- M/s. Bajaj Steel Industries Ltd., Nagpur has been producing and marketing ginning machines, autofeeders, pre and post cleaners and seed cotton conveying systems with the technical supervision and active collaboration of CIRCOT. The adjacent table gives the sale figures for the current year.
- A MOU was signed between CIRCOT and M/s. Mac-Well Engineering Pvt. Ltd., Mumbai for the manufacture of attachment for fibre cleaner to Raspador extractor machine.
- Consultancy for Scanning Electron Microscopy study of pharmaceutical samples received from M/s. Ashco Analytical Pvt. Ltd., Mumbai.
- Scanning Electron Microscopy study on oral drugs received from M/s. Degusa India Pvt. Ltd., Mumbai.
- Thermal characterisation studies on drug encapsulation for M/s. Bharat Serum & Vaccines Ltd., Mumbai.
- Chromatographic characterisation of fungal extract and isolation of active ingredients for M/s. Net Business Solutions, Mumbai.
- Thermal characterisation of the drug complex under formulation for M/s. Bharat Serum and Vaccines Ltd., Mumbai.
- Colour gradation studies on raw cotton linters.

Sr. No.	Description of Goods	Sale	Export
1.	D.R. Gin	514	102
2.	Pre-cleaner	10	0
3.	Auto Feeder	417	102
4.	Raw Cotton Suction Unit	33	0
5.	Lint Suction System	15	1
6.	Lint Cleaner	6	0
7.	Baling Press	2	0

The total revenue generated during the year under this category was Rs. 5.4 lakhs.

Commercial Testing :

During the year under report 8043 samples of fibre, yarn and fabric were tested at the Headquarters, about 2500 samples of fibre at GTC Nagpur and 1600 samples of fibre at the other regional centres of CIRCOT. About 100 samples have been tested for assessment of ginning percentage. Total number of samples tested under this head stood at 12,243.

Newer Technologies/processes developed at the Laboratory need to be first popularised so that these are sought by industries or private entrepreneurs. This is possible only through conduct of awareness programmes, seminars or through *Kisan melas* and by participating in exhibitions.

- ✓ The Institute conducted *Awareness Programmes for Modernisation of Ginning Factories and Human Resource Development.* One such was conducted at Adilabad on November 30, 2002 in which about 60-70 Ginning factories in and around participated. The second and third were at Sirsa on January 30, 2003 and at Rajapalayam on March 22, 2003 respectively. All the three programmes received overwhel-ming response from ginners. A wealth of information about improving the quality of cotton produced, measures to be taken to reduce contamination in cotton both at farm level and in ginneries to make it competitive in global market were provided. Relevance of modernization of ginning and pressing factories and need to employ trained manpower in ginning units to improve the productivity and quality of ginned lint were emphasized in these awareness programmes.
- ✓ A *Calibration Cotton Users' Meet* was organised at Rajapalayam on March 22, 2003 for the benefit of southern textile industries utilizing CIRCOT calibration cotton. At this meet, technical presentation on the need to use Calibration cottons and also the methodology employed by CIRCOT to assign values for calibration standards were made. All the queries of users of this reference standard were answered during the interaction.
- ✓ A seminar on *Role of Cost Effective Ginning in Production of Clean Cotton Bales and Scientific Processing of Cotton Seed* was held at GTC, Nagpur on March 28, 2003. This seminar was attended by large number of ginners, traders and Government officials. Eleven papers were presented at the seminar.
- ✓ The *Third Review Committee Meeting* to assess the progress of ginning modernisation under ICDP –MM-II programme at GTC, Nagpur was held on March 29, 2003 under the chairmanship of Dr. Anwar Alam, DDG (Engg.), ICAR. The committee suggested that a proposal may be sent to the Ministry to revalidate the unspent balance of Rs. 28.9 lakhs for the year 2003-2004.
- ✓ A *Kisan Sanman Divas* was organised on 23rd December, 2002 at GTC, Nagpur, in which progressive farmers and ginners were felicitated.

4

Education and Training

Education

The recognition granted to CIRCOT by the Mumbai University as one of its centres for carrying out Post Graduate studies and Research continued during the year. Eleven students were being guided for M.Sc. and thirteen for Ph.D degrees. Ten Scientists have been recognised as guides for M.Sc. and Ph.D. in various disciplines such as Physical Chemistry, Organic Chemistry, Bio-Physics, Microbiology, Physics and Textile Technology.

A three Member Committee comprising Dr. Jayant P. Dighe, Dean, Faculty of Science, University of Mumbai (Convenor), Prof. Ganesh B. Pawar, Chairman, Board of Studies in Bio-chemistry, University of Mumbai and Dr. R.T. Sane, Principal, Ruia College, Mumbai were appointed by the University of Mumbai to make on-the-spot visit to CIRCOT to consider the application for permanent recognition of the Institute in subjects like, Microbiology, Organic Chemistry and Physical Chemistry for M.Sc. and in Physics, Bio-physics and Physical Chemistry for Ph.D. The team visited the Institute on February 6, 2003 and examined the facilities available. They also had discussions with HOD's in this regard. A formal letter granting permanent recognition to CIRCOT from Mumbai University is awaited.

Training

For meeting the requirements of the textile and ginning industries, the Institute conducts training programmes on appropriate technologies in ginning for the production of clean quality cotton and on the maintenance aspects of ginning and allied machines at the Ginning Training Centre at Nagpur. Tailor made training courses on Cotton Quality Evaluation, and on the operation of HVI and AFIS are conducted at the Headquarters. Both training courses comprise informative lectures and a series of practical demonstrations along with visits to the Textile / Ginning and Pressing industries to get practical knowledge on the respective subject. Course material in the form of a book, which contains details of test methods, statistical interpretations of results, etc. are provided to the trainees.

(a) Quality Evaluation of Textile Fibres for Breeders, Traders and Textile Industry Personnel

During the period under report sixty-six members from trade and textile industry were imparted training on fibre quality evaluation in two batches.

(b) Training in Ginning and Bale Press for Fitters, Operators and Managers at GTC, Nagpur

At the Ginning Training Centre at Nagpur, regular training programmes are conducted for the benefit of gin operators and management staff on various aspects of ginning and material handling. During the reporting period the training programme was conducted in 13 batches including 53 trainees drawn from different factories.

(c) Training on Sophisticated Instruments:

Specialised Training Programme was conducted for twelve participants drawn from the industry on the use of HVI and AFIS.

Specialised training Course for Sponsored Personnel from RITES

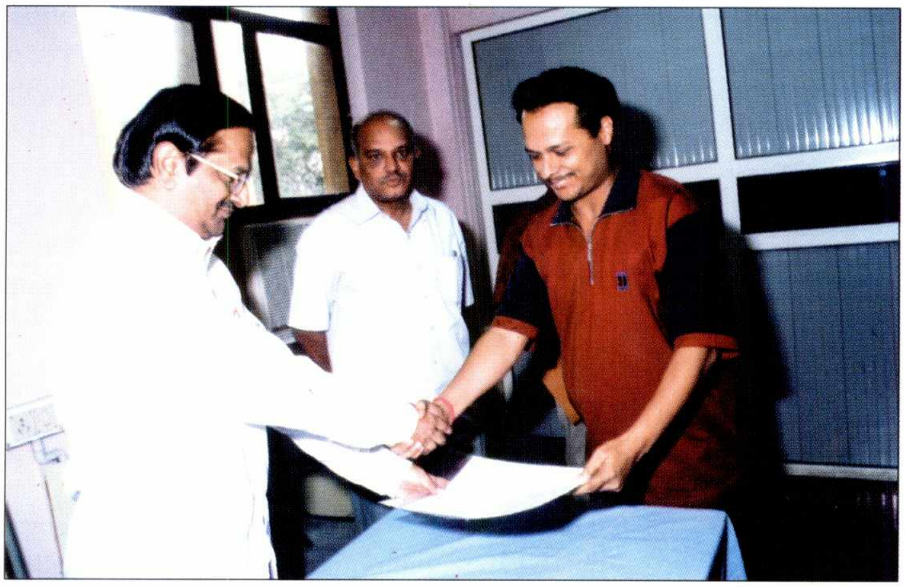
A specialized training course was organised for eight sponsored trainees on the use of sophisticated instruments and for certain tests in textiles. Generation of funds under this category was Rs. 40,000/-

In all, the revenue generated by training programmes during the year worked out to Rs. 2.9 lakhs.

(d) In-house Training :

A refresher course was conducted from November 25 to 30, 2002 to nine Technical Officers from various regional stations to acquaint them with the new developments in testing methods. There were eight lectures delivered on various topics related to fibre tests. They were also briefed about the diferent technologies developed by the Institute and available for commercial exploitation.

A visit to the Century Textiles and Industries was organised to apprise the participants about the modern high speed processing of cotton.



Dr. S. Sreenivasan, Director, CIRCOT presenting certificate to a trainee at the headquarters

Shri Mohan Dharia, Former Cabinet Minister and President, Vanrai Trust (wearing Gandhi cap) visiting CIRCOT stall at the Krishi 2002 – Agricultural Exhibition at Pune

EXTENSION / PUBLICITY

CIRCOT participated in various exhibitions organised by different agencies during the year.

- Krishi 2002, Agricultural Exhibition, at Pune from 10th Oct. to 13th Oct. 02 organised by Global Exhibitors, Pune.
- India International Trade Fair at Pragati Maidan, New Delhi organised by Indian Trade Promotion organization during November 14 to 27, 2002.
- Indian Agriculture Trade Fair – KISAN 2002, at Pune from 11th Dec. to 15th Dec. 02, organised by Deccan Exhibitors Pvt. Ltd., Pune.
- Krishi-Mela at Rahuri on December 21, 2002 organised by MPKV, Rahuri on the occasion of Late Prime Minister Shri Choudhari Charansingh Centenary Week celebration.
- *Kisan Sanman Divas* was organised by CIRCOT on 23rd December 2002 at GTC, Nagpur. Farmers and Ginners were felicitated on this occasion.

5

Linkages and Collaboration

CIRCOT has no agricultural farm attached to it at the headquarters and the Regional Quality Evaluation units located within the agricultural university premises serve as extension wings for the Institute. The staff members at these units collaborate with the scientists in agricultural universities by giving suggestions, by discussions, etc. on the technological aspects of cotton at different stages of crop development, post-harvest technology operations and serve as catalysts for promoting technologies developed by CIRCOT for gainful utilisation of cotton crop by-products and agro-wastes.

CIRCOT has regular interaction with CICR, Nagpur and has collaborative programmes with institutions in private and public sectors. The Institute also participates in various exhibitions, *kissan melas*, etc. conducted in different parts of the country.

The Director and Scientists of CIRCOT are members of various committees constituted by the Bureau of Indian Standards for cotton and textiles and they participate in various seminars, symposia, conferences, etc. in the country so that the knowledge and their expertise in various fields are passed on to the user groups. Director and many scientists are members of advisory panels of institutions like ATIRA, BTRA, SITRA, CCI, ICMF, 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 organised by other institutions. They also publish their research findings, apart from participating in exhibitions displaying technologies developed and improvement in processes brought about by the Institute.

Periodically publishing articles based on original research findings in national and international journals forms yet another aspect of the extension work.

CIRCOT conducts regular training courses both at the headquarters and at Ginning Training Centre (GTC), Nagpur. At the headquarters, Integrated Training Course on Cotton Quality Evaluation including elementary statistics applicable to textile testing is conducted for the sponsored personnel from the cotton trade and industry, while at the GTC, theoretical and practical training is imparted on different aspects of ginning and maintenance of ginning machines. A hostel that can accommodate about 20 trainees has also been provided at GTC, Nagpur.

Supply of reliable and accurate data on the quality of cotton fibre, yarn, fabric, consultancy services and publication of research results for the benefit of appropriate

user groups have been important extension activities of CIRCOT.

Technical Queries : Many queries from private organisations, semi government, state and central government departments were received and replies sent promptly. Information on various technologies and devices developed by CIRCOT, instruments designed, methods of test for cotton fibre, yarn and fabric, on quality levels of different cotton varieties, on by-products and agro-waste utilisation, etc. were supplied to interested end users on several occasions.

Commercial Testing : The Test House at CIRCOT had received fairly large number of samples of fibre, yarn, fabric and miscellaneous items for tests on payment basis from Textile Mills, Government and Semi-Government Organisations as well as Trade and Industry. Many types of fabric samples were received as paid tests from Mumbai Municipal Corporation, Nair Hospital, Directorate of Quality Assurance, RITES and Mumbai Port Trust. Several lots of yarn and fabric samples from the I.G. Office of Central Prisons, Pune, Aurangabad, Nasik and Nagpur were also referred to CIRCOT for tests. Fabric samples and uniforms from Zilla Parishads of Maharashtra were also received for testing under this category. Demand for testing Honey Dew Content, Wax Content, Colour Fastness to Light, Washing , etc., XRD, XRFS, SEM and Knittability had considerably increased during the current year.

The number of samples received for paid test during the period 2002-03 together with samples tested in the recent past is presented in Table 34.

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-two powder samples received from M/s. Ashco Analytical Services

TABLE 34 : TYPES OF PAID TESTS AND NUMBER OF SAMPLES TESTED DURING 2002-2003

Sr.No	Types of Tests	Average of Quinquennium 1994-95 to 1999-2000	2000-2001	2001-2002	2002-2003
1.	Fibre	3929	5392	10908	10670
2.	Spinning	149	47	44	71
3.	Yarn	212	205	157	253
4.	Fabric	816	958	903	533
5.	Ginning	223	30	57	1129
6.	Miscellaneous	381	179	665	426
7.	Trash Content	677	3694	162	161
	Total	6387	10505	12896	13243

Ltd., Mumbai and other clients for XRD Radial Scan.

2) Eleven samples of cotton received from M/s. Exon Laboratories and other parties for quantitative studies on honeydew using analytical methods.

3) Forty-five samples of polymers received from M/s. UICT, Mumbai and other clients for S.E.M. photographs and their analysis.

4) Two samples of cotton pulp received from M/s. Gelatine & Chemicals Ltd., Mumbai for measurement of mean length and other properties.

5) Four samples of solution received from M/s. Eco Lab, Mumbai for 280 nm UV Spectrum.

6) One polymer sample received from M/s. Shraddha Analytical Services, Mumbai for TGA Analysis.

7) Two pharmaceutical samples received from M/s. USV Ltd., Mumbai for Lyophilisation Test.

8) Nineteen rubber samples received from M/s. Indian Rubber Manufactures Association for weathering studies using Weather-O-Meter.

9) Two samples of liquid received from M/s. Siddharth Chemicals, Goa for tests on antifungal properties.

10) Four Coir samples received from M/s. King George Hospital for Compression Test.

11) Eighty-eight paper samples received from M/s. Repro Innovative Fulfillment Solution, Navi Mumbai and Brihan Mumbai Mahanagar Paliga, Mumbai for quality testing.

12) One reagent sample received from Dr. Shirish Sahasrabuddhe for AAS Test.

13) One reagent sample received from Dr. Shirish Sahasrabuddhe for HPLC Analysis.

14) One hundred and seventy-seven water samples for injection received from M/s. Ashco Analytical Services Ltd., Mumbai and other clients for TOC Analysis

15) One sample received from M/s. Pharmaceutical Coating Private Limited, Navi Mumbai for Tensile Test Characteristics on Instron

16) One sample of solvent received from M/s. Chemo Test Lab., Mumbai for the analysis of elements present in ppm levels.

17) One dyed fabric sample received from M/s. Texan Lab., Thane for Presence of Banned Amines and other Eco Tests.

18) Thirteen Iron Hoops and one Tie Wire sample received from M/s. Maharashtra State Co-op. Cotton Growers' Marketing Federation for tensile and other tests.

19) Eighteen fabric samples received from Dr. V. Subramaniam, A.C. College, Chennai & M/s. Associated Chemicals, Mumbai for Kawabata tests.

6

Publications

A. Annual Report

Annual Report of the Central Institute for Research on Cotton Technology for the year 2001-2002.

B. Research Publications (CIRCOT Publications - New Series)

649. Shanmugam, N., Vivekanandan, M.V. and Sreenivasan, S. – *Objective Cotton Grading : An Artificial Neural Network Approach* published in Indian Text. Journal, Vol. 112, No. 7, pp. 21-26, April 2002.

650. Sreenivasan, S. and Bhama Iyer, P. – *Some Issues Concerning Quality of Indian Cottons* published in Express Textiles Anniversary Issue, April 10, 2002.

651. Nath, J.M, Patil, P. G. and Shukla, S.K. – *Multipurpose Absorption Rate Meter* published in Electronics For You, Vol.34 (4), pp.46-49, 2002.

652. Balasubramanya, R.H., Shaikh, A.J., Bhatawdekar, S.P., Gurjar, R.M., Sirohi, S.K. and Sreenivasan, S. – *Utilisation of Cotton Plant By-produce for Value Added Products* published in AICOSCA Newsletter, pp. 1 – 16, June 2002.

653. Chattopadhyay, S.K., Ahmed, M. and Upadhyaye, D.L. – *Influence of Yarn Quality on Dimensions and Defects in Plain Knitted Cotton Fabrics – Some Observations* published in Colourage Special Supplement to June, pp. 21 – 25, 2002.

654. Doke, S.S., and Shanmugam, N. – *Artificial Intelligence and its Applications in Textiles* published in Asian Text. Journal, Vol. 11, No. 7, pp. 49-54, 2002.

655. Raje, C.R., Munshi, V.G. – *Low Stress Mechanical Properties of Wet Processed Weft Knitted Cotton Fabrics* published in Colourage Special Supplement to June, pp. 26 – 30, 2002.

656. Shanmugam, N., Vijayasingh, M. – *Implementing ISO 9000 in Knitted Garment Factory : Practical Guidelines* published in Colourage Special Supplement to June, pp. 31 – 34, 2002.

657. Bhama Iyer, P. – Assigning Value for a Standard Reference Material published in The Textile Industry & Trade Journal, Vol. 40, No. 9-10, Sept. – Oct., pp. 53-55, 2002.

658. Gangar, H.U. and Ahmed, M. – *The Art of Hand Knitting* published in Fashion

and Beyond, Oct. – Dec., pp. 54-56, 2002.

659. Ahmed, M., Chattopadhyay, S.K., Chaphekar, A.K., Gaikwad, R.S. – *Processing of Cotton-Ramie Blends on Short Staple Spinning System* published in Journal of the Textile Association, Vol. 63, No. 4, Nov. – Dec., pp. 155 – 159, 2002.

660. Hussain, G.F.S., Iyer, J.K., Singavi, B. and Iyer, K.R.K – *Estimation of Fibre Maturity from Micronaire Value* published in Indian Journal of Fibre and Textile Research, Vol. 27, December, pp. 335-341, 2002.

661. Venkatesh, H.R.L. and Bindu Venugopal – *Muslins, Calicos and other Choicest Fabrics of India* published in The Textile Industry and Trade Journal, Annual Number 2002/9, Vol. 40, No. 11-12, November – December 2002.

662. *Nachane, R.P., Hussain, G.F.S., Pai, S.D. and Mhadgut, D.V.* - Relation between the Cotton Yarn Price Index and Fibre Properties : Part III published in The Textile Industry and Trade Journal, Vol. 1-2, pp. 21-27, January – February, 2003.

663. Shanmugam, N., Vivekanandan, M.V., Vancheswaran, S. and Sreenivasan, S. – *Status of Trash Content in Indian Cotton* published in The Indian Textile Journal, Vol. 113, No. 5, pp. 25 – 29, February, 2003.

664. Nachane, R.P. and Hussain, G.F.S. – *Inverse Relaxation in Fabrics* published in Indian Journal of Fibre and Textile Research, Vol. 28, pp. 50-54, March, 2003.

C. Other Publications

1. CIRCOT leaflet No. 25 – Knitting Facility at CIRCOT for Research and Service to Industry

2. CIRCOT leaflet No. 26 – Spinning Tests at CIRCOT for Small Cotton Samples

3. CIRCOT leaflet No. 27 – Fabrics and Garments from Novel Blends: Cotton with Short Wool / Angora Rabbit Hair

4. CIRCOT leaflet No. 28 – Cotton Boll Hardness Tester

5. CIRCOT leaflet No. 29 – *Kapasachya Parhatipasun Particle Board – Lakdas eak Uttam Paryay (in Marathi)*

6. CIRCOT leaflet No. 30 – Variable Speed Double Roller Gin

7. CIRCOT leaflet No. 31 – *Kapas Ke Povddha ke Danthal se Particle Board – Lakadi Ka Uttam Vikalpa (in Hindi)*

8. CIRCOT leaflet No. 32 – Production of Compost from Ginnery Waste

9. Flame Retardant Finishing of Cotton Fabrics – A Status Report

10. Liliput Gin – Technical Bulletin and User Manual

11. HVI in Cotton Fibre Quality Evaluation – A CIRCOT Insight

12. High Volume Instrument – Implications of Testing Mode

13. National Agricultural Technology Project on Value Addition of Safflower Petals for Natural Dyes and Herbal Healthcare Products : Research Highlights 2002-03.

14. CIRCOT News, Vol. 4, No. 2.

15. CIRCOT Ginning Bulletin, Vol. 2, Issue 2 and Vol. 3, Issue 3.

16. Annual Cotton Quality Update 2002.

Books

Handbook of Test Methods for Cotton Fibres, Yarns and Fabrics Part I : Ginning Tests, Fibre Tests, Moisture Tests and Structural Studies. Ed. Dr. V. Sundaram, Dr. K.R. Krishna Iyer and Dr. S. Sreenivasan, CIRCOT 2002.

Summary of Papers

The following papers were published in the Summary of Papers brought out on the occasion of the **Seminar on Role of Cost Effective Ginning in Production of Clean Cotton Bale and Scientific Processing of Cottonseed** held at NBSS & LUP, Nagpur on March 28, 2003.

1. Sreenivasan, S. – *Research and Development Initiatives for Cost Effective Production of Clean Cotton*

2. Iyer, K.R.K. – *Modernisation of Ginning Industry through Technology Mission on Cotton*

3. Paralikar, K.M., Jadhav, S.B., Arude, V.G., Manoj Kumar, T.S., Selva Kumar, J. and Patil, P.G. – *Status of Ginning Industry in Maharashtra*

4. Nath, J.M., Paralikar, K.M. and Patil, P.G. – *An Application Software for Quality Cotton Update 'COTSOFT'*

5. Patil, P.G. – *Effect of Double Roller, Saw and Rotary Knife Ginning on the Quality of Cotton: A Review*

6. Shukla, S.K., Patil, P.G. and Paralikar, K.M. – *Energy Requirement for Various Systems in Modern Ginneries and its Conservation*

7. Balasubramanya, R.H., Shaikh, A.J., Subrahmanyam, Y. and Sreenivasan, S. – *Value Added Products from Ginnery Waste*

8. Sandeep Bajoria – *Importance of Scientific Processing of Cottonseed*

9. Bohra, R.D. – *Development of Delinting Machinery and Delinting Process*

10. Gayal, S.G., Shaikh, A.J. and Balasubramanya, R.H. – *Cottonseed Oil for Human Consumption*

11. Vakil, J.R. – *Genesis and Development of Cottonseed Oil, its Role and Significance as an Important Neutraeutical (s) in the Human Health*

D. Papers presented at Seminar/ Conferences, etc.

The following three papers were presented at the Technical Session IV of the

National Seminar on Future Prospects of Knitting and Knitwear organised by CIRCOT, Mumbai in Collaboration with Indian Fibre Society at CIRCOT, Mumbai on June 1 and 2, 2002.

1. Nachane, R.P., Ahmed, M. and Mathur, K. – *A New Method for Measuring Distortion in Cotton Knit.*

2. Ahmed, M., Chattopadhyay, S.K., Chaphekar, A.K. and Gaikwad, R.S. – *Characteristics of Ramie-cotton Blended Single Knit.*

3. Doke, S.S., Vijay Panchal and Ahmed, M. – *Comparative Study of Knitted Fabrics from Nylon-Cotton and Polyester-Cotton Core Spun Yarns.*

The following papers were presented in Meetings / Seminars

1. Sreenivasan, S. – *Fibre Quality Attributes of Bt Cotton : An Overview* presented at the National seminar on Bt Cotton Scenario with Special Reference to India held at Dharwad on May 23, 2002.

2. Sreenivasan, S. and Nachane, R.P. – *Understanding the Mechanical Properties of Raw Material as Relevant to Textiles and Clothing* in Compendium of Papers for Workshop on Textiles and Clothing Curriculum : Relevance to Garment Industry : NCUTE & SNDT Women's University, pp. 5, May 14, 2002.

3. Sreenivasan, S. – *Cotton and Textiles Empowerment through On-going Research and Future Plans* paper presented at the All India Cotton trade Associations' Conference, IMC held at Mumbai on July 27, 2002.

4. Sreenivasan, S. – *Processing and Value Addition in Ligno-Cellulosic Fibres for Textile and Non-textile end Uses : A CIRCOT Insight* presented at the National Seminar on Potentiality of Jute in Textile and Non-Textile Applications held at NIRJAFT on August 8, 2002.

5. Sreenivasan, S. – *Current Quality Scenario and Future Requirement of Cotton for Meeting Demand of Textile Industry* presented at the Parliamentary Standing Committee on Agriculture for Enhancing Production and Marketing of Cotton and Supply of Cotton Seeds to Farmers in Maharashtra on October 21, 2002.

6. Sreenivasan, S. - *Future Trends in Post-production, Handling, Processing and Value Addition to Cotton* paper presented at the Engineering Section of the Indian Science Congress held at Bangalore on January 6, 2003.

7. Sreenivasan, S. – *Technology of Ginning and Importance of Training* presented at the Seminar on Ginning, Technology Mission on Cotton held at Nagpur on January 11, 2003.

8. Sreenivasan, S. – *Research and Development Initiatives for Cost effective Production of Clean Cotton* presented at the Seminar on Role of

Cost Effective Ginning in Production of Clean Cotton Bale and Scientific Processing of Cottonseed held at NBSS & LUP, Nagpur on March 28, 2003.

9. Paralikar, K.M. and Sreenivasan, S. – *CIRCOT's Appropriate R&D Interventions for Energy Efficient High Productive Ginning of Cotton* presented at the World Cotton Research 3 Conference held at Cape Town, South Africa on March 9 – 13, 2003, pp. 5.22.5.

10. Khadi, B.M., Deshpande, L.A. and Sreenivasan, S. – *Hirsutisation of Cultivated Diploid Cotton* presented at the World Cotton Research 3 Conference held at Cape Town, South Africa on March 9 – 13, 2003, pp. 5.29.6.

11. Sreenivasan, S. – *Cotton Empowerment through Research and Technology Generation* presented at the World Cotton Research 3 Conference held at Cape Town, South Africa on March 9 – 13, 2003, pp. 5.29.6.

The following papers were published in the Souvenir brought out on the occasion of the **National Seminar on Future Prospects of Knitting and Knitwear**

1. Ahmed, M. – *A Simple Method for Calculating Design Area on Pattern Wheel Circular Knitting Machine.*

2. Chattopadhyay, S.K., Chaphekar, A.A., Upadhyay, D.L., Ahmed, M. and Gupta N.P. – *Angora Rabbit Wool and Cotton Blended Knit.*

3. Raje, C.R. – *Influence of Chemical Processing on Cotton Knits.*

4. Sudha, T. – *Fibre and Yarn Requirements for Quality Knitting.*

5. Ahmed, M., Chattopadhyay, S.K. and Srinathan, B. – *Effect of Combing on Cotton Single Knit.*

6. Anjali, A., Bharati, P., and Ahmed, M. – *Effect of Single, Double (Parallel) and Ply Yarns on the Single Jersey Plain Knitting Fabric.*

7. Ahmed, M. and Gangar, H.U. – *Evolution of Knitting.*

8. Gangar, H.U. and Ahmed, M. – *Hand Knitting.*

9. Ahmed, M. – *Knitted Jacquard.*

10. Gangar, H.U. and Ahmed, M. – *Knitting Action by Hand Knitting Pins.*

11. Ahmed, M. and Gangar, H.U. – *Knitting Techniques.*

12. Shanmugam, N. and Doke, S.S. – *Tactile Comfort Properties of Fine Count Rotor Yarn Single Jersey Knitted Fabrics.*

13. Shelza, B., Bharati, P. and Ahmed, M. – *Jute and Jute Blended Knits.*

14. Saxena, S. – *Use of Natural Dyes for Dyeing of Cotton Knits.*

15. Venkatesh, H.R.L. – *Knitwear Exports.*

16. Gurjar, R.M. and Balasubramanya, R.H. – CIRCOT's Low Cost Technology

for Degumming Ramie : Its Blending with Cotton and Polyester for Quality Knitting.

17. Kannan, S., Doke, S.S. and Nachane, R.P. – *Polyethylene Terephthalate (PRT)/ Polyester Staple Fibre (PSF) and its Relation to Materials Science*

18. Ahmed, M. – *Basis of Knitting* presented in the workshop on Knitting and fashion Illustration organised at Dr. Bhanuben Mahendra Nanavati College of Home Science, Matunga, Mumbai on June 3, 2002.

19. Vivekanandan, M.V., Sekar, S., Nachane, R.P., Sreenivasan, S. – *XRFS Analysis of Fibrous Materials* presented at the Workshop on Application of XRFS in Non-Ferrous Materials & Related Industries held at Hyderabad from November 27-29, 2002.

20. Sreenivasan, S. – *Future Trends in Post-production, Handling, Processing and Value Addition to Cotton* presented at the Sectional Symposium 2 – Engineering Intervention to Make India Competitive in the WTO Regime organised by the Indian Science Congress Association (ISCA) at Bangalore University from January 3 - 7, 2003.

21. Shaikh, A.J., Varadarajan, P.V. – *Eco-friendly Packing Material from Cotton Plant Stalks for Fruits* presented at the 6th Agricultural Science Congress organised by the National Academy of Agricultural Sciences at Bhopal from February 13 – 15, 2003.

22. Nachane, R.P. – *Processing of Banana Pseudostem for Exraction of Fibres* presented at the 6th Agricultural Science Congress organised by the National Academy of Agricultural Sciences at Bhopal from February 13 – 15, 2003.

23. Ahmed, M. – *Knitting – A New Avenue for Home Scientist*, presented at the Seminar on Vocational Opportunities in Home Science on February 24 and 25, 2003 at the Govt. College of Home Science and Science for Women, Jabalpur (publishd in the Souvenir pp. 3 – 4)

24. Balasubramanya, R.H. – *Biological Treatment of Crop Residues for Preparing Value Added Products* at the All India Seminar on Environmental Biotechnology in Waste Management held at Mumbai on February 14 and 15, 2003.

25. Gurjar, R.M., Balasubramanya, R.H., Shaikh, A.J.– *Cotton Stalk – A Potential Raw Material for Agrobased Panel Industry* presented at the 2nd International Conference on Development and Growth of Non Wood Agrobased and Allied Industry by All India Agrobased Industries Association and Society for Technology Management held at New Delhi on March 14 and 15, 2003.

The following papers were presented at the **7th International and 58th All India**

Textile Conference organised by The Textile Association (India) at Nehru Centre, Mumbai on December 14 and 15, 2002.

1. Ahmed, M., Chattopadhyay, S.K., Gaikwad, R.S. and Upadhye, D.L. – *New Dimensions of Ramie in Blends with Cotton.*

2. Chattopadhyay, S.K., Upadhye, D.L., Jadhav, R.K. and Subramaniam. R.M. – *CIRCOT-TRYTEX Miniature Spinning System – A New Development.*

3. Chattopadhyay, S.K., Bhaskar, P., Ahmed. M., Upadhye, D.L., Chaphekar, A.K. and Gupta, N.P. – *Novel and Value Added Fabrics from Angora Rabbit Hair and Cotton Blend.*

4. Ahmed. M., Chattopadhyay, S.K. (CIRCOT), Nitin Phatak (WRA) and Dey, S.K. (NIRJAFT) – *Better Utilisation of Indian Ramie* (in Hindi)

Poster Sessions

Varadarajan, P.V., Balasubramanya, R.H., Shaikh, A.J., Gayal, S.G. and Pallavi D. Ranay – *Value Added Products from Safflower Petals – An Agrowaste* poster paper presented at the 6th Agricultural Science Congress organised by the National Academy of Agricultural Sciences at Bhopal from February 13 – 15, 2003.

The following five papers were presented at the **90th Indian Science Congress** held at Bangalore from January 3-7, 2003.

1. Bhatawadekar, S.P., Gayal, S.G. and Balasubramanya, R.H. – *Protein Hydrolysates (Peptones) from Cotonseed Meal.*

2. Gurjar, R.M., Shaikh, A.J., Sawakhande, K.H. and Balasubramanya, R.H. – *Hard Boards from Cotton Stalks – Commercial Trials.*

3. Varadarajan, P.V., Balasubramanya, R.H., Shaikh, A.J., Gayal, S.G. and Pallavi D. Ranay – *Utilisation of Safflower Petals for Natural Dye and Herbal Health Care Products.*

4. Gayal, S.G., Bhatawadekar, S.P. – *Lipases for Textile Applications.*

5. Paralikar, K.M., Prabhudesai, R.S. – *Absorbent Cotton from Blow Room Waste.*

7

List of On-Going Projects During 2002-2003

CORE AREA I : IMPROVEMENT IN GINNING OF COTTON

1. Ergonomic Evaluation of Ginning Factories
2. Power Consumption Patterns in Double Roller Gin
3. Development of a Package for Effective Management of a Modern Ginning Factory
4. Design and Development of a Seed Cotton Heap Maker
5. Design and Development of an Automatic Roller Grooving Machine
6. Effect of Cylinder Type and Saw Band Type Pre-cleaners on the Quality of Lint

CORE AREA II : IMPROVEMENT AND QUALITY EVALUATION OF FIBRE, YARN AND FABRIC

1. Evaluation of the Quality of Cotton Samples received from Research Stations under the All India Co-ordinated Cotton Improvement Project and other Research Projects Financed by ICAR, State Governments, etc.
2. Evaluation of Quality of Major Trade Varieties Grown in Different Parts of the Country
3. Evaluation of Quality of Standard Varieties of Indian cotton
4. Assessment of Performance, Testing and Refinement of CIRCOT Miniature Spinning System
5. Developing Artificial Neural Network Models for Cotton Ring Yarn Quality Engineering
6. Effect of Moisture Stress on the Yield and Quality of Cotton with Special Reference to Short Fibre Content and Maturity
7. Frictional Characteristics of Chemically Modified Cotton Fabrics
8. Relationship between Lea-strength and Parallelised Yarn Bundle Strength on Commercial Cotton Yarns
9. Norms for Uster Evenness (U%) and Imperfections for Yarns Spun at Central Institute for Research on Cotton Technology (CIRCOT)
10. Study of Variation in the Quality of Lint according to the Position of Seed in the Locule

CORE AREA III : FINISHING AND DYEING OF COTTON WITH NATURAL AND ENVIRONMENT FRIENDLY AGENTS

1. Effect of Mordants and Mordanting Methods on Cotton Dyed with Natural Dyes
2. Monitoring of Banned Pesticide Residues in Cotton

3. Dyeing of Cotton: Polyester Blended Fabrics with Natural Dyes
4. Water Repellency of Cotton Fabric by Plasma Treatment

CORE AREA IV : UTILISATION OF COTTON PLANT RESIDUES FOR PRODUCTION OF VALUE ADDED PRODUCTS

1. Prevention of Aflatoxin Producing Microorganisms in Cottonseeds during Storage
2. Scale-up Studies on the Preparation of Peptone from Cottonseed Meal
3. Preparation of Value Added Products from Wastes Collected from Ginneries
4. Commercial Trials on Preparation of Hardboards from Cotton Stalks

NATP / REVOLVING / A.P. CESS FUNDED PROJECTS

1. Adoption and Refinement of Cotton Picker and Cleaning System (NATP project)
2. Value Addition of Safflower Petals for Natural Dyes and Herbal Health Care Products (NATP project)
3. Preparation and Marketing of CIRCOT Calibration Cotton (ICAR Revolving Fund project)
4. Ginning Out-turn of Roller Gins in Relation to Different Ratios for Cotton Feeding Time to Ginning Time (AP Cess Fund)
5. Processing of Cotton-Ramie Blends on Short Staple Spinning System (AP Cess Fund)
6. Development of Cotton-Wool Blended Yarns employing Short Staple Spinning System for the Production of Fabrics suitable for Various Applications (AP Cess Fund)
7. Quantitative Analysis of Toxic Inorganic Elements and Gram negative Bacteria in Soil, Cotton Plant Materials, Lint and Processing Dust (AP Cess Fund)

INTER INSTITUTIONAL PROJECT

1. Physico-chemical and Structural Characteristics of Banana Pseudo-stem Fibre (CIRCOT with NRCB, Trichy : AP Cess Fund)
2. Evaluation of Germplasm Accessions on the Basis of Seed Coat Neps Content (TNAU, Coimbatore with CIRCOT)
3. Preparation of Value Added Products from Arecanut and its Husk (CIRCOT and CPCRI, Regional Station, Vittal, Karnataka)

PROJECTS UNDER TECHNOLOGY MISSION ON COTTON

1. Identification and Development of Promising Genotypes from Introgressed Materials
2. Identification of Suitable Sources of Diploid Cotton with High Yield and Better Fibre Quality Traits in Diploid Cotton
3. Improvement of Medium Long and Extra Long Staple Fibre Suitable for High Speed Spinning
4. Quantitative and Qualitative Improvement of Cottonseed Oil
5. Utilisation of Cotton Plant By-produce for Value Added Products
6. Implementation of ICDP under MM II of Technology Mission of Cotton for Improvement of Ginning and Pressing and Extension Activities

8

SRC, RAC, Management Committee and QRT

Staff Research Council

The **One hundred and Second Meeting** of the SRC was held during May 6, 7 and 8, 2002 in which discussions were held on the progress of research work during the period 2001-2002 and a Programme of Work for 2002-2003 was finalised. Dr. S Sreenivasan, Director was in the Chair and all Heads of Divisions, Scientists and Technical Officers (T-6 and above) attended all the sessions. Dr. V. Sundaram, Dr. K.R. Krishna Iyer and Dr. G.P. Nair also attended the meeting as subject matter specialists. Fourteen new proposals were approved with certain modifications or suggestions. Director requested the scientists to keep in mind the recommendations of the QRT before planning future research work. The following observations were made.

- In respect of training of personnel on sophisticated instruments a linkage with the manufacturers must be established.
- A training programme for students may be devised.
- A target of 90 personnel to be trained during 2002-03 in training programmes on Quality Evaluation and Training on HVI and AFIS while a target of 10 was fixed for training on sophisticated instruments.
- A target of 15000 samples to be tested both at the Headquarters and Regional Stations put together in the commercial testing category.
- A potential customer list may be prepared and efforts may be made to keep in contact with them.
- A survey of the performance of the Variable Speed Double Roller Gins installed may be made and data on the efficiency of the machine be generated for future modifications.

The **Half-yearly SRC Meeting** to discuss the progress made in research activities during the period April to September 2002 was held during October 18, 19 and 28, 2002. In his opening remarks, the Director touched upon the following points.

- The commitment made by CIRCOT in various areas of research activity in the SFC document for X Plan.
- CIRCOT's emphasis on the availability and transportation of cleaned cotton stalks throughout the year for the ICAC-CFC funded project to the International Experts Group that visited the Institute.
- Importance of extension activities *on par* with that of research work.

The following three new project proposals in Core Area I and one new

proposal in Core Area II have been approved after incorporating the suggestions/ recommendations of the SRC.

Core Area I

1. Modification of DR Gin with Rotary Knife.
2. A Comparative Evaluation of Saw Ginning and Roller Ginning for all Length Classes of Representative Indian Cottons.
3. Studies on Wear Characteristics of Leather Rollers and Knifes used in Cotton Ginning Industry.

Core Area II

Development of a Low Cost Sliver Making Machine for Value Addition to Cotton at rural Level.

Research Advisory Committee

The Eighth meeting of the Research Advisory Committee (RAC) was held July 11 and 12, 2002. Dr. P.R. Roy, Chairman, RAC and Group Advisor, Aravind Mills, Ahmedabad presided over the meeting. There were discussions on the on-going research projects, as well as new research project proposals for 2002- 2003 keeping the recommendations / suggestions of the SRC in view. The relevance of each of the project with respect to the mandate of the Institute and QRT's observations were considered. On the second day a talk on **Role of R&D in Textile Industry** by Dr. P.R. Roy was organised. All the RAC members, scientists and Technical Personnel attended the lecture. Two leaflets entitled **Fabrics and Garments from Novel Blends : Cotton with Short Wool/ Angora Rabbit Hair** and **Cotton Boll Hardness Tester** were released by Dr. P.R. Roy and Dr. N.S.L. Srivastava respectively. The on-going research and allied activities were then presented by HODs. Major recommendations made were as follows :

1. Imported cottons are to be studied in detail for processing and related aspects and a publication to be brought out.
2. HVI mode of testing should be popularized.
3. Always consider the type of products and end uses before deciding the type of cottons needed.
4. Interaction with industry may be strengthened through frequent meetings, collaborative efforts, etc.
5. Workable relationships may be established among fibre quality, yarn quality, weavability and knittability.
6. Ensure new varieties of cotton released satisfy requirements of low imperfections / faults in yarn.
7. Keep track on losses to farmers and industry due to deterioration in quality of old varieties.
8. CIRCOT should try to dispel the confusion regarding strength (as tested by HVI mode and ICC mode) of foreign cottons vis-à-vis that of Indian cottons.
9. Evaluation work of new varieties should be taken up to fabric finishing from the present fibre/yarn level. To start with, the recently released 3 Bt cotton hybrids may be taken up for finishing trials.
10. Basic studies on friction between yarn

and metals may be taken up as friction has profound influence on knittability of yarns.

11. In most foreign countries, cotton is sold by "Type" with assured quality, while in India, marketing of cotton is done by varietal names and as there is large number of ginning and pressing factories existing here, indicating quality data on each bale is arduous. Therefore, CIRCOT may take up some Pilot Studies in a few markets to generate information on these aspects.

12. Further studies may be done on hairiness of yarn, as the same is important while going for high speed spinning, winding and weaving.

13. In spite of certain limitations, diversifying use of cotton for technical textiles may be examined as the country has and is likely to continue to have a large stock of unsold cotton.

14. While developing special blends like cotton – ramie, Avivastra wool - cotton, Angora Rabbit hair – cotton, etc. help of NIFT may be sought to develop speciality garments. However, the availability of some such products need to be estimated for a somewhat larger scale commercialization.

15. Studies may be initiated for developing or identifying cottons, which can be spun in the count range 50s to 80s and suitability of Indian cottons for compact spinning.

16. Basic research may be initiated on textile effluents from processing houses.

17. In all pilot plant studies, involve likely user of the technology.

18. Work on radiation processing of absorbent and super-absorbent finished products may be taken up.

19. CIRCOT has done considerable work on seed coat fragments and stickiness of cotton – the impact of these studies may be examined.

20. GTC should take up studies on Saw ginning Vs Roller ginning both from technical and economic point of view.

21. GTC should start consultancy to ginning units and preparation of project reports for modernization with TMC assistance.

22. GTC facilities may be extended for commercial ginning to interested ginners.

23. Work may be initiated on Saw gins and presses and for reducing power consumption of delinting units.

24. A survey should be conducted on the state of contamination of Indian cottons to substantiate or counter the ITMF criticism about Indian cottons.

25. For humidification at ginning, a system may be developed.

26. Studies should be undertaken exclusively on the optimum and profitable utilization of *desi* cottons.

27. The application of recent Nano-technology may be considered through initiating fresh research in the Indian context.

28. CIRCOT scientists should participate

in a few important International Conferences like the Bremen Conference.

29. CIRCOT should have regular and sustained interaction/collaboration with reputed cotton Institutes/Organizations in other countries.

30. CIRCOT may develop some Video for audio-visual presentation of new technology developed to the entrepreneurs and proper methods of picking, storage, ginning, etc. for farmers and gin operators.

31. CIRCOT may prepare a long-term perspective plan to generate rural employment through cotton products.

32. The Council should look into the depleting scientific manpower at CIRCOT and take corrective measures urgently.

RAC approved the following new projects under Core Areas I to V :

CORE AREA I : IMPROVEMENT IN GINNING OF COTTON

1. Design and Development of a Seed Cotton Heap Maker
2. Design and Development of an Automatic Roller Grooving Machine
3. Effect of Cylinder Type and Saw Band Type Pre-cleaners on the Quality of Lint

CORE AREA II : IMPROVEMENT AND QUALITY EVALUATION OF FIBRE, YARN AND FABRIC

1. Study of Variation in the Quality of Lint according to the Position of Seed in the Locule
2. Relationship between Lea-strength and Parallelised Yarn Bundle Strength on Commercial Cotton Yarns
3. Norms for Uster Evenness (U%) and Imperfections for Yarns Spun at Central Institute for Research on Cotton Technology (CIRCOT)
4. Frictional Characteristics of Chemically Modified Cotton Fabrics

CORE AREA III : FINISHING AND DYEING OF COTTON WITH NATURAL AND ENVIRONMENT FRIENDLY AGENTS

1. Dyeing of Cotton: Polyester Blended Fabrics with Natural Dyes
2. Water Repellency of Cotton Fabric by Plasma Treatment

CORE AREA IV : UTILISATION OF COTTON PLANT RESIDUES FOR PRODUCTION OF VALUE ADDED PRODUCTS

1. Preparation of Value Added Products from Wastes Collected from Ginneries
2. Commercial Trials on Preparation of Hardboards from Cotton Stalks
3. Scale-up trials on the CIRCOT's Biopulping Technology at Vamshadhara Paper Mills, Srikakulam, A.P.
4. Prevention of Aflatoxin Producing Microorganisms in Cottonseeds during Storage
5. Scale-up Studies on the Preparation of Peptone from Cottonseed Meal

Management Committee Meeting

The Fifty-fifth and Fifty-sixth Meetings

of the Management Committee were held on October 10, 2002 and February 22, 2003 respectively. Regular items such as confirmation of the minutes of the previous meeting, action taken on the recommendations of the committee, progress of works, action taken on the recommendations of the Institute Joint Council and Grievance Committee formed the topics for discussion in both the meetings. Discussions on the ongoing research projects and research highlights also figured prominently in the deliberations.

Redeployment of surplus supporting staff attached to Sirsa unit either to CIPHET, Ludhiana or to CIRCOT, Mumbai, Allotment of land by TNAU for Coimbatore Regional Unit of CIRCOT and its application for 50% sharing of HVI paid test fees were discussed. Dr. N.S.L. Srivastava made the following important suggestions at the 55th meeting of IMC:

- Collaborative research activities should be taken up with organised textile mills, industries, etc.
- CIRCOT should come forward with suitable proposals for foreign collaboration to train scientists and other experts in its various areas of activity. Institute should come out with a list of countries / organizations most suitable for undertaking such collaborative work and brief ICAR about the same.

At the 56th meeting, Dr. Pitam Chandra, ADG (PE), ICAR made the following observations at the end.

- Scientists should contribute technical papers on the technologies developed for publication in the Journal of Agricultural Engineering.
- In the context of changing global scenario, it would be worthwhile to study the quality parameters of imported cottons and develop protocols so that it would be possible to check the import of inferior cotton and thereby protect Indian cottons and farmers.
- Scientists should focus attention on biocomposites, which is an emerging area of research.
- Efforts are to be made on testing clothing fabrics to determine the comfort properties of these fabrics after various treatments.

9

Participation of Scientists/Technical Personnel in Conferences, Meetings, Workshops, Symposia, etc.

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

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
1.	One day Seminar on Agriculture and Growth Opportunities	Mumbai	03-04-2002	Dr. S. Sreenivasan
2.	19th Meeting of the Empowered Committee Constituted by Ministry of Textiles for Creation of Laboratory Facilities for Quality Assessment in Textiles	Mumbai	13-04-2002	Dr. S. Sreenivasan
3.	2nd National Seminar *cum* Workshop on Technology Upgradation in Vegetable Oil Industry	Mumbai	20-04-2002	Dr. (Smt.) Sudha Tiwari
4.	2nd Review Meeting of the Panel constituted by Ministry of Agriculture under ICDP-MM II of TMC	Nagpur	27-04-2002	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. K.M. Paralikar Dr. A.J. Shaikh Shri P.G. Patil
5.	Seminar on Indian Garment Industry in Global Arena	Mumbai	27-04-2002	Dr. S.K. Chattopadhyay Shri N. Shanmugam
6.	NABL Accreditation Review Meeting	Mumbai	02-05-2002 & 03-05-2002	Dr. S. Sreenivasan Dr. (Smt.) P. Bhama Iyer Dr. P.V. Varadarajan
7.	National Seminar on Integrated Cotton Cultivation	Hyderabad	04-05-2002	Dr. S. Sreenivasan
8.	Review of Progress of the NATP Project on Value Addition to Safflower for Natural Dyes and Healthcare Products by CRIDA Team	Mumbai	10-05-2002	Dr. S. Sreenivasan Dr. P.V. Varadarajan
9.	Workshop on Education in Textiles & Clothing Relevance to Garment Industry	Mumbai	14-05-2002	Dr. S. Sreenivasan Dr. R.P. Nachane
10.	212th Meeting of Board of Directors of the Cotton Corporation of India Ltd.	Mumbai	20-05-2002	Dr. S. Sreenivasan

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
11.	National Seminar on Bt Cotton Scenario with Special Reference to India	Dharwad	23-05-2002	Dr. S. Sreenivasan Dr. (Smt.) P. Bhama Iyer
12.	Four Days Workshop on Exploring Social Science Information in Digital Environment	Mumbai	27-05-2002	Smt. M.P. Kamble
13.	Annual Workshop of MMF-I of MM I of TMC on Utilisation of Cotton By-produce for Value Added Products	Mumbai	29-05-2002	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. (Smt.) P. Bhama Iyer
14.	Technical Appraisal Team Meeting; TMC, MM III & IV	Mumbai	18-06-2002	Dr. S. Sreenivasan
15.	National Meeting on Integrated Cotton Cultivation organised by Ministry of Textiles, TMC, MM III & IV	Mumbai	24-06-2002	Dr. S. Sreenivasan
16.	Implementation Committee Meeting; TMC MM III & IV	Mumbai	25-06-2002	Dr. S. Sreenivasan
17.	Cotton Advisory Board Meeting	Mumbai	25-06-2002	Dr. S. Sreenivasan
18.	Post Harvest Technology Panel Meeting	New Delhi	27-06-2002 & 28-06-2002	Dr. S. Sreenivasan
19.	ICDP-MM II Review Meeting	Mumbai	04-07-2002	Dr. S. Sreenivasan
20.	All India Cotton Trade Associations' Meeting	Mumbai	27-07-2002	Dr. S. Sreenivasan
21.	ICMF-CDRA Standing Committee Meeting on Cotton	Mumbai	27-07-2002	Dr. S. Sreenivasan
22.	Training Programme under Integrated Cotton Cultivation	Madhya Pradesh	30-07-2002	Dr. S. Sreenivasan
23.	Standing Committee Meeting; MM I, TMC	Nagpur	31-07-2002	Dr. S. Sreenivasan
24.	Technical Advisory Team Meeting; MM III &IV TMC	Mumbai	05-08-2002	Dr. S. Sreenivasan
25.	National Seminar on Potentiality of Jute in Textile and Non-Textile Applications	Kolkatta	08-08-2002	Dr. S. Sreenivasan Dr. S.K. Chattopadhyay
26.	1st Meeting of the Technical Team Constituted for Cost Benefit Analysis of Modernisation of Textile Testing Facilities by the Textile Commissioner, Govt. of India	Mumbai	13-08-2002	Dr. S. Sreenivasan

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
27.	Implementation Committee Meeting,;MM III & IV, TMC	Mumbai	16-08-2002	Dr. S. Sreenivasan
28.	Two Days Seminar on HPLC – Basic Theory, Instrumentation and Application	Mumbai	23-08-2002 & 24-08-2002	Smt. N. D. Nachane
29.	Workshop on Geosynthetics	Mumbai	23- 08-2002 & 24- 08-2002	Dr. S.K. Chattopadhyay
30.	2nd Meeting of the Technical Team Constituted for Cost Benefit Analysis of Modernisation of Textile Testing Facilities	Mumbai	17- 09-2002	Dr. S. Sreenivasan
31.	Annual General Body Meeting of All India Cotton Seed Crushers' Association	Mumbai	19- 09-2002	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. A.J. Shaikh
32.	Xth Plan Discussion Meeting of Engineering Panel	New Delhi	28- 09-2002	Dr. S. Sreenivasan
33.	Annual General Body Meeting, Indian Cotton Mills Federation	Mumbai	30- 09-2002	Dr. S. Sreenivasan
34.	Standing Committee Meeting; MM III & IV, TMC	New Delhi	01- 10-2002	Dr. S. Sreenivasan
35.	Technical Appraisal Team Meeting; MM III & IV TMC	Mumbai	09- 10-2002	Dr. S. Sreenivasan
36.	Review of Progress of NATP Project on Safflower Utilisation for Natural Dyes and Healthcare Products	Mumbai	16- 10-2002	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. P.V. Varadarajan Dr. A.J. Shaikh Dr. S.G. Gayal
37.	Parliamentary Standing Committee Meeting on Agriculture for Enhancing Production and Marketing of Cotton and Supply of Cotton Seeds to Farmers in Maharashtra	Mumbai	21- 10-2002	Dr. S. Sreenivasan
38.	Implementation Committee Meeting; MM III & IV, TMC	Mumbai	22- 10-2002	Dr. S. Sreenivasan
39.	ICAR Group Meeting on Diversification of Coir for Value Added Products	Kerala	07- 11-2002 & 08- 11-2002	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. G.F.S. Hussain Dr. S.K. Chattopadhyay

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
40.	Conference on New Age Technology	Mumbai	14- 11-2002	Dr. S.G. Gayal
41.	Meeting with H.E. Dr. Sharali, Nirmatov, Deputy Minister, Ministry of Agriculture and Water Resources and Director General, Uzbek Scientific Centre of Agricultural Research, Uzbekistan	Mumbai	16-11-2002	Dr. S. Sreenivasan
42.	Meeting with Ms. Ann Shankar, Resource Person, UNDP and Punjab Dhuri Weavers	Mumbai	23-11-2002	Dr. S. Sreenivasan Dr. P.V. Varadarajan Dr.(Smt.) Sujatha Saxena
43.	3rd Meeting of the Expert Committee Constituted for Cost-Benefit Analysis of Upgradation of Textile Testing Facilities	Mumbai	27-11-2002	Dr. S. Sreenivasan
44.	Application of XRFS in Non-Ferrous Materials & Related Industries	Hyderabad	27- 11-2002 to 29- 11-2002	Dr. R.P. Nachane Shri S. Sekar Shri M.V. Vivekanandan
45.	Cotton Advisory Board Meeting	Mumbai	29-11-2002	Dr. S. Sreenivasan
46.	Awareness Programme on Ginning Modernisation and Human Resource Development under the Technology Mission of Cotton	Adilabad	30- 11-2002	Dr. S. Sreenivasan Dr. K.M. Paralikar Shri P.G. Patil Dr. T.S. Manojkumar Shri V.G. Arude
47.	Board of Directors Meeting, The Cotton Corporation of India Ltd.	Mumbai	05-12-2002	Dr. S. Sreenivasan
48.	Meeting with Ms. Sarita Bali, Director, Economic Relations, Ministry of External Affairs, Govt. of India	Mumbai	11-12-2002	Dr. S. Sreenivasan Dr. K.M. Paralikar
49.	7th International & 58th All India Textile Conference	Mumbai	14- 12-2002 & 15- 12-2002	Dr. R.H. Balasubramanya Dr. G.F.S. Hussain Shri Muntazir Ahmed Dr. S.G. Gayal Shri R.M. Gurjar Dr. R.P. Nachane Dr. (Kum.) C.R. Raje Dr. A.J. Shaikh Dr. P.V. Varadarajan Dr. S.K. Chattopadhyay Dr. Smt. Sujatha Saxena Shri D.V. Mhadgut Shri N. Shanmugam Shri K.V. Ananthakrishnan

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
				Shri S. Chandrasekar Shri H.R. Laxmivenketesh Smt. N.D. Nachane Dr. (Smt.) S.D. Pai Shri G. Viswanathan
50.	Technical Appraisal Team Meeting; MM III & MM IV; TMC	Mumbai	16-12-2002	Dr. S. Sreenivasan
51.	Subcommittee Meeting for Approval of Machinery Manufacturers; TMC MM III & MM IV	Mumbai	16-12-2002	Dr. S. Sreenivasan
52.	Varietal Denotification / Identification Committee Meeting under CAB	Mumbai	18-12-2002	Dr. S. Sreenivasan
53.	56th Annual Conference of the Indian Society of Agricultural Statistics	Dharwad	18-12-2002 to 20-12-2002	Dr. C.D. Ravindran
54.	Implementation Committee Meeting; MM III and MM IV of TMC	Mumbai	20-12-2002	Dr. S. Sreenivasan
55.	ICMF-CDRA Joint Meeting with Seed Producers and Trade	Mumbai	20-12-2002	Dr. S. Sreenivasan
56.	Kissan Samman Diwas Meeting	Nagpur	23-12-2002	Dr. S. Sreenivasan Dr. K.M. Paralikar Shri P.G. Patil
57.	90th Indian Science Congress	Bangalore	03-01-2003 to 07- 01-2003	Dr. R.H. Balasubramanya Dr. K.M. Paralikar Dr. A.J. Shaikh Dr. P.V. Varadarajan Dr.(Smt.)S.P. Bhatawadekar Dr. S.G. Gayal Shri R.M. Gurjar
58.	Sectional Symposium 2 – Engineering Intervention to Make India Globally Competitive in the WTO Regime : 90th Indian Science Congress	Bangalore	06- 01-2003	Dr. S. Sreenivasan
59.	Seminar on Ginning Awareness: TMC & Textiles Committee	Nagpur	11- 01-2003	Dr. S. Sreenivasan Dr. K.M. Paralikar Shri P.G. Patil Shri Vishnu Arude Dr. T.S. Manojkumar Shri Sujeet Kumar Shukla
60.	8th National Scientific Seminar on Opportunities and Challenges of Globalisation in Agriculture	Jabalpur	17- 01-2003 to 19- 01-2003	Shri Muntazir Ahmed Dr. (Smt.) Sujatha Tiwari

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
61.	Varietal Zoning Meeting under CAB	Mumbai	21- 01-2003	Dr. S. Sreenivasan
62.	Meeting for Finalisation of Varietal Distribution in the Country	Mumbai	28- 01-2003	Dr. S. Sreenivasan
63.	Ginners' Meet	Sirsa	30- 01-2003	Dr. S. Sreenivasan Dr. K.M. Paralikar Shri Ram Parkash
64.	Breeders' Conclave	Coimbatore	03- 02-2003 & 04- 02-2003	Dr. S. Sreenivasan Dr. D.N. Makwana
65.	4th International Conference on Advances in Meteorology	New Delhi	05- 02-2003 to 07- 02-2003	Dr. R.P. Nachane
66.	Advances in Paper Machine Calendaring and Finishing	Mumbai	07- 02-2003 & 08- 02-2003	Dr. R.H. Balasubramanya Dr. S.G. Gayal Dr. A.J. Shaikh
67.	Glimpses of GC, HPLC, FTIR, Basic Statistics and Validation on Analytical Results	Ankleshwar	07- 02-2003 & 08- 02-2003	Dr. (Smt.) Sujatha Saxena
68.	AICRP Meet on Jute and Allied Fibres	Coimbatore	09- 02-2003 & 10- 02-2003	Dr. S. Sreenivasan
69.	Annual Workshop on Post Harvest Technology	Pant Nagar	13- 02-2003 & 14- 02-2003	Dr. S. Sreenivasan Dr. S.K. Chattopadhyay Dr. S.B. Jadhav Shri D.L. Upadhye
70.	6th International Science Congress	Bhopal	13- 02-2003 to 15- 02-2003	Dr. R.P. Nachane Dr. A.J. Shaikh Dr. P.V. Varadarajan
71.	Implementation Committee Meeting; MM III & MM IV; TMC	Mumbai	17- 02-2003	Dr. S. Sreenivasan
72.	National Symposium on Emerging Trends in Agri Physics and Four Decades of Research in Division of Agri Physics	New Delhi	20-02-2003 to 22-02-2003	Dr. R.P. Nachane Dr. G.F.S. Hussain
73.	Varietal Identification Committee Meeting	Mumbai	03-03-2003	Dr. S. Sreenivasan
74.	5th Meeting of Standing Committee on Mini Mission II of TMC	New Delhi	05-03-2003	Dr. S. Sreenivasan

Sr. No.	Meetings / Conferences / Seminars / Symposia, etc.	Place	Date	Name of the person/s who attended
75.	National Seminar on Good Laboratory Practices (GLP)	Mumbai	10-03-2003 to 12-03-2003	Dr. S. Sreenivasan Dr. P.V. Varadarajan Dr. G.F.S. Hussain
76.	44th Joint Technological Conference of ATIRA, BTRA, NITRA and SITRA	Coimbatore	08-03-2003 & 09-03-2003	Dr. (Kum.) C.R. Raje
77.	Workshop on Pollution Free Cotton Seed Delinting Technology	Akola	12-03-2003	Dr. S. Sreenivasan Dr. K.M. Paralikar Shri P.G. Patil
78.	Annual Workshop – NATP Programme on Value Addition to Safflower for Natural dyes and Health Care Products	Mumbai	20-03-2003	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. P.V. Varadarajan Dr. A.J. Shaikh Dr. S.G. Gayal
79.	NATP – Workshop on Wool Diversification for Value Addition	Thane	25-03-2003	Dr. S. Sreenivasan Dr. S.K. Chattopadhyay
80.	3rd Review Meeting of Implementation of ICDP – MM II Programme of Modernisation of Ginning, Pressing and Extension Infrastructure at GTC, Nagpur	Nagpur	29-03-2003	Dr. S. Sreenivasan Dr. R.H. Balasubramanya Dr. K.M. Paralikar Dr. A.J. Shaikh Dr. S.G. Gayal Shri R.M. Gujar Shri P.G. Patil Dr. T.S. Manojkumar Shri Sujeet Kumar Shukla Smt. Jyoti M. Nath Shri L. John Selvakumar

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Workshops, Seminars, Summer Institutes, Farmers' Day, etc. Organised by CIRCOT

Quality Awareness Meet

This joint meet was organised by CIRCOT and Gujarat Agricultural University (GAU) on April 20, 2002 at the Main Cotton Research Station, Surat on the occasion of the inauguration of High Volume Fibre Testing System (HFT 9000) at the CIRCOT Unit at Surat.

Agricultural Scientists from GAU, seed producers and traders attended the function. Shri Prem Sharda, Vice Chancellor of South Gujarat University inaugurated the HFT-9000 at the CIRCOT Regional Quality Evaluation Unit, Surat. He emphasized the need for improvement in quality of cottons for sustained international trade. Shri Y. Subrahmanyam, Scientist-in-charge presented a brief introduction about the functioning of the Regional Unit. Dr. C.B. Patel, Campus Director of Agriculture, GAU welcomed the gathering while Dr. S. Sreenivasan, Director, CIRCOT in his thematic address pointed out the relevance of the modern technology for quick and accurate evaluation of quality. He also emphasised the need to have cotton with less trash content in order to compete at the international market.

Shri Karsanbhai Patel, a progressive local farmer, social worker and President of a Farmers' Association explained in detail about the contribution rendered by the Main Cotton Research Station at Surat since its inception. The inaugural session ended with vote of thanks by Dr. J.C. Patel, Associate Research Scientist (Plant Breeding), GAU.

The following two Institute's publications were released on this occasion.

1. **HVI in Cotton Fibre Quality Evaluation – A CIRCOT Insight** by Shri Prem Sharda

2. **Annual Cotton Quality Update 2002** by Dr. C.B. Patel

In the technical session that followed Dr. (Smt.) P. Bhama Iyer, Principal Scientist, CIRCOT presented a paper on **Relevance of High Volume Instrument in Fibre Quality Evaluation**. She summarized the basic concepts and working of the modules related to the HVI system, the status of HVI in India, advantages of HVI in research and trade.

The Technical session ended with a vote of thanks by Shri M.C. Bhalod, Technical Officer, CIRCOT.

Quality Awareness Meet at Surat

National Seminar on Future Prospects of Knitting and Knitwear

This two day National seminar was arranged by the Indian Fibre Society (IFS) in collaboration with CIRCOT on June 1 & 2, 2002 and inaugurated by Dr. Panjab Singh, Secretary DARE and D.G. ICAR. The welcome address was given by Dr. S. Sreenivasan, Director, CIRCOT and Dr. S.N. Pandey, Chairman, IFS, gave introductory remarks. The Chief Guest in his speech emphasized the need for upgrading and improving the post harvest processing and handling facilities in the country to produce clean cotton. He observed that cotton remains the preferred raw material for knits despite stiff competition from polyester and other synthetic fibres. He also stressed that all out efforts should be made to have uniform strong and clean cottons for quality knitwear.

There were three Technical sessions on June 1 and two sessions on June 2 apart from the valedictory session, the details of which are as follows :

TECHNICAL SESSION I

Yarn Requirements for Quality Knitting

Chairman : Dr. A.N. Desai, Director, BTRA, Mumbai

- *Yarn Quality for Knits* : V. Hariharan Iyer, The Century Textiles and Industries Ltd., Mumbai
- *Self Twist Yarns for Knitwears* : S.V. Bhalerao, Wool Research Association, Thane
- *Comparative Study of Knitted Fabrics from Nylon-Cotton and Polyester-Cotton*

Core Spun Yarn : S.S. Doke & Vijay Panchal, V.J.T.I., Mumbai and M. Ahmed, CIRCOT, Mumbai

TECHNICAL SESSION II

Trends in Development of Knitting Machinery

Chairman : Dr. Anwar Alam, DDG (Engg.), ICAR, New Delhi

- *Recent Trends and Innovations in Knitting Machines* : Bhaskar Datta, Batliboi Ltd., Mumbai
- *Latest Developments in Warp Knitting Technology* : Kishore G. Shewale, ATE Enterprises Pvt. Ltd., Mumbai
- *Technology of Processing of Knit Fabrics*: Edwyn Rodrigues, Batliboi Ltd., Mumbai

TECHNICAL SESSION III

Garment Making and Marketing of Knitwear

Chairman : Shri Amar Datta, Director, NIFT, Mumbai

- *Future of Knitwear Industry* : M.K. Panthaki, The Clothing Manufacturers' Association of India, Mumbai
- *Garment Making and Marketing of Knitwear* : R.N. Swami, Consultant, Thane
- *Knitted Technical Textiles* : B.V. Doctor, SASMIRA, Mumbai
- *Knitting and Information Technology* : Monita Marwaha and Suhail Anwar, NIFT, Mumbai

June 2, 2002

TECHNICAL SESSION IV

Knitted Fabric Manufacture and Quality

Chairman : Shri M.K. Bardhan, Director, SASMIRA, Mumbai

- *Shrinkage of Knitted Fabrics in Different Directions* : H.L. Vijaya Kumar, Bapuji

Knitwear Seminar

Institute of Engineering & Technology, Davanagere, Karnataka and V. Subramaniam, A.C. College of Technology, Chennai

- *Hosiery Fabric Production and Its Quality Requirement* : C.N. Vartak, Textile Consultant, Pune
- *A New Method for Measuring Distortion in Cotton Knit* : R.P. Nachane, M. Ahmed and K. Mathur, CIRCOT, Mumbai
- *Characteristics of Ramie-Cotton Blended Single Knit* : M. Ahmed, S.K. Chattopadhyay, A.K. Chaphekar & R.S. Gaikwad, CIRCOT, Mumbai and S.K. Dey, NIRJAFT, Kolkata

TECHNICAL SESSION V

Chemical Processing and Finishing of Knitted Fabrics

Chairman : Dr. S.N. Pandey, Chairman, IFS, Mumbai

- *Enzyme Application in Knit-Processing*: Edward Menezes, Rossary Biotech Pvt. Ltd., Mumbai
- *Fire Retardant Finishes for Garments* : Ketan L. Gandhi, L.N. Chemicals, Mumbai
- *Processing of Tubular Knits* : G.P. Nair, Textile Processing Consultant, Mumbai
- *Processing of Knit Fashion Garments for Export* : D.L. Shah, SASMIRA, Mumbai

VALEDICTORY SESSION

Chairman : Dr. V. Sundaram, Editor, Journal of Indian Society for Cotton Improvement, Mumbai

Summary of the Proceedings of Technical Sessions : Dr. (Mrs.) P. Bhama Iyer and Dr. P.V. Varadarajan, CIRCOT, Mumbai

Vote of Thanks : Dr. R.H. Balasubramanya, Principal Scientist and Head, CBPD, CIRCOT, Mumbai

A Book of Paper was brought out which contained the full length papers presented at the seminar.

Awareness Programme on Ginning Modernisation and Human Resource Development :

Awareness Programme on Ginning Modernization and Human Resource Development under Technology Mission on Cotton

This was organised on November 30, 2002 at Adilabad in Andhra Pradesh in Collaboration with M/s. Bajaj Steel Industries Ltd., Nagpur. About 25 ginners attended the meeting. While Dr. S. Sreenivasan, Director and Dr. K.M. Paralikar Head, Transfer of Technology Division participated from CIRCOT; other dignitaries included Mr. Bajranglal Agarwal, President Adilabad Cotton Association, Mr. Kantiprasad Patodia of M/s. Makhanlal Rajkujmar Cotton Ltd., Adilabad and Dr. K.R.Krishna Iyer former Director of CIRCOT and consultant, TMC, MM. III & IV.

At the awareness programme, the ginners were appraised of the technologies developed by CIRCOT that are useful in increasing the productivity in ginning operation as well as in utilizing the wastes generated during this activity. The need for training gin operators, fitters and supervisors

Dr. S. Sreenivasan, Director making a point at the First Awareness Programme at Adilabad, Andhra Pradesh

to improve their efficiency was also highlighted.

Apart from this, ginners were told about the need and relevance of ginnery modernization and salient features of the package offered under the TMC MM.IV. All the participants were exhorted to go in for upgradation of their installations as that alone would help in production of clean contaminant free cotton.

The Second awareness programme on Ginning Modernisation and Human Resource Development was held at CIRCOT Regional Centre, Sirsa on 30.1.03 under the chairmanship of Dr. C.D. Mayee, Director, CICR, Nagpur. About 30 ginners participated in this meeting.

Dr. K.R.K. Iyer Consultant, TMC, reiterated the need for modernisation of ginning factories in order to produce clean cotton. Elaborating on the TMC Package for upgradation of ginneries, Dr. Iyer clarified that composite factories only could qualify for benefit under this scheme.

Shri Ved Parkash Nagpal, Branch Manager, CCI, Sirsa, in his address pointed out that lack of interest in north zone ginneries to opt for modernization is due to the reduced cotton production over the years from 50 lakhs to 18 lakh bales. At a time when ginning operation is beset with problems of lack of availability of quality cotton, higher investments for modernization would not be forthcoming from ginners.

Dr. S. Sreenivasan drew the attention of the traders, ginners and mill industry in the region to the installation of HVI machine

Dr. K. M. Paralikar, Head, Transfer of Technology Division, Interacting with the Audience at the Sirsa Awareness Meet

at CIRCOT Unit of Sirsa and exhorted them to take full benefit of it. While modernization is one of the key requirements for production of clean cotton, Dr. Sreenivasan stressed the importance of trained manpower to run a modern unit and advised the ginners to utilize the training facility offered by CIRCOT at Nagpur.

Elaborating on the difficulties faced by the ginning factories in the north due to lack of availability of cotton in adequate quantities Mr. Sushil Mittal, President of the Ginners' Association, sought government help in establishing modern units with adequate financial assistance.

Dr. C.D. Mayee spoke on the importance of modernization of ginning factories and reducing losses during processing. Emphasizing the importance of training for ginners to produce quality bales, Dr. Mayee exhorted the industry to go for modernization before it becomes too late as imported clean cottons have found a firm place in the country.

The third awareness programme on Ginning Modernisation and Human Resource Development Under Technology Mission on Cotton was organized at the Chamber of Commerce hall at Rajapalyam (Tamil Nadu) on March 22, 2003. About 50 participants comprising ginners and traders attended the Programme. While welcoming the delegates, Dr. S. Sreenivasan, Director, CIRCOT emphasized on the need for modernization. To make a modernized ginnery economically viable, Dr. Sreenivasan suggested that CIRCOT technology of value adition to ginnery wastes can be adopted by ginners. Dr. K.M.Paralikar, Head, Transfer of Technology Division, CIRCOT brought out the importance of ginning training to

Mr. Dhanushkodi Raja, Managing Director, Rajaram Mills, Rajapalayam, Inaugurating the Awareness Meet at Rajapalayam

efficiently run a modernized ginning factory.

Inaugurating the programme, Mr. Dhanush Kodi Raja, Managing Director, Rajaram Mills, Rajapalayam, exhorted the ginners to opt for modernization as that would enable the ginnery to produce clean cotton to remain competitive in the open market-economy. Dr. K.R. Krishna Iyer, Consultant, TMC MM III & IV explained in lucid terms the salient features of the modernization package of Govt. of India, while Shri P.G. Patil, Scientist, CIRCOT gave a brief account of the activities of the Ginning training centre at Nagpur. Lively discussion followed the presentations where all the queries raised by the ginners were suitably answered.

Role of Cost Effective Ginning in Production of Clean Cotton Bale and Scientific Processing of Cotton Seed : This seminar was organised at the NBSS & LUP auditorium on March 28, 2003 by CIRCOT. This activity arranged as part of the ICDP – MM II programme of CIRCOT was intended to showcase the role of cost effective ginning for the production of clean cotton and emphasize the need for scientific processing of cotton seed in order to make 'ginning' an economically viable enterprise.

Spread over three sessions, eleven papers were presented at the seminar, the details of which are given below :

- Research and Development Initiatives for Cost Effective production of Clean Cotton: S. Sreenivasan, CIRCOT, Mumbai
- Modernisation of Ginning Industry through Technology Mission on Cotton: K.R. Krishna Iyer, TMC (MM III & IV), Mumbai.
- Status of Ginning Industry in Maharashtra : K.M. Paralikar and S.B. Jadhav, CIRCOT, Mumbai and V.G. Arude, T.S. Manojkumar, J. Selvakumar and P.G. Patil, GTC, Nagpur.
- An Application Software for Cotton Quality Update-COTSOFT, J.M. Nath, K.M. Paralikar and P.G. Patil, GTC, Nagpur.
- Effect of Double Roller, Saw and Rotary Knife Roller Ginning on the Quality of Cotton – A Review: P.G. Patil, GTC, Nagpur.
- Energy Requirement for Various Systems in Modern Ginneries and its Conservation: S.K. Shukla, P.G. Patil and K.M. Paralikar, GTC, Nagpur.
- Value Added Products from Ginnery Waste: R.H. Balasubramanya, A.J. Shaikh, Y. Subrahamanyam and S. Sreenivasan, CIRCOT, Mumbai.

Dignitaries at the Seminar

- Importance of Scientific Processing of Cotton Seed : Sandeep Bajoria, AICOSCA, Mumbai.
- Development of Delinting Machinery and Delinting Process : R.D. Bohra, Cottor Plants (India) Pvt. Ltd., Mumbai
- Cotton Seed Oil for Human Consumption: Sudha Tiwari, A.J. Shaikh and R.H. Balasubramanya, CIRCOT, Mumbai.
- Genesis and Development of Cotton Seed Oil, its Role and Significance as an Important Neutraceutical (s) in the Human Health: J.R.Vakil, Bharati Vidhya Peeth, Pune.

The Seminar was well attended by participants drawn from ginning industry, cotton associations, machinery manufacturers, and government officials connected with cotton promotion, industry personnel and scientists. Judging by the response of the participants it could be said that the seminar realised its objective in good measure.

Workshop on Utilisaion of Cotton Plant By-produce for Value Added Products (MMF 1 of Mini Mission 1 of Technology Mission on Cotton)

This workshop was held on May 29, 2002 at CIRCOT, Mumbai. About 2o people participated in the meeting. Dr. S. Sreenivasan, Director, CIRCOT welcomed all the members and highlighted the importance of by-products particularly in the present day scenario of cotton cultivation in India. The high cost of cultivation is the main cause for the net returns becoming even negative at times. Under such circumstances, growing

desi cottons which are fairly resistant to pests and diseases with organic inputs need to be encouraged with special emphasis on the utilization of cotton plant stalks and cottonseeds which are available in abundance.

Dr. C.D. Mayee, Director, Central Institute for Cotton Research, Nagpur and Member Secretary of Standing Committee, MM I of TMC in his inaugural address indicated that as many as 25 promising lines in *Gossypium hirsutum* are available with high productivity coupled with good attributes. He also stressed that a few promising lines with as high as 25 – 26% oil in cottonseeds are available. He also stressed that cotton crop is not to be viewed only for its lint but also to be considered as a total crop including the seeds and the biomass.

Dignitaries at the Workshop

Dr. R.H. Balasubramanya, Principal Scientist and Head and Principal Investigator and Nodal Officer of MMF1 of MMI of TMC made a comprehensive exposition of the work carried out during the past 18 months. The presentation included preliminary work on the transportation of cotton stalks and baling apart from commercial trials on the preparation of hard boards at Jollyboard Ltd. near Miraj using 100% cotton stalks and in 70:30 combination of bagasse and cotton stalks.

The opinion of experts namely Dr. V. Sundaram, Shri A.S. Yawalkar and Shri Suresh Kotak was taken into consideration while finalising the recommendations.

Vigilance Awareness Week Celebration : As per directives from the Govt. of India, the week beginning from October 31 to November 6, 2002 was celebrated as Vigilance Week. The weeklong activities commenced with a pledge administered to all the staff in Hindi on October 31, 2002. An essay competition on the subject **How Vigilant Indians Are?** was organised on November 1, 2002 wherein all the staff members took part. Prizes were awarded to the first two best essays each in Hindi, Marathi and English. The following were the winners in the essay competition conducted during the Vigilance week.

Dr. S. Sreenivasan, Director, CIRCOT welcoming the audience

English

I prize : Smt. Binu Sunil

II prize : Shri A.A. Chaphekar

Hindi

I prize : Shri R.R. Chhagani

II prize : Smt. V.V. Janaskar

Marathi

I prize : Smt. S.D. Dudam

II prize : Shri S.N. Salve

On the **Importance of Vigilance in the Present Era** a talk was arranged on November, 2, 2002 in which Major Vijaya Kumar (Retd.) brought out in clear terms the need to be vigilant and efforts being done by the Govt. of India in this direction. Major Vijaya Kumar stressed upon the need to bring in the much needed awareness among public to be vigilant in all walks of life.

National Integration Week : The week from November 19 to 25, 2002 was celebrated as the National Integration Week. This week long celebration culminated as the **Conservation Day** on the last day. To mark this occasion a talk by Dr. S.R. Maley, Director, Eco Save Systems Pvt. Ltd., Mumbai was arranged at the Institute on **Environmental Complexities of Agriculture**.

Dr. S. R. Maley, Director, Eco Save Systems Pvt. Ltd. being welcomed by Dr. S. Sreenivasan, Director, CIRCOT

Dr. Maley, in his lecture voiced concern on the accumulation of insert substances in the soil leading to alteration of soil structure, buffering and breakdown activity leading to build up of toxic molecules in the soil, depletion in carbon content due to increased usage of fertilizers, depletion of soil reserves and exploitative agriculture in favour of cash crops at the expense of legumes.

He also dwelt at length on the places where such problems persist in India, possibilities of minimizing environmental complexities in agriculture, the special feature of organic fertilizers and finally on how properly manufactured organic manure works in the soil.

National Science Day: On the occasion of the National Science Day on February 28, 2003 which marks the discovery of Raman Effect by the Nobel Laureate Prof. C.V. Raman in 1928, Prof. Gautam Parelkar of Mithibai College, Mumbai gave a lecture on **50 Years of DNA Discovery**. This lecture which brought out the history and development of this path breaking discovery in molecular biology was replete with the various facts of application including the genetically modified crop promotion technique; Bt. cotton. The lecture was well attended by the staff of CIRCOT.

Felicitation to Dr. Panjab Singh, D.G., ICAR: The Agricultural Research Service Scientists'

Talk by Prof. Gautam Parelkar of Mithibai College, Mumbai on ***50 Years of DNA Discovery***

Dr. Panjab Singh, Secretary, DARE and D.G., ICAR releasing the publication CIRCOT Technologies and Services to the Trade and Industry

Forum, CIRCOT unit organised a felicitation function on April 17, 2002 to Dr. Panjab Singh, Secretary, DARE and Director General, ICAR on his being awarded the **Best Agriculture Scientist for the Millenium** at the 89th Indian Science Congress, Lucknow by the Hon. Prime Minister of India.

Dr. Panjab Singh, Secretary, DARE and D.G., ICAR being felicitated by Dr. S. Sreenivasan, Director, CIRCOT on being conferred the award of Best Agriculture Scientist for the Millennium at the 89th Indian Science Congress, Lucknow by the Hon. Prime Minister of India

Dr. S. Sreenivasan welcomed the gathering and Dr. Panjab Singh released the publication entitled **CIRCOT Technologies and Services to the Trade and Industry.**

On behalf of the scientist's forum, Dr. V. Sundaram, former Director of CIRCOT felicitated Dr. Panjab Singh with a shawl and a silver plaque. Dr. S.N. Pandey, chairman, Indian Fibre Society and Dr. V.R. Gadwal, President, Indian Society for Cotton Improvement also felicitated Dr. Panjab Singh. Dr. R.H. Balasubramanya, Principal Scientist & Chairman of the Scientists' forum presented the Vote of Thanks.

Kisan Sanman Diwas : This was organised by CIRCOT at its Ginning Training Centre at Nagpur on December 23, 2002 as part of the birth centenary celebration of Late Chaudhari Charan Singhji, ex. Prime Minister of India. This function organized at the NBSS & LUP auditorium was well attended with participation from Scientists;

Dr. K. S. Gajbhiye, Director, NBSS & LUP, Nagpur, guest of honour felicitating Managing Director, Laxmi Cotton Industries, Guntur on the occasion of Kisan Sanman Diwas organised by CIRCOT at GTC, Nagpur

farmers, ginners, trading organizations and Government Officials.

On this occasion, the following seventeen farmers and five ginners were felicitated and certificates of merit were distributed in recognition of their outstanding achievements.

Farmers :

1. Shri U.K. Shinde, At post Telgaon, Tq. Kalmeshwar, Distt. Nagpur.
2. Shri B.S. Mahajan, At post Telgaon, Tq. Kalmeshwar, Dist. Nagpur.
3. Shri S.K. Hiwarkar, At post Telgaon, Tq. Kalmeshwar, Distt. Nagpur.
4. Shri A.S. Khuspure, At post Telgaon, Tq. Kalmeshwar, Distt. Nagpur.
5. Shri S.P. Nimbalkar, At Tishti (BK), Tq. Kalmeshwar, Distt. Nagpur.
6. Shri D.A. Hiwase, At Tishti (BK), Tq. Kalmeshwar, Distt. Nagpur.
7. Shri Ramesh Patil, At Tishti (BK), Tq. Kalmeshwar, Distt. Nagpur.
8. Shri U.N. Kumbhare, At Tishti (BK), Tq. Kalmeshwar, Distt. Nagpur.
9. Shri P.S. Adakane, At Tishti (BK), Tq. Kalmeshwar, Distt. Nagpur
10. Shri Ramesh Satpute, At Wakeshwar, Tq., Distt. Nagpur
11. Shri Tejram Dhayawat, At Wakeshwar, Tq., Distt. Nagpur
12. Shri Bhaskar Taywade, At Wakeshwar, Tq., Distt. Nagpur
13. Shri Mahadeo Sausagade, At Wakeshwar, Tq., Distt. Nagpur
14. Shri N.S. Wagh, At Umari Wagh, Tah. Hingana, Distt. Nagpur.
15. Shri J.S. Dawane, At Umari Wagh, Tah. Hingana, Distt. Nagpur
16. Shri M.G. Wagh, At Umari Wagh, Tah. Hingana, Distt. Nagpur
17. Shri Manohar Parchure, At post Nagpur, Distt. Nagpur

Ginners :

1. Narendra Cotfibre Industries, Bahadarpur Road, Burhanpur (C.Rly.), Madhya Pradesh
2. Shendurni Sahakari Kharedi Vikri Ginning Pressing Society Ltd., Shendurni, Tq. Jamner, Distt. Jalgaon, Maharashtra.
3. Lakshmi Cotton Trading Company, D.No. 6-3-4, 3/4 Arundalpeth, Guntur, Andhra Pradesh.
4. Amit Cotton Limited, 1-8-663, Azambad Industrial Area, Azambad, Hyderabad, Andhra Pradesh.
5. Shree Sudarshan Ginning & Pressing Factory, Jam, Maharashtra.

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Distinguished Visitors

1. Ms. Shashi Misra, Additional Secretary, DARE and Secretary, ICAR, New Delhi
2. Members of Board of Regents from UAS, Dharwad
3. Dr. Nawab Ali, Project Director, Soybean Processing and Utilisation Centre, CIAE, Bhopal
4. Dr. V.K. Singh, Director, CSWRI, Avikanagar
5. Dr. N.P. Gupta, Principal Scientist, Textile Manufacture & Textile Chemistry, CSWRI, Avikanagar
6. Dr. B.S. Mehta, Principal Scientist, Animal Genetics & Breeding, CSWRI, Avikanagar
7. Mr. Hans Rahm, Member, CFC Mission on Cotton Stalks, Switzerland
8. Dr. Alberecht Epple, Member, CFC Mission on Cotton Stalks, Germany
9. Ms. Sarita Bali, Director, Economic Relations, Ministry of External Affairs, New Delhi
10. Dr. U.D. Bongale, Director, Karnataka State Sericulture Research & Development, Bangalore
11. Dr. Panjab Singh, Secretary, DARE and Director General, ICAR, New Delhi
12. Major Vijaya Kumar (Retd.)
13. Dr. R.P. Kachru, ADG (Engg.), ICAR (Retd.)
14. Dr. H.E. Sharali, Nirmatov, Deputy Minister, Ministry of Agriculture and Water Resources and Director General, Uzbek Scientific Centre of Agricultural Research, Uzbekistan
15. Dr. Jayant P. Dighe, Dean, Faculty of Science, University of Mumbai
16. Prof. Ganesh B. Pawar, Chairman, Board of Studies in Bio-chemistry, University of Mumbai
17. Dr. Pitam Chandra, Assistant Director General (PE), ICAR, New Delhi

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Infrastructural Facilities

Library : To keep pace with the advancements in the field of cotton research, latest available books on cotton, cotton technology, agro-waste utilisation and books of general interest like those of computers and software are periodically added to the library. During 2002 – 2003, 43 books were added to the library and the total number of books by the end of March 2003 was 5339. With the addition of 115 bound volumes of journals, the total number of bound volumes stands at 7249. Sixty-nine journals were obtained through subscription of which 41 were Indian and 28 foreign. Many journals were also received as complimentary or on exchange basis. The financial outlay for the library during 2002 – 2003 has been Rs. 8 lakhs. Besides the staff of this Institute, the students and researchers from various colleges affiliated to Mumbai University, sister institutions and personnel from the textile industry availed of the library facilities. Inter-library loan arrangements were also maintained with other libraries in Mumbai.

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Personnel

Major events during 2002-2003 relating to CIRCOT personnel are listed below:

A. APPOINTMENTS

Name	Designation	Effective Date of Appointment
Shri P. E. Gurav	Supporting Staff Gr. I	08-05-2002

B. PROMOTIONS

The five yearly assessment of Technical Staff was held and promotions granted to the following technical personnel :

Sl. No.	Name	Grade to which Promoted	Effective Date of Promotion
1.	Shri V.M. Kulmethe	Technical Officer T (7-8)	16-07-1999
2.	Shri S. Chandrashekar	Technical Officer T (7-8)	31-12-1999
3.	Shri H.R. Laxmivenkatesh	Technical Officer T (7-8)	01-07-2000
4.	Dr. (Smt.) S.D. Pai	Technical Officer T (7-8)	01-07-2000
5.	Shri K.V. Ananthakrishnan	Technical Officer T (7-8)	01-01-2001
6.	Shri G. Viswanathan	Technical Officer T (7-8)	01-01-2002
7.	Dr. R.D. Nagarkar	Technical Officer T - 6	01-01-2003
8.	Shri R.R. Chhagani	Technical Officer T - 5	05-08-2001
9.	Shri V.D. Devikar	Technical Officer T - 5	13-10-2001
10.	Shri H.S. Koli	Technical Officer T - 5	13-10-2001
11.	Shri S.N. Hedau	Technical Officer T - 5	23-03-2002
12.	Smt. S.R. Kawlekar	Technical Officer T - 5	07-05-2002
13.	Shri R. G. Dhakate	Technical Officer T - 5	16-10-2002
14.	Smt. K.K. Kale	Technical Officer T - 5	16-12-2002
15.	Smt. K.R. Joshi	Sr. Technical Assistant T-4	29-06-2001
16.	Shri V.D. Kalsekar	Sr. Technical Assistant T-4	29-04-2002

Sl. No.	Name	Grade to which Promoted	Effective Date of Promotion
17.	Shri M. Bhaskar	Sr. Technical Assistant T-4	21-09-2002
18.	Shri M.B. Chandanshive	Technician T-1-3	07-09-2001
19.	Shri C.V. Shivgan	Technician T-1-3	16-01-2003
20.	Shri D.A. Salaskar	Technician T-2	29-06-2001
21.	Shri R.A. Suddawar	Technician T-2	29-06-2001
22.	Shri S.K. Parab	Technician T-2	01-10-2002
23.	Shri C.L. Mundale	Technician T-2	01-10-2002
24.	Shri R.R. Gosai	Technician T-1	22-04-2002
25.	Shri D.M. Raje	Technician T-1	22-04-2002
26.	Shri P.S. Panchbudhe	Technician T-1	01-05-2002

C. ADVANCE INCREMENTS

The five yearly assessment of eligible Technical staff was held and advance increments granted to the following Technical personnel.

Sl. No.	Name	Present Grade	No. of advance increments	Effective date
1.	Shri N.V. Bansode	Technical Officer T-5	One more advance increment	01-07-2001
2.	Shri S.M. Gogate	Technical Officer T-5	One more advance increment	01-07-2001
3.	Shri D.N. Moon	Technical Officer T-5	Two advance increments	01-01-2002
4.	Shri D.U. Kamble	Sr. Technical Assistant T-4	One increment	10-06-2002
5.	Smt. Bindu Venugopal	Sr. Technical Assistant T-4	One increment	05-11-2002
6.	Shri V.D. Kalsekar	Technical Assistant T-3	One more advance increment (Total 3)	28-04-2001
7.	Shri M. Bhaskar	Technical Assistant T-3	Two more advance increments (Total 3)	21-09-2001
8.	Shri B.V. Shirsath	Technician T-2	Two advance increments	10-09-2001
9.	Shri D.M. Correia	Technician T-2	Two advance increments	18-09-2001
10.	Shri B.V. Shirsath	Technician T-2	One more increment	10-09-2002

D. TRANSFER

Scientific

Dr. C.D. Ravindran, Sr. Scientist from CICR, Nagpur to CIRCOT Headquarters w.e.f. 1-7-2002.

Technical

1. Shri Matish Chandra, Technical Officer T-5 from Sriganganagar Q.E. unit to CIRCOT Headquarters w.e.f. 01-06-2002.
2. Shri P.S. Panchbudhe, Technician T-1 from CIRCOT Headquarters to GTC, Nagpur w.e.f. 13-06-2002.
3. Shri Udai Vir Singh, Technical Officer T-5 from Quality Evaluation Unit, Sirsa to IASRI, New Delhi w.e.f. 02-12-2002.

Due to closure of the Regional Quality Evaluation Units at Ludhiana, Hissar and Sriganganagar the following staff have been transferred to Regional Quality Evaluation Unit at Sirsa.

Name	Designation	Date of Transfer
Shri Ram Parkash	Technical Officer T-8	01-06-2002
Shri Hamid Hassan	Technical Officer T-5	01-06-2002
Shri Jal Singh	Technical Officer T-5	01-06-2002
Shri Gian Singh	Technician T-1	01-06-2002
Shri Sanwarmal Saini	Supporting Staff Gr.IV	01-06-2002
Shri Satyanarayan Gope	Supporting Staff Gr.II	01-06-2002
Shri Sarup Singh	Supporting Staff Gr.I	01-06-2002

E. RETIREMENT / TERMINATION

Scientific

1. Shri A.K. Gupta, Sr. Scientist retired from service w.e.f. 30-04-2002.
2. Dr. (Smt.) P. Bhama Iyer, Principal Scientist retired from service w.e.f. 31-05-2002.
3. Dr. N.C. Vizia, Principal Scientist retired from service w.e.f. 31-10-2002.

Technical

1. Shri T.K.M. Das, Technical Officer T (7-8) retired from service w.e.f. 31-10-2002.
2. Shri K.V. Ananthakrishnan, Technical Officer T(7-8) retired from service w.e.f. 31-03-2003.

Supporting Staff

Shri D.G. Kamble, S.S. Gr. II voluntarily retired from service w.e.f. 01-03-2002.

F. TRAINING

Training Programme	Period and Place	Participant (s)
Agri-Electronic Instrumentation (in Hindi)	April 23 & 24, 2002 Chandigarh	Dr. (Smt.) Sujatha Saxena
44th Seminar & Hindi Workshop on Rajbhasha Management and Implementation	April 24 – 26, 2002 New Delhi	Shri P.D. Sonawane
General Requirements for Competence of Training & Calibration Laboratories as per ISO/IEC 17025:1999 (D 522)	May 06 - 08, 2002 Mumbai	Dr. (Smt.) S.D. Pai Smt. S.V. Sukhi
Library Improvement and Networking within ICAR/SAUs Libraries	June 17 – 19, 2002 New Delhi	Shri V.B. Suryanarayanan
Gahan Hindi Prasikshan Evam Karyashala	June 18 – 22, 2002 Hyderabad	Dr. D.N. Makwana Dr. S.B. Jadhav Smt. M.V. Kamerkar
Stress Management	July 1 – 6, 2002 Hyderabad	Dr. R.P. Nachane Shri R.M. Gurjar
Technical Workshop on Financial Management in Central Autonomous Bodies	July 10 – 12, 2002 New Delhi	Shri A.B. Dalvi Shri A.P. Natu
Cash and Accounts Management Effectiveness	July 11 – 13, 2002 New Delhi	Shri S.A. Telpande
Summer School on Eco-friendly Management of Solid and Liquid Wastes of Farm, Urban & Industries for Agriculture	July 17, 2002 to August 6, 2002 Coimbatore	Dr. (Smt.) Sujatha Saxena
Computer Application for Administrative & Financial Management	July 17 – 27, 2002 New Delhi	Shri S.V. Kasabe Shri S.D. Ambolkar
Establishment Rules with Focus on Managerial Effectiveness	July 18 – 20, 2002 New Delhi	Smt. Nandini Lohe Palorkar
Training Programme on Laboratory Quality Accreditation	July 29 – 31, 2002 Mumbai	Shri G. Viswanathan
Information Technology in Agriculture	July 31 to August 20, 2002 Hyderabad	Shri N. Shanmugam

Training Programme	Period and Place	Participant (s)
75th FOCARS Programme for the ARS Probationers	August to November 2002 Hyderabad	Shri N. Vigneswaran
Winter School on Production Technology of Agricultural Equipment	September 2 – 24, 2002 Bhopal	Shri P.G. Patil
Advance Course on Management of Human Resources in Agriculture – Winter Course	September 18 to October 8, 2002 Hyderabad	Dr. D.N. Makwana
Technical Workshop on the Financial Act with special Focus on TDS	September 21, 2002 Mumbai	Shri Devesh Nigam
Integration of Windows & G.N.U./Linux Environment	October 5 – 6, 2002 Mumbai	Shri V.B. Suryanarayanan Shri D. Radhakrishna Murthy
7th Management Development Programme in Agricultural Research	November 21 – 27, 2002 Hyderabad	Dr. K.M. Paralikar
Information Technology in Agriculture	December 2 – 23, 2002 Hyderabad	Shri Y. Subrahmanyam Dr. S.B. Jadhav
Reorientation Programme on the Contract Labour (Regulation & Abolition) Act 1970	December 9, 2002 Bangalore	Shri S.V. Kokane
Training in Computers - Windows & M.S. Office	January 13 – 15, 2003 CIRCOT, Mumbai	Dr. E.A. Pachpinde Shri R.K. Jadhav Shri G.B. Hadge Smt. K.K. Kale Smt S.D. Dudam Smt. S.M. Desai Smt. V.V. Janaskar Smt. J.R. Chavkute Shri R.D. Shambharkar Shri T.D. Dhamange
International Conference on Non-Wood Agrobased Panel Boards & Allied Industry	February 14 – 15, 2003 New Delhi	Shri R.M. Gurjar
Detection and Estimation of Aflatoxin Contamination in Groundnut and its Management	January 20 – 25, 2003 Andhra Pradesh	Shri N. Vigneshwaran

Training Programme	Period and Place	Participant (s)
Training in Computers - Windows & M.S. Office	February 24 – 26, 2003 CIRCOT, Mumbai	Shri D.L. Upadhye Shri R.R. Chagani Shri S.N. Hedau Smt. P.S. Nirhali Shri K.W. Khamkar Smt. S.D. Ambre Smt. T.T. Souz Smt.U.N. Bhandari Smt. S.G. Parab Shri V.M. Sable
Measurement of Uncertainty	February 25 – 26, 2003 Mumbai	Dr.R.P. Nachane Dr. C.D. Ravindran Shri D.V. Mhadgut Shri N. Shanmugam
Professional Educational Course on Artificial Neural Network	March 10 – 13, 2003 Mumbai	Shri N. Shanmugam Shri M.V. Vivekanandan

G. AWARD

Shri R.D. Nagarkar, Technical Officer T-5 has been awarded Ph.D. by the University of Mumbai on 17-5-2002.

H. OBITUARY

Shri G.D. Narkar, T-I-3 passed away on 15-06-2002.

STAFF WORKING AT THE CENTRAL INSTITUTE FOR RESEARCH ON COTTON TECHNOLOGY AS ON 31-03-2003

(List does not include vacant posts)

LIST OF STAFF AT THE HEADQUARTERS

Scientific Personnel

Director

Dr. S.Sreenivasan, M.Sc., Ph.D., F.T.A., C.Text, F.T.I.

Principal Scientist & Head of Division

1. Dr. R.H. Balasubramanya, M.Sc.(Agri.), Ph.D., F.T.A., C.Text, F.T.I.
2. Dr. K.M. Paralikar, M.Sc., Ph.D., F.R.M.S.

Principal Scientist

1. Shri M.Ahmed, B.Sc., B.Text (Text.Tech)
2. Dr. (Smt.) S.P. Bhatawadekar, M.Sc., Ph.D.
3. Dr. S.G. Gayal, M.Sc., Ph.D.
4. Shri R.M. Gurjar, M.Sc.
5. Dr. G.F.S. Hussain, M.Sc., Ph.D.
6. Dr.R.P. Nachane, M.Sc., Ph.D. , F.T.A., C.Text., F.T.I.
7. Dr. (Kum.) C.R. Raje, M.Sc., Ph.D.
8. Dr. A.J. Shaikh, M.Sc., Ph.D.
9. Dr. P.V. Varadarajan, M.Sc., Ph.D.

Senior Scientist

1. Dr. S.K. Chattopadhyay, B.Sc.Tech.(Text.)., M.Tech.(Text.Engg.)., Ph.D.
2. Dr. D.N. Makwana, M.Sc., Ph.D.
3. Smt. Prema Nair, M.Sc.(Agri.)
4. Dr. C.D. Ravindran, M.Sc., Ph.D.
5. Dr. (Smt.) Sujatha Saxena, M.Sc., Ph.D.

Scientist (S.G.)

1. Shri D.V. Mhadgut, M.Sc.
2. Dr. S.B. Jadhav, M.Sc., Ph.D.

PERSONNEL

Scientist (Senior Scale)

1. Shri P. Bhaskar, M.Sc.
2. Shri K.H. Sawakhande, M.Sc.

Scientist

1. Shri Ashok Kumar Barimalla, M.Tech. (Ag. Engg)
2. Shri N. Shanmugam, M.Tech., AMIE, D.T.T., C.Eng. (India)
3. Shri N. Vigneshwaran, M.Sc.(Ag.)

Technical Personnel

Technical Officer T-8

Dr. H.U. Gangar, B.E.(Electrical) Grade I.E.T.E., Ph.D.

Technical Officer T-7

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. Dr. (Smt.) S.D. Pai, M.Sc., Ph.D., F.T.A.
6. Shri G. Viswanathan, M.Sc., A.T.A.

Technical Officer T-6

1. Dr. S.J. Guhagarkar, M.Sc., Ph.D.
2. Smt. A.A. Kathe, M.Sc.
3. Shri P.K. Mandhyan, M.Sc., A.T.A.
4. Smt. N.D. Nachane, B.Sc.
5. Dr. R.D. Nagarkar, M.Sc., Ph.D.
6. Dr. E.A. Pachpinde, M.Sc., Ph.D.
7. Shri R.S. Pathare, B.Sc.
8. Shri D. Radhakrishnamurthy, M.Sc., M.Phil.
9. Shri K.B. Rajagopal, B.Sc.
10. Shri S. Sekar, B.Sc.
11. Smt. R.K. Shahani, M.A., B.Lib.
12. Smt.S.V. Sukhi, M.Sc., D.F.L.(German)
13. Dr. (Smt.) Sudha Tiwari, B.Sc., Ph.D.
14. Shri V.B.Suryanarayanan, B.Sc., D.F.L.(German)
15. Shri S. Vancheswaran, B.Sc.

Technical Officer T-5

1. Shri S. Banerjee, M.Sc.
2. Shri R.R. Chhagani, M.Sc.
3. Shri S.G. Dalvi, S.S.C., Cert. Wireman, Cert. Ref & A.C., Govt.Elect.Sup.
4. Shri S.M. Gogate, B.Sc.
5. Shri G.B. Hadge, M.Sc.
6. Shri S.N. Hedau, B.Sc.
7. Smt.K.K. Kale, B.A.
8. Smt. S.R. Kawlekar, M.Sc., P.I.M.R
9. Shri H.S. Koli, B.Sc.
10. Shri V.V. Kshirsagar, S.S.C., I.T.C. Cert.Elec.Super., Cert. F.& S., Conditioning Plant Operator
11. Shri Matish Chandra, M.Sc.
12. Shri R.M. Modi, S.S.C., Cert. Photography
13. Shri M. Mohan, M.Sc., Dip.J.
14. Shri D.N. Moon,B.Sc.
15. Shri C.M. More, B.Sc.
16. Shri S.S. Patekar
17. Shri B.R. Pawar, B.Sc., L.L.M.
18. Shri R.S. Prabhudesai, M.Sc., D.C.M.
19. Shri P.N. Sahane, D.I.F.T.
20. Smt. Sheela Raj, M.Sc.
21. Shri D.L. Upadhye, S.S.C.(Tech.)., N.C.T.V.T.(I.T.I.& C.T.I.)
22. Shri T. Venugopal, B.E.(Civil)
23. Shri M.V. Vivekanandan, B.Sc.

Senior Technical Assistant T-4

1. Smt. Bindu Venugopal, B.Sc.
2. Smt. Binu Sunil, M.Sc.
3. Shri B.B. Gaykar
4. Shri R.K. Jadhav, B.Sc.
5. Smt. K.R. Joshi, M.A. (Hindi Translator)
6. Shri V.D. Kalsekar, B.Sc.
7. Shri D.U. Kamble, B.Sc.
8. Shri S.V. Kokane, B.A.
9. Shri R.R. Mahangade, M.Sc.
10. Smt. P.L. Nirhali, B.Sc.
11. Smt. C.D. Prabha, M.Sc.
12. Shri S.G. Shinde
13. Shri R.M. Sonke, B.Sc.
14. Smt.N.A. Sonkusle, B.Sc.

Technical Assistant T-3

1. Shri A.A. Chaphekar, M.Text.
2. Kum. C.D. D' Souza, M.Sc.
3. Smt. P.R. Mhatre, B.Sc., B.Lib.
4. Shri A.P. Modak, B.Text (Textile Technology)
5. Shri R.S. Narkar, B.Sc., D.C.I.A.

Category T-I-3

1. Shri M.B. Chandanshive, Cert.Cot.Spin.(Machinist/Fitter)
2. Shri C.V. Shivgan, H.S.C., Cert.Wireman, Cert.Electrician, Cert.Elec.Supr. (PWD)., Cert. M. & A.W.(Technician)

Category T-2

1. Shri G.G. Ambare
2. Shri M.G. Ambare, B.Sc.
3. Shri A.R. Bane
4. Shri M.Y. Chandanshive
5. Shri D.M. Correia, S.S.C., I.T.I., N.C.T.V.T. (Mechanic)
6. Shri G.S. Deorukhkar
7. Shri B.R. Jadhav
8. Shri R.R. Khurdekar
9. Shri T.S. Mhaske
10. Shri M.R. Nevrekar
11. Shri S.V. Patil
12. Shri D.A. Salaskar
13. Shri B.K. Sawant
14. Shri S.M. Sawant
15. Shri M.B. Thokrul
16. Shri V.Y. Unhalekar
17. Shri S.A. Waghela
18. Shri S.K. Parab

Category T-1

1. Shri N.D. Kambli, B.Sc.
2. Shri R.P. Kadam, B.Sc.
3. Smt. M.P. Kamble, B.A., B.Lib.
4. Shri D.M. Raje
5. Shri R.R. Gosai

Auxiliary Personnel

Canteen staff

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

Administrative Personnel

Finance and Accounts Officer

Shri Devesh Nigam, M.Sc.

Jr. Accounts Officer

Shri S.V. Kasabe, B.Com., L.L.B.

Assistant Administrative Officer

1. Shri P.D. Sonawane, B.A., L.L.B.
2. Shri K. Sudhakaran
3. Shri M.Z. Bhagat
4. Smt. M.V. Kamerkar, B.A.

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. Ms. S. Harrison
8. Smt. S. Koshy, B.Com.
9. Smt. V.V. Desai
10. Smt. S.D. Ambre
11. Smt. T.P. Mokal, B.A.
12. Smt. S.M. Desai
13. Shri A.P. Natu
14. Smt. J.J. Karanjavkar
15. Shri K. Parleshwar

Private Secretary

Shri Venu Thanikal

Personal Assistant

1. Smt. S.D. Dudam, M.A.
2. Smt. T.T. Souz

Stenographer Gr. III

1. Smt. U.N. Bhandari
2. Smt. R.R. Tawde, B.Com.
3. Smt. Viniya Rajesh Naik, B.A.
4. Smt. S.G. Parab, B.A.
5. Shri R.D. Shambharkar

Upper Division Clerk

1. Smt. S.R. Shirsat, B.A.
2. Shri N.V. Kambli
3. Shri J.R. Mangale, B.Com.
4. Smt. V.V. Janaskar, B.Com., M.A.
4. Shri S.D.Ambolkar
5. Shri R.K. Pallewad, B.A.

Lower Division Clerk

1. Shri P.V. Jadhav
2. Smt. S.P. Paiyala
3. Shri V.M.Sable
4. Smt.J.R. Chavkute
5. Smt. B.D. Kherodkar
6. Shri A.R. Gujar
7. Shri T.D. Dhamange, B.Com.

Sr. Gestener Operator

Shri A.B. Sawant

Supporting Staff Gr.IV

1. Shri L.R. Indurkar
2. Shri M.Z. Rathi

Supporting Staff Gr.III

1. Shri N.J. Kharat
2. Shri R.B. Jadhav
3. Shri M.B. Gurve
4. Shri O.T. Thapa
5. Shri B.R. Satam
6. Shri D.M. Chougule
7. Shri S.D. Gurav
8. Shri R.S. Rane
9. Shri M.K. Ghadge
10. Smt. T.V. Bhowar
11. Shri N. Singh
12. Smt. B.R. Balmiki
13. Shri D.B. Temgire
14. Shri C.S. Salvi

Supporting Staff Gr.II

1. Shri T.B. Khan
2. Shri K.T. Mahida
3. Shri P.G. Gogale
4. Shri M.M. Katpara
5. Shri M.A.A. Rashid
6. Shri G.N. Mayawanshi
7. Shri H.B. Vesmiya
8. Shri M.J. Sumra
9. Shri C.P. Solanki
10. Shri S.K. Bobate
11. Shri P.P. Patil
12. Shri R.G. Tak
13. Shri R.P. Karkate
14. Shri S.G. Phalke
15. Shri M.M. Kadam
16. Shri S.N. Bandre

Supporting Staff Gr.I

1. Shri S.B. Worlikar
2. Shri D.G. Gole
3. Shri C.D. Acharekar
4. Shri M.K. Prabhulkar
5. Shri J.D. Sakpal
6. Shri V.B. Khandeshe
7. Shri A.D. Sonawane
8. Shri S.D. Magar
9. Shri V. Murugan
10. Shri S.R. Tondse
11. Shri V.T. Poojari
12. Shri S.P. Naik
13. Shri M.N. Kamble
14. Smt. K.B. Thapa
15. Shri S.V. Kokane
16. Shri D.K. Kasar
17. Shri S.R. Tondase
18. Shri D.R. Gawde
19. Shri S.S. Surkule
20. Smt. V.N. Walzade
21. Shri S.M. Chandanshive
22. Shri P.E. Gurav

LIST OF STAFF AT THE QUALITY EVALUATION UNITS

COIMBATORE

Technical Officer T-6	: Shri S. Venkatakrishnan, MSc., A.T.A
Technical Officer T-5	: Shri K. Thiagarajan, M.Sc.
Technical Assistant T-II-3	: Shri M. Bhaskar, Dip. Ref. & Air-Cond.
Supporting Staff Grade III	: Shri V.M. Subramanian

DHARWAD

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

GUNTUR

Technical Officer T-6	: Shri S. Mukundan, M.Sc.
Supporting Staff Gr.IV	: Shri Ch. Thimmanna
Supporting Staff Gr.III	: Shri V.Y.M. Suvarchala Rao

NAGPUR

Scientist (Sr. Scale)	: Shri P.G. Patil, M.Tech. (Post-Harvest Engg.)
Scientist	: Smt. Jyoti M. Nath, M.Sc.
	: Dr. T.S. Manojkumar,M.E.(Agril.)(Agril.Processing), Ph.D. (Agril. Processing)
	: Shri Vishnu Arude, M.Tech.
	: Shri Sujeet Kumar Shukla, M.Tech (Mech. Engg.)
	Shri John Selvakumar, M.Sc. (Agril. Engg.)
Technical Officer T- (7-8)	: Shri V.M. Kulmethe, B.Sc.
Technical Officer T-5	: Shri N.V. Bansode, B.Sc.
	: Shri S.L. Bhanuse, B.Sc.
	Shri U.D. Devikar, B.Sc.
	: Shri R. G. Dhakate, B.Sc.
	: Shri V.L. Rangari, B.Sc.

PERSONNEL

Technical Assistant T-2	: Shri C.L. Mundale Shri B.V. Shirsath, B.A., I.T.I.
Technical Assistant T-1	: Shri P.S. Panchbudhe, B.A.
Senior Clerk	: Shri B.D. Dhengale : Smt. G.G. Palorkar, B.A. : Shri S.A. Telpande, M.Com.
Machine Operator (T-2)	: Shri R.A. Suddawar (Driver) Shri B.H. Umredkar
Supporting Staff Gr.IV	: Shri John Robert : Shri H.S. Bhabar
Supporting Staff Gr.III	: Shri M.P. Tohokar
Supporting Staff Gr.II	: Shri A.R. Chutale : Shri J.P. Patel : Shri R.B. Kautkar
Supporting Staff Gr.I	: Shri R.G. Matel : Shri R.C. Rokde : Shri M.G. Bhandkkar

SIRSA

Technical Officer T-8	: Shri Ram Parkash, B.Sc., LL.B.
Technical Officer T-5	: Shri Hamid Hassan, M.Sc. Shri Jal Singh, M.Sc.
Technical Assistant T-1	: Shri Gian Singh
Supporting Staff Gr.IV	: Shri Sanwarmal Saini
Supporting Staff Gr.II	Shri Mahabir Singh Shri Satyanarayan Gope
Supporting Staff Gr.I	: Shri Sarup Singh

SURAT

Scientist (SG)	: Shri Y. Subrahamanyam, M.Sc.
Technical Officer T-6	: Shri M.C. Bhalod, B.Sc.
Technical Officer T-5	: Shri G.G. Mistry, B.Sc.
	: Shri M.B. Patel, B.Sc., L.L.B. (Special)
Senior Clerk	: Shri J.I. Parmar, B.Com.
Technician T-2	: Shri J.B. Dhodia
Supporting Staff Gr.IV	: Shri K.M. Rathod
Supporting Staff Gr.I	: Shri M.G. Sosa