ICAR

CIRCOT
Annual Report
2009-2010

International Year of Natural Fibres - 2009

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

CIRCOT

ANNUAL REPORT 2009-2010

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(Indian Council of Agricultural Research)
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Cover Theme :

Background – Composite Fabric made from Cotton and Banana Fibres

Photograph - 1 : International Conference on "Emerging Trends in Production, Processing and Utilisation of Natural Fibres", Mumbai, April 16-18, 2009

Photograph - 2 : International Workshop on "Utilisation of Cotton Plant By-produce for Value-Added Products", Nagpur, November 9-11, 2009

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CONTENTS

Preface

The Eighty-sixth annual report of CIRCOT, pertaining to the year 2009-10; is being presented here to all the stakeholders and well wishers connected to this great institution with a sense of satisfaction and pride. This annual publication provides an opportunity for a dispassionate review of the achievements of the institute, to identify areas of shortfalls and rededicate ourselves to the cause of Indian cotton in particular and natural fibres as a whole.

Indian cotton reached yet another milestone during the year by crossing the 10 million hectare mark in area under cultivation for the first time. Despite the best of efforts, however,the production could not reach any new land mark and is expected to hover around 290 lakh bales owing to deficient monsoon and other related factors making a dent in the productivity. This is dampening the spirits of the cotton community especially at a time when the price for the commodity is soaring and that the area under Bt. cotton is surging ahead to reach 80-85 % of the total area under the crop. As it is, no serious attempts are being made to correct the staple imbalance in the availability of cotton with more than 70% of the produce confined to the long category.

As is well known the year 2009 was declared as the year of Natural fibres by the U N General assembly. In order to celebrate the event in a befitting manner, the ICAR in collaboration with the Indian Society For cotton Improvement (ISCI), the Indian Fibre society (IFS),and the Texas Tech University, USA organised a three day International Conference on Production, Processing and Utilisation of Natural Fibres at Hotel May Fair, Worli, Mumbai during April 16-19,2009.CIRCOT took a lead role in the organisation of this international event. Hailed as a grand success, the international seminar provided an excellent opportunity for Indian researchers connected with all natural fibres such as Cotton, Jute and allied fibres, Banana pseudostem fibre, Wool and Silk to interact and chalk out a programme for more efficient production and utilisation of these eco-friendly natural resources. A fashion show highlighting natural blended fibre fabrics in enchanting colours and designs was the crowning event at the international seminar. As a take-off from this event, the ICAR is seriously looking at the possibility of initiating a network programme in Production, Processing and value addition encompassing all natural fibres with a special emphasis to bring to fore the environmental and societal benefits that could accrue to the rural community in particular and the nation at large with the broad based use of these natural resources.

The CFC sponsored project on Utilisation of Cotton By-produce for Value added products did come to an end with the organisation of an International Workshop at Hotel pride, Nagpur during November 9-11,2009.Conducted jointly by CIRCOT, with ICAC and CFC; the workshop could bring together cotton researchers, government officials and other connected stake holders from India, African Countries and USA to an effective exchange of views and provided a single platform for devising a road map as to how to use this veritable, annually renewable resource for the enhancement of farm income and rural employment generation. Judging from the response both at the seminar and thereafter the seriousness shown by a few African governments; it could be said that in the not very distant future, this CIRCOT technology would transform itself to a viable enterprise not only in India but also in majority of the Afrio-asian countries.

The National Agricultural Innovation projects currently in operation at CIRCOT are proceeding well as per the technical programme after having gone through the initiation troubles. The projects on cotton value chain, banana pseudostem, flexible Rubber dam, and nano Cellulose production have begun to show tangible results. The interest these projects have generated among the respective stake holders is exhilarating, but at the same time has definitely brought in additional accountability to the institution and the scientists, egging them to perform better. The business planning and development unit at CIRCOT is sincerely trying its best to create entrepreneurship for identified technologies from the institute and also its best to inculcate the spirit of commercialisation among the scientists in the West zone institutes under its ambit.

The infrastructural improvement at CIRCOT in terms of constructing Type IV quarters at Mahim complex in Mumbai has begun offering hope to the senior officers of getting a home closer to the institute. The other major programme of construction of an annexure building at Matunga has also crossed all major hurdles and the CPWD is in advanced stages of identifying the construction agency. Hopefully, in a couple of years, the Institute would have added these "most looked forward to" infrastructural improvements that could contribute significantly to the productivity of the human resource apart from providing an opportunity and space to venture into newer areas of research.

CIRCOT thus continues its march forward with renewed vigour and zeal to fulfil its mandate despite the continuous erosion in its trained and expert human resource.

S. Sreenivasan
Director

Executive Summary

This is the Eighty-sixth Annual Report of CIRCOT and covers the activities of the Institute for the period from April 1, 2009 to March 31, 2010.

Introduction : CIRCOT was established as a Technological Laboratory under the Indian Central Cotton Committee (ICCC) in 1924. Indian Council of Agricultural Research (ICAR) took over the administrative control of the laboratory in 1966 when the ICCC was abolished along with other commodity committees. The laboratory was renamed as Cotton Technological Research laboratory. To intensify research and reorient the activities in consonance with the research priorities of ICAR, new mandates were formulated. The laboratory was renamed as Central Institute for Research on Cotton technology on April 1, 1991.

The Institute continued to play its role as the technology partner to contribute the All India Coordinated Cotton Improvement Project and over 2532 samples were evaluated for their fibre properties and spinning potential. More than 3,000 cotton samples from various breeding trials were assessed at the headquarters for fibre quality, while at the Regional Quality Evaluation Units more than 20,000 samples belonging to initial stages of breeding trials were evaluated.

The Library at CIRCOT has a total of 6555 books and 7846 bound volumes of Journals. Eighteen Indian and 24 foreign journals were subscribed for during the year. The library also subscribed to CDROM Database of ASTM, TAPPI, AATCC, Standard Test Methods, World Textile Abstracts and Analytical Abstracts. An On-line registration with Lexis Nexis, USA for Total Patents database under ITMU – IPR Fund has also been subscribed. With this, it is possible to access and retrieve data on any patent information worldwide. CIRCOT continued to be recognised as a post graduate institution affiliated to the Mumbai University.

During the year under review, thirty-one projects, including externally aided programmes were in operation under different core areas.

During the period under report two IRC, one RAC and two Institute Management Committee Meetings were held.

The following Seminars/Workshops were conducted during 2009-2010 :

- ✓ An International Conference on **Emerging Trends in Production,**

Processing and Utilisation of Natural Fibres from April 16 – 18, 2009 was organised at Mayfair, Worli, Mumbai as a collaborative effort of ISCI, IFS, ICAR and Texas Tech University, USA to celebrate the International year of Natural Fibres.

- ✓ The Fifth Review Meeting of the project on **Utilisation of Cotton Plant By-produce for Value Added Products** was conducted on June 12, 2009 at Dr. V. Sundaram Committee Room at CIRCOT, Mumbai.
- ✓ Third CAC Meeting of NAIP Sub Project (Comp. II) : **A Value Chain on Utilisation of Banana Pseudostem for Fibre and other Value Added Products** was held on August 27, 2009.
- ✓ Four Hindi Workshops on June 15 and 16, 2009, September 24 and 25, 2009, December 18 and 19, 2009, February 19 and 20, 2010 were held during the year.
- ✓ Hindi Week was celebrated from September 14 to 19, 2009 with competitions, poster presentations and lectures.
- ✓ Vigilance Awareness Week was observed from November 3 to 7, 2009.
- ✓ An International **Workshop on Utilization of Cotton Plant By-produce for Value Added Products** was organized from 9-11 November 2009 at Hotel Pride, at Nagpur by the Central Institute for Research on Cotton Technology (CIRCOT), Mumbai, in collaboration with the International Cotton Advisory Committee (ICAC), Washington and the Common Fund for Commodities (CFC), Netherlands. About 20 participants from other countries predominantly from Africa participated in the workshop.
- ✓ Two Business Development Programmes for CIRCOT Technologies were arranged one at the Cotton Association, Mumbai on August 1, 2009 and another one at Southern India Mills' Association (SIMA), Coimbatore on December 22, 2009 under the aegis of the Business Planning and Development Unit of CIRCOT.
- ✓ Quami Ekta Week was celebrated during November 19 – 25, 2009.
- ✓ A Choupal was conducted on December 16, 2009 by the Institute in collaboration with the Town Official Language Committee, North Mumbai.
- ✓ A function to felicitate Shri Rajvinder Singh, a Germany based poet for his outstanding work in Hindi was organised jointly by the Institute and Shruti Sanvad Sahitya Kala Academy.
- ✓ The International Women's Day

was celebrated on March 9, 2010 with a talk on Stress Management by Dr. (Smt.) Savitri Kulkarni, Associate Dean, Welingkar Institute of Management Development & Research, Matunga, Mumbai.

- ✓ An Awareness meet was organised for the Ginners at Khandesh on June 25, 2009.
- ✓ A programme for the ginning industry personnel at Nagpur on August 20, 2009 was arranged in collaboration with M/s. Bajaj Steel Industries Limited, Nagpur.
- ✓ A programme to disseminate the technology of quality ginning and preservation of fibre attributes was held at Khandawa, Indore, Madhya Pradesh on September 4, 2009 for the benefit of cotton merchants and ginners in that area.
- ✓ An Awareness meet at Nandura Village, Babhulgaon Taluka, Yeotmal was organised for popularisation of clean cotton picking and utilization of cotton stalks.
- ✓ During the year three lectures by the staff and four by outside personnel were arranged on various topics for the benefit of the staff members of the Institute.
- ✓ The Institute participated in four exhibitions and arranged three industry-interface meetings.
- ✓ Like earlier years, in the current year also the Institute won a number of prizes; Long Jump, Javelin throw, Table Tennis, Badminton, Chess and Carrom (Women), Table Tennis (Men).

Research Highlights : In a study on the Influence of Storing Conditions on Bale Quality, it was found that the fibre properties of the lint is not affected by storage in tropical conditions for a period not exceeding three months while the colour of the lint becomes yellowish.

A computerized software namely 'Cotton Bale Manager' has been developed with two important functionalities - (1) Design and generation of bale identification tag and (2) Computer interfacing of bale tags and management of bale database including the information of the bale ID and fibre quality parameters. The software generates unique bar-coded customized labels for every individual bale which is integrated with bale information along with its fibre properties. This technology has been successfully transferred to M/s. SSPS, Hyderabad.

A prototype of cylinder type cotton pre-cleaner based on axial flow principle was designed and developed. It was observed that the principle of axial flow could be effectively used for pre-cleaning of seed cotton. The capacity of the machine was found to be between 5-7 quintals/hr. The machine was found to remove effectively the large trash particles, sand, dust, kawadi, etc. The

cleaning efficiency of the developed machine was found to be 25-30% and the trash content reduced by about 1-1.5% after cleaning.

In the All India Co-ordianted Cotton Improvement Project (AICCIP), 1233 samples at the Headquarters and 1299 samples in all the Regional units were tested. The technological report for 2008-09 was presented during April 6 - 8, 2009 in the Annual Workshop at Hyderabad. Apart from these, a number of samples pertaining to various other trials have also been tested for fibre properties.

During the reporting period, 94 trade and 50 standard varieties received were evaluated for their fibre, spinning and yarn properties. In the case of standard varieties the 2.5% span length and micronaire values remained the same irrespective of the season but the tenacity values were lower than the assigned values at the time of release of some varieties.

Five hundred and sixty-three containers of calibration cottons were sold and Rs.3,30,754/- revenue generated.

An instrument has been fabricated and developed for measuring the electrical resistance of the fabrics and textile materials. The performance of the instrument was evaluated by testing several kinds of fabrics and the error and deviation in the measurement has been found to be well within the tolerance limits.

In a study on the Structure-Property Relationships of DREF Friction Spun Yarns, it was found that the Strength and elongation % of DREF yarn do not change significantly with varying carding drum speeds and also the tensile properties of DREF yarns depend mainly on core nylon 6 filament content. The sheath cotton content does not seem to influence the tenacity of the composite yarn.

In the NAIP funded project on **Value Chain for Cotton Fibre, Seed and Stalks: An innovation for Higher Economic Returns to Farmers and Allied Stake Holders** the progress made is summarized as follows :

At Nagpur 341 qtl of *Kapas* from first picking, 107 qtl of *kapas* from second picking and 466 qtl of *Kapas* from the first picking at Coimbatore were procured. Ginning of the cotton has been completed in both the places. From this 65 bales and 80 bales have been prepared at Nagpur and Coimbatore respectively. Tagging of all the bales for quality parameters have been done. At Nagpur 8.165 tonnes 30s count yarn was prepared and yarn preparation for 80s count at Coimbatore is in progress. Two tonnes of yarn doubled and made in hank form and fabric preparation is in progress. Cleaning of cotton stalks and chipping completed at Nagpur. Four tonnes of chipped stalk were delivered to M/s. Arbindo Laminates and 11 tonnes to

GTC, Nagpur Plant for making particle board. Pre-treatment using 0.1% cellulose and 0.2% Papain gave slightly higher yield of oil than control (untreated). Work on the installation of anaerobic treatment plant at NDDB, Sabarmati Ashram, Bidaj is completed and commissioned.

In the project entitled **A Value Chain on Banana Pseudostem for Fibres and other Value Added Products**, CIRCOT is a consortium partner. During the period under report, procedures for fibre extraction have been standardized and the varieties identified for evaluation. One hundred samples pertaining to 25 varieties received from Navsari and 8 samples from NRCB, Tiruchirapalli were tested for tensile parameters. Ten varieties were evaluated for chemical composition. Softening trials were conducted to soften the banana fibres. Four softening agents were used for softening the fibres prior to yarn preparation. About 80 Kg yarn was produced using Jute Spinning System and sent to MANTRA for fabric preparation. Also, as a preliminary trial, 2 Kg yarn was produced on Medlari Charkha and the quality parameters of yarn were evaluated. It was found that the yarn obtained from automatic plant was having better tenacity. Yarn prepared on Medlari Charkha was finer (about 500 Tex), as compared to machine made yarn (about 580 Tex). Using the pseudostem sap as mordant, dye uptake could be improved with good fastness properties. The process for the preparation of micro crystalline cellulose (MCC) by chemical method has been standardized.

CIRCOT is a consortium partner in the project on **Design and Development of Rubber Dams for Watersheds** under Component 4 of the NAIP project. During the reporting period, fabric properties like the tensile strength (Strip), tensile strength (Wide width), elongation at break, tear strength, Index Puncture strength and flexural rigidity were tested for experimental fibres for both warp and weft except index puncture strength. A specification has been arrived at for bulk fabric preparation for the protodam.

In another NAIP project on **Value Chain for Coconut Fibre and its by-products: Manufacture of Diversified Products of Higher Value and Better Marketability to Enhance the Economic Returns of Farmers**, a joint survey was conducted by CIRCOT along with TMNRRDC at Tiruvananthapuram, Ernakulum, Alleppey and Tenkasi during July 12 to 18, 2009. The survey was indented to study the status of different extraction machineries used for coconut fibre, their processing and spinning methods. The designs for prototype disintegrator, defibering machine with cleaner and fibre segregator were prepared.

In a project on the Eco-friendly Pre and Post Processing of Fabrics Prepared from Organic Cotton and Finishing with

Chitosan, enzymatically bioscoured and bleached fabric was dyed with berberine dye and dyed fabric was treated with chitosan and dried and cured. The antibacterial property of the dyed fabric was evaluated using *S. aureus*. The fabric showed 100% reduction in the bacterial count indicating good antibacterial property.

In the project on Development of Protective Clothing for Agricultural Pesticide Spraying Operations, grey fabrics purchased from the market were scoured by kier boiling and were bleached. These were then tested for various characteristics such as ends and picks per inch, fabric weight, drop absorbency and pesticide protective performance. All samples after scouring and bleaching showed instantaneous wetting upon testing for drop absorbency and pesticide penetration through these samples ranged from 21 % - 34% for both ironed and non-ironed samples. These values were not very different from those obtained for grey washed samples (20% to 38% for ironed and 17% to 35% for non-ironed). Therefore these fabrics in the grey stage itself can be used as low cost level 1 pesticide protective clothing as they satisfy the specified percent pesticide penetration requirement of 5% - 40%. Twelve commercial ready for dyeing fabrics comprising of 100% cotton woven and knits, polyester cotton blends and a woolen and a nylon fabric were procured and tested for physical characteristics and percent pesticide penetration. In this only two cotton knits and two twill fabrics (one cotton and another blended) passed level 1 pesticide protection criteria. It was observed that grey cotton knits given a hot soda detergent wash provided better pesticide protection than the scoured and bleached sample.

In the Component 4 of NAIP project on the **Synthesis and Characterization of Nano-Cellulose and its Application in Biodegradable Polymer Composites to Enhance their Performance** project, it was found that since the conventional sulphuric acid hydrolysis process is energy intensive and the surface of the nanocellulose is chemically modified, an attempt was made to prepare it through microbial and enzymatic means. For this, short staple cotton 'Bengal Desi' was used as the raw material for preparation of nanocellulose. The cotton fibres were converted to microcrystalline cellulose (MCC) by conventional hydrochloric acid hydrolysis. Subsequent conversion of MCC to nanocellulose was carried out by hydrolysis using the fungus, *Trichoderma reesei*. Controlled fungal degradation of MCC resulted in nanocellulose of size less than 100 nm and the yield of 23%. This nanocellulose was characterized for its size. This nanocellulose was used as filler in the preparation of starch film to improve its mechanical and functional properties (reducing gas and water vapour permeability). Simultaneously,

nanocellulose was prepared by using high pressure homogenizer (at 40,000 psi). Homogenization resulted in the nanocellulose with very high aspect ratio (more than 100). The starch film is being prepared with the incorporation of nanocellulose of very high aspect ratio.

Under the CFC funded project on the **Utilisation of Cotton Plant Byproduce for Value added Products**, an NGO to supply ready to use cotton stalk chips was identified. The identified firm could collect cotton stalks, chip in the field and supply about 500 ton ready to use chips to M/s. Godavari Particle Board Industries. A market survey was completed by M/s. Mac Donald Co., Mumbai for the particle boards and hard boards prepared from cotton stalks. The survey clearly indicated that cotton stalks can serve as an additional raw material and industries are of the view that they are ready to use cotton stalks provided the same is supplied at the factory site.

Under the Technology Mission on Jute, about 50 kg of decorticated ramie fibres were degummed and were blended with Bunny cotton (30:70) and spun on cotton system. They were converted into woven material at Sholapur on powerlooms. After the production of towels, to increase the absorbency and to give a soft feel , they were subjected on one side to a shearing process. The towels satisfied all the norms for absorbency.

In the **Zonal Technology Management and BPD Unit at CIRCOT**, Mumbai (National Agricultural Innovation Project, Component 1), during the year, thirty-one members have registered with ZTM-BPD Unit and an annual registration fee of two thousand was collected from each member. Bankable Project Proposal has been prepared for "Particle Board manufacturing Plant from cotton stalks" in consultation with M/s. MITCON Consultancy Services, Pune. This proposal is meant for setting up of particle board unit at Wardha District under cooperative system. This project is yet to take off, however BPD is in constant touch with MITCON about the further developments. Two Business Development Programmes on CIRCOT Technologies were conducted - one at CAI, Mumbai on 1st August 2009 and the other at SIMA, Coimbatore on 22 December 2009. More than 65 entrepreneurs participated in each programme. BPD presented a market research paper titled, "Demand assessment of Agribusiness technologies of Cotton and its By-products" at International Conference on Agripreneurship and Rural Development [ICARD2009] held at Banaras Hindu University Campus, Varanasi, India on December 5, 2009.

Extension Activities : The Director and scientists of CIRCOT continued as members of various committees of BIS for cotton and textile testing, and in various panels of organisations like

ATIRA, BTRA, SITRA, UICT, etc. 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 by way of scientific papers for the benefit of the appropriate user groups and (iv) dissemination of technical information through training programmes.

The testing house received over 9500 samples of fibre, yarn and fabric for different kinds of tests while at the Regional centres about 21500 samples were tested. Training courses on cotton quality evaluation were conducted at the headquarters for about 49 persons engaged in textile trade and industry. At GTC, Nagpur, around 336 sponsored personnel were trained on various aspects of cotton ginning. The resource generation at CIRCOT during 2009-10 by commercial sample testing, consultancy research, training and revolving fund activities was to the tune of Rs. 106.55 lakhs as against the Council's set target of Rs. 66 lakhs for the period under report.

सार संक्षेप

यह केन्द्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान के कार्यकलापों की 1 अप्रैल, 2009 से 31 मार्च, 2010 की छियासीवीं वार्षिक रिपोर्ट है ।

भूमिका

केन्द्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान (सिरकॉट) की स्थापना भारतीय केन्द्रीय कपास समिति के अंतर्गत सन् 1924 में प्रौद्योगिक प्रयोगशाला के रुप में हुई । भारतीय कृषि अनुसंधान परिषद ने सन् 1966 में इस प्रयोगशाला को अपने प्रशासनिक नियंत्रण में ले लिया, जब भारतीय केन्द्रीय कपास समिति का अन्य व्यावसायिक समितियों के साथ समापन कर दिया गया । इस प्रयोगशाला का नाम बदलकर कपास प्रौद्योगिकी अनुसंधान प्रयोगशाला रखा गया । भारतीय कृषि अनुसंधान परिषद के अनुसंधान कार्यकलापों को प्रधानता व नया मोड़ देने एवं कृषि अनुसंधान कार्यों में तेजी लाने के लिए नए सिद्धान्त व आज्ञापत्र बनाए गए । 1 अप्रैल, 1991 को इस संस्थान का नाम पुनः बदलकर केन्द्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान रखा गया, जो संस्थान का वर्तमान नाम है ।

संस्थान ने अखिल भारतीय समन्वित कपास सुधार परियोजना (ए.आइ.सी.सी.आइ.पी.) के अंतर्गत तकनीकी सहभागी के रुप में काम करते हुए इस वर्ष लगभग 2532 से अधिक कपास के नमूनों की गुणवत्ता परीक्षण एवं साथ ही कई नमूनों का कताई परीक्षण भी किया । वर्तमान वर्ष के दौरान देश के विभिन्न कपास प्रजनकों से प्राप्त 3000 से भी अधिक कपास के नमूनों का तन्तु परीक्षण मुख्यालय, मुंबई में किया गया, जबकि संस्थान के क्षेत्रीय गुणवत्ता मूल्यांकन इकाईयों में प्रयोग की प्रारंभिक अवस्थाओं से प्रजनित लगभग 20,000 से भी अधिक कपास के नमूनों की तन्तु-गुणवत्ता का परीक्षण द्वारा मूल्यांकन किया गया ।

संस्थान के पुस्तकालय में कुल 6555 पुस्तकें एवं 7846 जिल्द चढे जर्नल हैं । अठारह भारतीय एवं 24 विदेशी जर्नलों की सदस्यता प्राप्त करने पर ये जर्नल पुस्तकालय में नियमित रुप से उपलब्ध हैं । साथ ही संस्थान के पुस्तकालय में भारतीय व ए.एस.टी.एम. मानक, टी.ए.पी.पी.आई, ए.ए.टी.सी.सी., मानक परीक्षण पद्धति, विश्व टेक्सटाइल सारांश एवं विश्लेषित सारांशों के सीडी रोम डाटाबेस भी उपलब्ध हैं । आइ.टी.एम.यू-आइ.पी.आर. परियोजना के अनुदान के अंतर्गत पेटेन्ट के संपूर्ण डाटाबेस हेतु लेक्सिस, नेक्सिस, यु.एस.ए. में ऑन-लाइन रजिस्ट्रेशन की सुविधा भी प्राप्त कर ली गई है । इसके द्वारा पूरे विश्व के किसी भी पेटेन्ट की जानकारी प्राप्त की जा सकती है । पहले की भांति, इस संस्थान को मुंबई विश्वविद्यालय के अधीन स्नातकोत्तर संस्थान के रुप में मान्यता प्राप्त है,

संस्थान में रिपोर्ट की अवधि के दौरान बाहर की निधि की मदद से चल रहे कार्यक्रमों को मिलाकर विभिन्न

कोर क्षेत्रों में कुल इकतीस परियोजनाओं के अंतर्गत शोधकार्य जारी रहे ।

रिपोर्ट की अवधि के दौरान संस्थान में दो आई.आर.सी., एक आर.ए.सी. तथा दो संस्थान प्रबंधन समिति की बैठकों का आयोजन हुआ ।

वर्ष 2009-2010 के दौरान निम्नलिखित कार्यशालाओं/सम्मेलनों का आयोजन हुआ :

1. दिनांक 16-18 अप्रैल, 2009 के दौरान एक अंतर्राष्ट्रीय कार्यशाला **इमर्जिंग ट्रेन्डस इन प्रोडक्शन, प्रोसेसिंग एंड यूटिलाइजेशन ऑफ नेचुरल फाइबर** मेफेयर, वरली, मुंबई में इस्की, आइ,एफ.एस., आइ.सी.ए.आर एवं टेक्सास टेक विश्वविद्यालय, अमेरिका के सम्मिलित प्रयास से आयोजित हुआ ।

2. कपास डंठलों के बेहतर मूल्य संवर्धित उत्पाद परियोजना की पाँचवी पुनरावलोकन बैठक का आयोजन डा.वी.सुन्दरम समिति कक्ष में दिनांक 12 जून, 2009 को हुआ ।

3. एन.ए.आई.पी. के घटक 2 के अंतर्गत - **केला सुडोम तना रेशा एवं अन्य मूल्य संवर्धित उत्पाद पर मूल्य कड़ी** परियोजना की तीसरी सी.ए.सी. बैठक 27 अगस्त, 2009 को हुई ।

4. वर्ष के दौरान हिन्दी की चार कार्यशालाएँ क्रमशः 15-16 जून, 2009, 24-25 सितंबर, 2009, 18-19 दिसंबर, 2009 एवं 19-20 फरवरी, 2010 को हुईं ।

5. 14-19 सितंबर, 2009 के दौरान हिन्दी सप्ताह शोध पत्र प्रदर्शनी एवं वाक् प्रतियोगिताओं के साथ मनाया गया ।

6. सतर्कता जागरुकता सप्ताह 3 से 7 नवंबर, 2009 के दौरान मनाया गया ।

7. एक अंतर्राष्ट्रीय कार्यशाला **कपास डंठलों के उपयोगी मूल्य संवर्धित उपोत्पाद** विषय पर 9-11 नवंबर, 2009 के दौरान प्राइड होटल, नागपूर में केन्द्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान (सिरकॉट), मुंबई ने अंतर्राष्ट्रीय कपास एडवाइजरी कमिटि (आय.सी.ए.सी.) वाशिंगटन एवं कॉमन फंड फार कोमोडिटिज (सी. एफ. सी.), नीदरलैंड के साथ मिलकर आयोजित किया । लगभग 20 विदेशी मुख्यतः अफ्रिका के सहभागियों ने इस कार्यशाला में भाग लिया ।

8. सिरकॉट के तकनीकों के लिए दो बिजनेस विकास प्रोग्राम कॉटन एसोसिएशन, मुंबई में 1 अगस्त, 2009 एवं दूसरा सदर्न इंडिया मिल्स एसोसिएशन (सीमा) कोयंबत्तुर में 22 दिसंबर, 2009 को बिजनेस प्लानिंग एवं डेव्लपमेंट यूनिट, सिरकॉट ने आयोजित कराया ।

9. कौमी एकता सप्ताह 19-25 नवंबर, 2009 के दौरान मनाया गया ।

10. संस्थान में 16 दिसंबर, 2009 के दिन नगर राजभाषा कार्यान्वयन समिति (नराकास) के साथ मिलकर एक चौपाल का आयोजन हुआ ।

11. मशहूर कवि (जर्मन स्थित) श्री राजविन्दर सिंह को सम्मनित करने के लिए संस्थान ने श्रुति संवाद

साहित्य कला अकादमी के साथ मिलकर कार्यक्रम किया ।

12. अंतर्राष्ट्रीय महिला दिवस 9 मार्च, 2010 को संस्थान में डा. (श्रीमती) सावित्री कुलकर्णी, एसोसिएट डीन, वेलिंगकर इंस्टीट्यूट ऑफ मैनेजमेंट डेव्लपमेंट एंड रिसर्च, माटुंगा, मुंबई के **तनाव प्रबंधन** पर व्याख्यान के साथ मनाया गया ।

13. ओटाई करने वालों के लिए एक जागरुकता बैठक 25 जून, 2009 के दिन **खानदेश** में हुई ।

14. ओटाई उद्योग के लोगों के लिए दिनांक 20 अगस्त, 2009 को मेसर्स बजाज स्टील इंडस्ट्रीज लिमिटेड, नागपुर के सहयोग से नागपुर में एक प्रोग्राम आयोजित किया गया ।

15. खंडवा, इंदौर, मध्य प्रदेश में 4 सितंबर, 2009 के दिन आधुनिक ओटाई तकनीक के गुणों एवं कपास के गुणधर्मों को बचाने पर कपास के व्यापारियों एवं ओटाई करने वाले क्षेत्रों के लोगों के लिए एक कार्यक्रम आयोजित किया गया ।

16. स्वच्छ कपास की चुनाई एवं कपास के डंठलों के बेहतर उपयोग पर नान्दुरा गाँव, बाभुलगाँव तालुका, यवतमाल में जागरुकता बैठक आयोजित की गई ।

17. संस्थान के कर्मचारियों के ज्ञानवर्धन हेतु वर्ष के दौरान संस्थान के कर्मचारियों द्वारा तीन एवं बाहर से बुलाए गए वक्ता द्वारा चार व्याख्यानों का आयोजन हुआ ।

18. संस्थान ने तीन प्रदर्शनियों में भाग लिया एवं तीन इंडस्ट्री-इंटरफेस मीटिंग का आयोजन किया ।

19. पहले की वर्षों की ही तरह इस वर्ष भी संस्थान के कर्मचारियों ने जोनल एवं सेन्ट्रल मीट स्पोर्टस में कई मेडल जीते : ऊँची कूद, जेवलीन फेंक, टेबल टेनिस, बैडमिंटन, शतरंज, कैरम आदि ।

विशिष्ट शोधकार्य

गाँठ की गुणवत्ता पर भंडारण अवस्था के प्रभाव के अध्ययन में तीन माह के दौरान पाया गया कि ट्रॉपिकल क्षेत्र में भंडारण से कपास के तंतु गुणों पर कोई प्रभाव नहीं पड़ता, जबकि इनके रंगों में थोड़ा पीलापन आता है ।

एक कम्प्यूटीकृत सॉफ्टवेयर "कॉटन बेल मैनेजर" विकसित किया गया जिनके दो प्रमुख कार्य हैं - (1) गाँठ की पहचान के टैग की डिजाइन एवं विकास एवं (2) गाँठों के टैग को कम्प्यूटर के साथ जोड़ना एवं रेशों के गुणवत्ता सहित गाँठों की पहचान आदि डाटा का मैनेजमेंट । यह सॉफ्टवेयर प्रत्येक गाँठों के लिए यूनिक बार कोड पैदा करता है जिसे टैग बनाकर गाँठ के साथ रेशों की गुणवत्ता आदि की सूचना के साथ लगाया जा सकता है । यह तकनीकी सफलतापूर्वक एस.एस.पी.एस., हैदराबाद को हैस्तानांरित की गई है ।

एक्सियल फ्लो सिद्धान्त पर आधारित एक बेलन टाइप के कपास प्री क्लीनर का प्रोटो-टाइप डिजाइन बनाकर विकसित किया गया । यह पाया गया कि एक्सियल फ्लो सिद्धान्त कपास की प्री-क्लीनिंग के लिए

प्रभावी है । मशीन की क्षमता 5 से 7 क्विंटल प्रति घंटे पायी गई । पाया गया कि मशीन प्रभावी तरीके से बड़े संदूषकों, बालू, धूल-कण, कावडी आदि को साफ कर पाता है । मशीन की सफाई करने की क्षमता 25 से 30% एवं सफाई से धूल-कण निकालने की क्षमता 1 से 1.5% तक पायी गयी ।

अखिल भारतीय कपास समन्वित सुधार परियोजना (ए. आइ. सी. सी. आई.पी.) के अंतर्गत 1233 कपास के नमूनों का मुंबई मुख्यालय में एवं 1299 नमूनों का क्षेत्रीय यूनिटों में गुणवत्ता मूल्यांकन परीक्षण किया गया । वर्ष 2008-2009 के लिए रेशों की गुणवत्ता पर आधारित तकनीकी रिपोर्ट आचार्य एन.जी.रंगा कृषि विश्वविद्यालय, हैदराबाद में 6-8 अप्रैल, 2009 के दौरान आयोजित वार्षिक कार्यशाला में प्रस्तुत की गई ।

रिपोर्ट की अवधि के दौरान 94 ट्रेड एवं 50 स्टैन्डर्ड प्रजातियों का रेशा, कताई एवं सूत परीक्षण किया गया । मानक प्रजातियों के रेशा गुणवत्ता परीक्षण में पाया गया कि रेशों के 2.5% स्पान लंबाई एवं महीनता हर मौसम में एक समान रहते हैं, जबकि इन रेशों की टेनासिटी (ग्राम/टेक्स) समय के बीत जाने से और मौसम-मौसम की तुलना पर रिलीज के दौरान निर्धारित किये गये मानक मानों से कम पाये गये ।

मानक कपास के पाँच सौ तिरसठ कंटेनर बेचे गए एवं इससे संस्थान को रु.3,30,754/- की प्राप्ति हुई ।

वस्त्रों एवं टेक्सटाइल उत्पादों के विद्युत प्रतिरोध मापने हेतु एक यंत्र बनाकर विकसित किया गया । इस यंत्र के निष्पादन मूल्यांकन हेतु विभिन्न प्रकार के वस्त्रों से परीक्षण किया गया और पाया गया कि माप में गल्तियाँ व अशुध्दियाँ निर्धारित सीमा के अंदर ही रही ।

ड्रेफ-फ्रिक्शन द्वारा कताई किए सूतों के स्ट्रक्चर-प्रापर्टी के अध्ययन में पाया गया कि ताकत एवं खिंचाव (%) कार्ड के ड्रम स्पीड बदलने पर कुछ खास नहीं बदलते हैं और साथ ही ड्रेफ सूतों के तनन गुण मुख्यतः **कोर** नायलोन 6 फिलामेन्ट पर निर्भर करते हैं । सम्मिश्र सूतों की तनन शक्ति पर उपरी सतह के कपास का कुछ खास प्रभाव नहीं पाया गया ।

राष्ट्रीय कृषि नवोन्मेषी परियोजना के द्वारा अनुदानित **वैल्युचेन फॉर कॉटन फाइबर, सीड एण्ड स्टाल्क : ऐन इनोवेशन फार हायर इकोनिमिक रिटर्न टु फारमर्स एण्ड एलाइड स्टेक होल्डरस्** परियोजना में निम्नलिखित संक्षिप्त उपलब्धियाँ हुई हैं ।

नागपुर में कपास की प्रथम चुनाई में 341 कुन्तल, द्वितीय पिकिंग में 107 कुन्तल एवं कोयम्बत्तुर में प्रथम पिकिंग में 466 कुन्तल कपास खरीदा (प्रोक्यूर) किया गया है तथा दोनों स्थानों से खरीदे गए कपास की ओटाई पूरी की जा चुकी है । इससे 65 गाँठ (बेल) कपास नागपुर में एवं 80 गाँठ (बेल) कपास कोयम्बटूर में तैयार किया गया है । इन सभी गाँठों में गुणवत्ता प्राचलों के लेवल लगाये गये हैं । नागपुर में 8165 टन 30 सूतांक (काउण्ट) के सूत तैयार किया गया है तथा कोयम्बत्तुर में 80 सूतांक का सूत निर्माणाधीन है । दो टन सूतों को डबल करके हैंक का निर्माण किया गया है एवं वस्त्र बनाने का कार्य उन्नति पर है । नागपूर में कपास डण्ठलों की सफाई व इनकी चिपिंग का कार्य पूरा हो गया है । पार्टिकल बोर्ड बनाने हेतु, ओटाई प्रशिक्षण केन्द्र, (जी.टी.सी.) नागपुर

ने 11 टन चिप्ड कपास डण्ठल, एम./एस. अरबिन्दों लेमिनेट्स को प्रदान किया है। नियंत्रित बिनौलों की अपेक्षा 0.1% सेलुलोज उपचारित और 0.2% पैपन उपचारित बिनौलों से थोड़ा अधिक तेल निकाला गया है। एन.डी.डी.बी. साबरमती आश्रम, बिदाज में एनअरोबिक उपचार संयत्र को प्रतिष्ठापन करके उसमें परीक्षण शुरु कर दिया गया है।

एवौल्युचेन ऑन बनाना सिड़ोस्टेम फॉर फाइबर ऐण्ड अदर वैल्यु एडेड प्रोडक्ट्स परियोजना में के.क.प्रौ.अनु.सं. एक संगठन सहयोगी है। प्रतिवेदन के समय तक केले के रेशों को निकालने एवं विभिन्न उचित प्रजातियों की गुणवत्ता मूल्यांकन की विधियों का मानकीकरण किया गया है। नवसारी से एक सौ नमूने, जो विभिन्न केलेकी प्रजातियों के थे तथा एन.आर.बी.सी. से प्राप्त 8 केले नमूनों का तन्य प्रालभ परीक्षण किया गया है। केले के रेशों को मुलायम बनाने हेतु अभ्यास किये गये हैं। सूत बनाने से पहले चार प्रकार के मुलायम बनाने वाले एजेण्टों का प्रयोग किया गया है। लगभग 80 किलोग्राम सूत की कताई पटसन कताई यंत्र का प्रयोग करते हुए की गयी एवं तत्पश्चात इसे मंत्रा सुरत में वस्त्र निर्माण हेतु भेज दिया गया है। प्रारम्भ में 2 किलोग्राम सूत का निर्माण मेडलारी चरखे से किया गया इसके बाद सूत का गुणवत्ता मूल्यांकन किया गया है। यह पाया गया है कि स्वचालित यंत्र से तैयार किये गये सूत में बेहतर शक्ति है। मेडलारी चरखे से तैयार किया हुआ सूत यंत्र द्वारा बनाये गये सूत की तुलना में अधिक पतला था (लगभग 500 टेक्स)। केले के सिडोस्टेम सैप का प्रयोग मारडैण्ट के रुप में करने पर रंग के अच्छे गुणधर्म प्राप्त किए जा सकते हैं। सूक्ष्म स्फटिक सेल्युलोज (एम.सी.सी.) को तैयार करने की विधि का मानकीकरण किया गया है।

के.क.प्रौ.अनु.सं. **डिजाइन एण्ड डेवलपमेण्ट ऑफ रबरडैम फॉर वाटर शेड्स** नामक राष्ट्रीय नवकरण परियोजना में एक संघटन सहयोगी है। इस परियोजना में वस्त्रों की विशेषताएँ यथा तन्य शक्ति (स्ट्रिप), तन्य शक्ति (वाइड विड्थ), प्रसार, टियर शक्ति, इन्डेक्स पंक्चर तथा फ्कजुरल दृढ़ता का निर्धारण किया गया है प्रोटोडैम तैयार करने हेतु ब्यौरा तैयार किया जा चुका है।

राष्ट्रीय नवकरण परियोजना जिसका शीर्षक **वैल्युचेन फॉर कोकोनट फाइबर ऐण्ड इटस बाइ-प्रोडक्ट : मनुफैक्चर ऑफ डाइबरसीफाइड प्रोडक्ट ऑफ हायर वैल्यु ऐण्ड बेटर मार्केटबिलिटी टू इन्हान्स द इकोनिमिक रिटर्न्स ऑफ फारमर्स** में के.क.प्रौ.अनु.सं. संघटन सहयोगी है। इस परियोजना में टी.एम.एन.आर.आर.डी.सी. व सिरकॉट ने मिलकर तिरुवन्तपुरम, इर्नाकुलम, अलेपी व तनकाशी में दिनांक 12 से 18 जुलाई, 2009 के दरम्यान एक संचालित किया। इस सर्वेक्षण का लक्ष्य, विभिन्न प्रकार के यंत्र जो रेशा निकालने के काम आते हैं, उनका अध्ययन और रेशों का प्रकृम तथा रेशों की कताई का स्तर जानना था। ऐसे प्रोटोटाइप यंत्र का विकास किया गया है जिसमें रेशों की सफाई करने का प्रकृम, रेशों को अलग करने का प्रकृम एवं रेशों को इकट्टा करने का प्रकृम समाहित हैं।

एक परियोजना में आर्गैनिक कपास में प्रकृम के पहले एवं प्रकृम के बाद चिटोसन एन्जाइम का प्रयोग करके परिस्थितिक मित्रवत वस्त्रों को तैयार किया गया है इन वस्त्रों को बरबेरीन रंग से रंगा गया एवं चिटोसन इन्जाइम से उपचारित करके सुखाया गया था।

एस.औरेसस का प्रयोग करके रंग रंजित वस्त्रों की प्रतिजीवाणु गुणधर्मों का मूल्यांकन किया गया है। वस्त्रों में जीवाणुओं की संख्या में 100% कमी देखने को मिली है। इससे पता चलता है कि वस्त्रों में जीवाणुरोधी गुणधर्म विद्यमान है।

कृषि कीटनाशी छिडकाव कार्यों के लिये संरक्षक वस्त्रों के विकास की परियोजना में बाजार से खरीदे पाँच घूसर सूती वस्त्रों को कीयर-क्वथन द्वारा अभिभार्जित करके और फिर विरंजित किया गया। इसके बाद इनके विभिन्न गुणधर्मों जैसे प्रति इंच तानों व बानों की संख्या, प्रति वर्गमी., वस्त्र भार, बूँद अवशोषकता तथा कीटनाशी संरक्षण का परीक्षण किया गया। बूँद अवशोषकता की जाँच करने पर सभी अभिभार्जित व विरंजित नमूनों ने तुरंत गीलापन प्रदर्शित किया तथा इस्त्री व बिना इस्त्री किये हुए दोनों अवस्थाओं में इनका कीटनाशी संरक्षण 21 से 34 प्रतिशत तक पाया गया। इन वस्त्रों का कीटनाशी संरक्षण, घूसर धोये हुए वस्त्रों के कीटनाशी संरक्षण (20 से 38 प्रतिशत इस्त्री किये हुए तथा 17-35 प्रतिशत बिना इस्त्री किये हुए के लिये) के जैसा ही था। अतः इन सूती वस्त्रों को घूसर अवस्था में ही कम मूल्य के दर्जा - 1 कीटनाशी संरक्षक वस्त्रों के तौर पर इस्तेमाल किया जा सकता है क्योंकि ये इन दर्जे के लिये निर्धारित कीटनाशी सरंक्षण की आवश्यकता (40 प्रतिशत से कम) को पूरा करते है। बारह विभिन्न तरह के व्यवसायिक, रंजन के लिये तैयार वस्त्र बाजार से मँगाये गये जिनमें शत प्रतिशत सूती बुने तथा सूचीग्रंथित वस्त्र, पालिएस्टर-सूत संमिश्रित वस्त्र तथा एक-एक ऊनी व नायलॉन वस्त्र शामिल थे। इनके मौलिक तथा कीटनाशी संरक्षण गुणों की जाँच की गई। इन वस्त्रों में से सिर्फ दो सूचीग्रथित वस्त्र तथा दो ट्विल बुनाई वाले वस्त्र (एक सूती तथा एक पालिएस्टर - सूत संमिश्रित वस्त्र) ही कीटनाशी संरक्षण दर्जा - 1 के लिए निर्धारित मानदंडों के अनुरुप पाये गये। यह भी देखा गया कि गर्म सोडा व डिटर्जेंट से धोये गये घूसर सूचीग्रंथित वस्त्रों का कीटनाशी सरंक्षण व्यवसायिक अभिभार्जित व विरंजित सूती वस्त्र के कीटनाशी संरक्षण से बेहतर था।

एन.ए.आई.पी. के घटक-4 की परियोजना - **नैनो सेलूलोस का निर्माण एवं अभिलक्षणन तथा इनका जैव अपघटनीय पॉलीमर कम्पोजिटों का निष्पादन सुधारने के लिये अनुप्रयोग** के अंतर्गत सूक्ष्मजैविकीय तथा एन्जाइम प्रक्रियाओं के द्वारा नैनोसेलूलोस बनाने के प्रयास किये गये क्योंकि पारंपरिक सल्फ्यूरिक जल-अपघटन प्रक्रिया ऊर्जा सघन होने के साथ साथ इसमें नैनोसेलूलोस की सतह का रासयानिक रुपांतरण भी देखा गया। इसके लिये लघु रेशे वाली कपास **बंगाल देसी** को कच्चे माल के तौर पर इस्तेमाल किया गया। पारंपरिक हाइड्रोक्लोरिक अम्ल जल अपघटन द्वारा कपास के रेशों से सूक्ष्म स्फटिक सेलूलोस (माइक्रो क्रिस्टलाइन सेलूलोस) का निर्माण किया गया। इस सूक्ष्म स्फटिक सेलूलोस से ट्राइकोडर्मा रीसी कवक द्वारा नैनो सेलूलोस बनाया गया। नियंत्रित कवकीय अपघटन द्वारा 100 वे नैनोमीटर से कम आकार वाला नैनोसेलूलोस 23 प्रतिशत मात्रा में प्राप्त हुआ। इस नैनोसेलूलोस का स्टार्च फिल्म के निर्माण में फिल्म के यांत्रिक तथा कार्यात्मक गुणधर्मों (गैस तथा जल वाष्प पारगम्यता) को सुधारने के लिये पूरक के रुप में उपयोग किया गया। साथ ही साथ उच्च दाब समांगित्र (होमोजिनाइजर) में 40000 पीएसआई तक उच्च दाब पर भी नैनो सेलूलोस बनाया गया। समांगीकरण द्वारा प्राप्त नैनोसेलूलोस उच्च अभिमुखता अनुपात (100 से अधिक) वाला था। इस उच्च अभिमुखता अनुपात

वाले नैनोसेलूलोस का उपयोग करके स्टार्च फिल्म बनाई जा रही है ।

सी.एफ.सी. द्वारा वित्तपोषित **कपास पौधे के उपोत्पादों का मूल्यवर्धित उत्पादों के लिए उपयोग** परियोजना में कपास डंठलों के छोटे टुकड़ों की आपूर्ति करने वाली गैर-सरकारी संस्था का पता लगाया गया । यह संस्था खेत से कपास डंठलों को इकट्ठा करके उनके छोटे टुकड़े करके उपयोग के लिये तैयार कपास इंठलों के छोटे टुकड़ों की लगभग 500 टन मात्रा की आपूर्ति मै.गोदावरी पार्टिकल बोर्ड इन्डस्ट्रीज को कर सकती है । मै.मैक डोनाल्ड कंपनी, मुंबई ने कपास डंठलों से बनाये गये पार्टिकल बोर्ड और हार्ड बोर्ड के लिए बाजार सर्वे का काम पूरा किया । इस सर्वे से स्पष्ट संकेत मिला कि कपास डंठलों को अतिरिक्त कच्चे माल के तौर पर इस्तेमाल किया जा सकता है और यदि फैक्टरी में ही इसकी आपूर्ति की जाये तो उद्यमी इसका उपयोग करने के लिए तैयार हैं ।

जूट पर तकनीकी मिशन के अंतर्गत लगभग 50 किलो विवल्किट रेमी के रेशे विगोंदन करने के बाद बन्नी कपास के साथ 30:70 अनुपात में संमिश्रित किये गये और कपास तंत्र पर इनकी कताई की गई । शोलापुर में विद्युत करधे पर कपड़ा बनाया गया । तौलिये बनाने के बाद उनकी अवशोषकता और स्पर्श की कोमलता बढ़ाने के लिये एक तरफ से कर्तन प्रक्रिया की गई । उत्पादित तौलिये की अवशोषकता के सभी मानदंडों के अनुरुप थे ।

के.क.प्रौ.अनु.सं. मुंबई में क्षेत्रीय प्रौद्योगिकी प्रबंधन एवं बी.पी.डी. इकाई (एन.ए.आई.पी., घटक-1) के अंतर्गत रु.2000/- प्रति सदस्य पंजीकरण शुल्क देकर इस वर्ष इकतीस सदस्यों ने पंजीकरण करवाया । मै.मिटकॉन कन्सल्टेन्सी सर्विसेज, पुणे के परामर्श से कपास डंठलों से पार्टिकल बोर्ड के निर्माण पर बैंक प्रस्तुति योग्य परियोजना प्रस्ताव बनाया गया । यह प्रस्ताव वर्धा जिले में सहकारी क्षेत्र में पार्टिकल बोर्ड इकाई स्थापित करने के लिये है । अभी यह इकाई स्थापित नहीं हुई है और इसकी प्रगति के बारे में जानकारी लेने हेतु बी.पी.डी. मै.मिटकॉन से लगातार संपर्क में है । के.क.प्रौ.अनु. की प्रौद्योगिकियों पर दो व्यापार विकास कार्यक्रम आयोजित किये गये जिसमें से एक का आयोजन 1 अगस्त, 2009 को सी.ए.आई., मुंबई में किया गया तथा दूसरा 22 दिसम्बर, 2009 को एस.आई.एम.ए., कोयम्बतूर में आयोजित किया गया । दोनों ही कार्यक्रमों में 65 से अधिक उद्यमी उपस्थित थे । बनारस हिंदू विश्वविद्यालय परिसर, वाराणसी में 5 दिसम्बर, 2009 को आयोजित कृषि उद्यमिता और ग्रामीण विकास पर अंतर्राष्ट्रीय सम्मेलन में बी.पी.डी. द्वारा **कपास और उसके उपोत्पादों की कृषि व्यापार प्रौद्योगिकियों का माँग मूल्यांकन** विषय पर एक शोध पत्र प्रस्तुत किया गया ।

प्रसार गतिविधियाँ :

के.क.प्रौ.अनु.सं. के निदेशक व वैज्ञानिक, कपास व वस्त्र परीक्षण पर विभिन्न बी.आई.एस. समितियों के सदस्य के रुप में कार्य करते रहे तथा ए.टी.आई. आर.ए., बी.टी.आर.ए., एस.आई.टी. आर.ए. तथा यू.आई.सी.टी. जैसे संस्थानों के विभिन्न पैनलों पर भी रहे । इस अवधि में संस्थान की मुख्य प्रसार गतिविधियाँ इस प्रकार रहीं - (i) रेशे, सूत और वस्त्र के विभिन्न गुणवत्ता पहलुओं पर यथार्थ और विश्वसनीय आंकड़े उपलब्ध कराना, (ii) परामर्शदात्री सेवायें (iii) उचित

उपयोगकर्ताओं के लाभ के लिये शोध परिणामों को वैज्ञानिक शोध पत्रों में प्रकाशित करना (iv) प्रशिक्षण कार्यक्रमों द्वारा तकनीकी जानकारी का प्रसार करना।

विभिन्न प्रकार के परीक्षणों के लिये 9500 से अधिक रेशे, सूत और वस्त्र के नमूने परीक्षण गृह में प्राप्त हुए जबकि क्षेत्रीय इकाइयों में लगभग 21,500 नमूनों का परीक्षण किया गया। कपास गुणवत्ता मूल्यांकन पर मुख्यालय में प्रशिक्षण कार्यक्रम आयोजित किये गये जिनमें व्यापार और वस्त्र उद्योग से जुड़े लगभग 49 लोगों ने भाग लिया। ओटाई प्रशिक्षण केन्द्र, नागपूर में लगभग 336 प्रायोजित प्रशिक्षणार्थियों ने कपास ओटाई के विविध पहलुओं पर प्रशिक्षण प्राप्त किया।

वर्ष 2009-10 में व्यवसायिक नमूनों के परीक्षण, परामर्शदात्री सेवाओं के प्रशिक्षण तथा रिवॉल्विंग फंड गतिविधियों से संस्थान ने रिपोर्ट की अवधि के दौरान, इस अवधि के लिये परिषद द्वारा निर्धारित लक्ष्य रु.66 लाख से काफी अधिक रु.106.55 लाख की धनराशी अर्जित की।

Salient Achievements at a Glance

Research Achievements

- ✓ When cotton lint in bale form is stored for a period upto three months in tropical environments, there is no deterioration in fibre attributes except for a change in colour towards yellow.
- ✓ 'Cotton Bale Manager', a software designed and developed in association with M/s. SSPS, Hyderabad for coding bales with its origins indicating fibre attributes has been licensed to the collaborating firm for commercial transfer to interested end users.
- ✓ A prototype of cylinder type cotton pre-cleaner based on axial flow principle was designed and developed.
- ✓ During the year 2009-10, 2532 cotton samples received under AICCIP was tested for fibre and spinnability tests and promising entries identified.
- ✓ Ninety-four trade and fifty standard varieties received during the reporting period were evaluated. In the case of standard varieties the 2.5% span length and micronaire values were noted to be stable from season to season while the tenacity values were lower than the assigned values at the time of release of some varieties.
- ✓ Strength and elongation of DREF-3 yarn do not change significantly with varying carding drum speeds. The tensile properties of yarns depend mainly on core fibre content. Breaking strength of yarn decreases as count increases and follows a power law type of relation.
- ✓ A Rotating Flat System for CIRCOT Mini Card has been designed and fabricated.
- ✓ A procedure for the extraction of fibre from banana pseudostem has been standardized and varieties for evaluation identified. Sap from pseudostem when used as mordant was found to improve the dye uptake and fastness properties of the dyed fabric.
- ✓ Chitosan treated fabric showed good antbacterial properties even after the 25th washing.
- ✓ The market survey conducted by M/s. Mac Donald Co., Mumbai for the preparation of particle boards and hard boards from cotton stalks indicated that cotton stalks can serve as an additional raw material and industries are of the view that they are ready to use cotton stalks provided the same is made available at the factory site.
- ✓ Thirty full sized terry towels, prepared through CIRCOT method of degumming from 50 kg decorticated ramie fibres. A degumming plant for treatment of ramie was installed at CRIJAF, Barrackpore.
- ✓ A bankable project proposal was prepared for "Particle Board manufacturing Plant from cotton stalks" in collaboration with M/s. MITCON Consultancy Services, Pune. This proposal is meant for setting up of particle board unit at Wardha District under cooperative system.

Training, Consultancy and Technology Transfer Activities

- ✓ About 9560 cotton samples at the headquarters and 21,730 at regional units under the paid test category were tested and around Rs. 66,08,710 generated.
- ✓ At the headquarters 49 sponsored personnel from cotton trade and industry in four

batches underwent training in quality evaluation of fibres and in the use of HVI and AFIS including statistical interpretation of data. At the Ginning Training Centre, Nagpur, 336 gin fitters sponsored from various ginning industry underwent training in the operation of various machines and their maintenance in 11 batches. Revenue generation through training activity was around Rs.8,71,236.

- ✓ During 2009-10, 563 containers of CIRCOT Calibration cotton were sold generating around Rs. Rs.3,30,754.
- ✓ Twelve consultancies were undertaken generating around Rs. 16.35 lakhs.
- ✓ Fifteen new innovations were patented during the current year alone.

Awareness Programmes, Participation in Exhibitions and Organising Seminars/ Workshop/Conferences

- ✓ An International Conference on **Emerging Trends in Production, Processing and Utilisation of Natural Fibres** was organised from April 16 – 18, 2009 at Mayfair, Worli, Mumbai in association with ISCI, IFS, ICAR and Texas Tech University, USA to celebrate the International year of Natural Fibres.
- ✓ The Fifth Review Meeting of the project on **Utilisation of Cotton Plant By-produce for Value Added Products** was held on June 12, 2009 at Dr. V. Sundaram Committee Room at CIRCOT, Mumbai.
- ✓ Third CAC Meeting of NAIP Sub Project (Comp. II) : **A Value Chain on Utilisation of Banana Pseudostem for Fibre and other Value Added Products** held on August 27, 2009.
- ✓ Four Hindi Workshops on June 15 and 16, 2009, September 24 and 25, 2009, December 18 and 19, 2009, February 19 and 20, 2010 were organised.
- ✓ Hindi Week was celebrated from September 14 to 19, 2009 with competitions, poster presentations and lectures.
- ✓ Vigilance Awareness Week was celebrated from November 3 to 7, 2009.
- ✓ An International Workshop on **Utilization of Cotton Plant By-produce for Value Added Products** was organized from 9-11 November 2009 at Hotel Pride at Nagpur by the Central Institute for Research on Cotton Technology (CIRCOT), Mumbai, in collaboration with the International Cotton Advisory Committee (ICAC), Washington and the Common Fund for Commodities (CFC), Netherlands.
- ✓ Two Business Development Programmes for CIRCOT Technologies were arranged one at Cotton Association of India, Mumbai on August 1, 2009 and another at Southern India Mills' Association (SIMA), Coimbatore on December 22, 2009 under the aegis of the Business Planning and Development of CIRCOT.
- ✓ Quami Ekta Week was celebrated during November 19 – 25, 2009.
- ✓ A Choupal was organised on December 16, 2009 by the Institute in collaboration with the Town Official Language Committee, North Mumbai.
- ✓ A function to felicitate Shri Rajvinder Singh, a Germany based poet for his outstanding work in Hindi was organised jointly by the Institute and Shruti Sanvad Sahitya Kala Academy.

SALIENT ACHIEVEMENTS AT A GLANCE

- ✓ The International Women's Day was celebrated on March 9, 2010 with a talk on Stress Management by Dr. (Smt.) Savitri Kulkarni, Associate Dean, Welingkar Institute of Management Development & Research, Matunga, Mumbai
- ✓ An awareness meet was held for the Ginners at Khandesh on June 25, 2009.
- ✓ A programme for the ginning industry personnel at Nagpur organised on August 20, 2009 in collaboration with M/s. Bajaj Steel Industries Ltd., Nagpur.
- ✓ A programme to impart quality ginning to Cotton Merchant and Ginners at Khandawa, Indore, Madhya Pradesh on September 4, 2009 was conducted.
- ✓ An Awareness meet at Nandura Village, Babhulgaon Taluka, Yeotmal was organised for clean cotton picking and utilization of cotton stalk under the NAIP CVC project.
- ✓ During the year three lectures by the staff and four by outside personnel were arranged on various topics for the benefit of the staff members of the Institute.

Participation in Exhibitions :

- ✓ Krishimela 2009 at Bengaluru from November 19 – 22, 2009
- ✓ Exhibition on Natural Fibres of India at ANGRAU, Hyderabad from October 26 – 28, 2009. Received Best Stall Award
- ✓ Exhibition at NRCC, Nagpur on February 27 and 28, 2010
- ✓ Pusa Krishi Vigyan Mela at IARI, New Delhi from March 4 – 7, 2010. Received Best Stall Award

Industry-Interface Meet

- ✓ Three industry-interface meetings were conducted during the year.

Accolades

- ✓ ICAR Zonal Sports Meet was held at CSWRI, Avikanagar, Rajasthan from February 10 – 14, 2010. Women became winners in Long Jump, Javelin Throw, Table Tennis, Badminton, Chess and Carrom. In the event for Men they were winners in Table Tennis. Women were runner-up in Shot-put while men were runner-up in Carrom, Chess and 4 x 100 m Relay Race. Smt. T.T. Souz won the Best Women Athlete while Shri B.B. Gaykar and Shri P.G. Gogale were awarded Life Time Achievement Award (for actively participating in the ICAR sports for a long period).
- ✓ Shri Chitranayak, Scientist and Smt. P.R. Mhatre, Senior Technical Assistant secured Seventh and Tenth place respectively at the All India Praveen Examination conducted in May 2009 by the Hindi Teaching Scheme, Mumbai.
- ✓ Shri Chitranayak, Scientist received a Memento and a Certificate from ASHIRWAD, Mumbai on November 9, 2009 for writing Hindi Technical articles.

Budget Utilisation and Revenue Generation

- ✓ The Institute utilized the entire allocation of Rs. 5 crores sanctioned by the Council under the Plan for the year 2009-10.
- ✓ The revenue generation during the year stood at Rs. 106.55 lakhs against the Council's target of Rs. 66 lakhs for the year 2009-10.

1

Introduction

This Eighty-sixth Annual Report of the Central Institute for Research on Cotton Technology (CIRCOT) covers the period from April 1, 2009 to March 31, 2010.

CIRCOT was established in the year 1924 by the then **Indian Central Cotton Committee (ICCC)** under the name of **Technological Laboratory of ICCC**. At that juncture the objectives were to undertake spinning tests on various cotton strains received from agricultural departments in the country and to assess their spinning value. These activities were carried out by the Institute in close co-ordination with both the Departments of Agriculture and Agricultural Universities located in major cotton producing tracts in the country. After the abolition of commodity committees including the ICCC, the administrative control was transferred to the Indian Council of Agricultural Research (ICAR) and the name of the Institute was changed to **Cotton Technological Research Laboratory (CTRL)**. Since then the research activities have been reoriented and strengthened towards increasing the production and quality of cotton in the country. Research on better utilisation of cotton and cotton agro-wastes was recently accorded higher priority with a view to provide avenues for additional income to the grower and to promote self-employment opportunities for rural people.

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

Mandate

- To develop new technologies and machinery for better utilization of cotton and other textile fibres by carrying out basic, applied, strategic and anticipatory research in post harvest technology.
- To extend effective technological support for improvement of quality of Indian cottons and cotton products.
- To act as nodal centre for diversified utilisation of cotton plant by-products & processing waste and other crop residues.
- To provide services like training,

education and consultancy to textile industry, Government and private agencies and to function as a referral laboratory for textile testing.

Achievements Made in the Recent Past

To help the ginners in the day-to-day ginning operations and to solve their problems, a Technical Manual for Trouble Shooting in Modernised Ginneries has been brought out by the Institute. Various technical and operational problems likely to be encountered while operating the modernised infrastructure in ginning are dealt with in this book. Remedial measures, schedules, routine maintenance, off-season repairs, etc. have also been discussed. This publication is probably the only one of its kind available in the country.

A database has been developed for the efficient management of a modernised ginnery. This database can incorporate all the details like inventory, ginning system, energy requirement, packing, workers output, etc. Answers for any query can be got since the database incorporates around 43 tables (22 master tables and 21 transaction tables). Menu options available are Master Menu, Infrastructure, Transaction, Query Report, Utility and Exit. Basic financial components are also incorporated in this database.

A Prototype Variable Saw Gin has been designed and fabricated under a collaborative project with M/s. Cottor Plants India Ltd., Mumbai. All the accessories necessary for the gin stand are also fabricated and installed at GTC, Nagpur. It was noted that the performance of the machine is quite satisfactory.

To circumvent the problem of chromium contamination due to conventional rollers, a fabric based rubber roller suitable for double roller gin has been designed and developed. The soft rubber layer of self grooving rubber roller was modified to abrade faster so that a better groove could be formed. The life of the roller has been enhanced through the hardness and abrasive resistance of the roller. The inner core was made with particle board to reduce the quantity of rubber used. An improved version of the rubber roller is being put to testing on a commercial ginning machine for its evaluation.

Cotton Bale Manager, a computerised software has been developed for designing and generation of bale identification tag and management of bale database including the information about bale ID and its fibre quality parameters. This software generates an unique bar-coded customized label for every individual bale and is integrated with bale information along with its fibre properties. The user can generate a sequence of customized labels with 16-bit bar-coded permanent bale ID. Each bale label includes information on the factory name, the press mark number, year of production,

bar-coded bale ID and bar code. Also the user can edit, save, and print the specific labels. The software can read the bale bar-coded ID with the help of a barcode scanner. The software has an integrated database. The designed software will open the record for the bale if information has been already entered for that ID or the user can also enter records for new bale IDs. User can also browse and search the database using different criteria. All users can search and query the database and generate report. The software has been successfully tested to generate labels for the bales prepared under the NAIP cotton value chain project. Plastic stickers are used to prepare the bar-coded labels and are printed on the bar-code printer. The size of the label is kept as 100 x 75 mm. Bale marking parameters and fibre quality parameters have been integrated with bale ID's, in the bale database.

A single cylinder cotton pre-cleaner based on axial flow principle for on farm use has been designed and developed. In an axial flow pre-cleaner seed cotton is fed at one end of the spiked cylinder through feeder, making it to move axially along the length of the cylinder as it rotates. The rotational motion of the cylinder draws the cotton inside and agitates it across the grid surfaces. Seed cotton enters the machine at one end and moves from one to the other chamber along the axis of the same cylinder and gets discharged at the other end after cleaning. Foreign matter gets dislodged from the cotton by the agitating and scrubbing action of the cylinders and falls through grid bars provided underneath the spiked cylinder. The trash is accumulated in the trash chamber. In case of axial flow cotton pre-cleaner if four guide plates are mounted on the machine, the seed cotton moves in a spiral path around and between the spiked cylinder and grid surfaces four times. It means that in case of axial flow single cylinder pre-cleaner, it is possible to achieve desired cleaning efficiency with one cylinder which would be equivalent to that of the 4 cylinder cleaner which employs the principle of feeding along the length of the cylinder. A prototype single cylinder pre-cleaner is designed with a capacity of 5-7 quintals per hour. The axial flow pre-cleaner consists of different assembly's viz. cylinder assembly, grid bar assembly, top cover assembly, feeder assembly, mainframe assembly and power drive assembly The machine is made portable by providing wheels. The preliminary testing of the developed pre-cleaner is carried out and found to be working satisfactorily.

The All India Co-ordinated Cotton Improvement Project (AICCIP), in which CIRCOT is the technological partner, undertakes testing of cotton samples received from the agricultural universities and breeders. During the year 2008-09, 6687 samples were tested and reported.

Data generated for a 35 year period in the AICCIP project was statistically analysed for G. arboretum and *G.*

hirsutum varieties. This 35 year period was divided into seven, five year block periods. The reliability indices were constructed for monitoring the progress of quality improvement in varieties over the 35 year period to find out if there is any deterioration in the fibre quality characteristics after their release. Results indicated that for *hirsutum* varieties there is a sharp decline in the 2.5% span length in all the four zones. For the arboreum, the fibre length showed improvement in the central zone, maintained practically the same in the north zone. Some individual strains showed better reliability indices compared to the check variety in all the five year block. It was also found that the arboretum strains were more stable than hirsutum regarding the micronaire which was maintained over the years. The north zone showed a rapid increase in the micronaire value for hirsutum and fluctuated for the strains from south zone strains. Fibre strength generally declined for all the zones and for both the species, the decline differed with each species.

Highly sophisticated instruments like HVI needs to be calibrated and checked for calibration at regular frequent intervals. This calibration is carried out using what are known as "Calibration Cottons" the Standard Reference Materials. Till 1997, the United States Department of Agriculture (USDA) was the only agency producing these reference materials. Import of calibration cottons involves time, foreign exchange and arduous procedural wrangles for import. In an effort to produce indigenous standards on par with the USDA's calibration cotton, the Institute through a ICAR Revolving Fund in 1997 started preparation and marketing Calibration Cottons for making it available to the industry. Two sets of standards one for conventional instruments and the other for High Volume Instrumentation System (HVI) are being produced and marketed under this programme. The novelty of the CIRCOT HVI standards is that the same calibration cottons are useful for both ICC and HVI mode operation. CIRCOT calibration cottons have become highly sought after standards by the Indian spinning mills over the years.

In cotton growing areas, villagers normally use traditional methods for sliver making which is crude and quite cumbersome since they are made with hands. Fibre damage also happens in this process. Wastage of cotton accompanied by inferior quality slivers often result by this manual processing. With this in mind, the Institute has developed a machine which has three detachable units – pre-opening, carding and sliver winding units. This machine is simple, easy to operate, has low power consumption, safe, produces sliver of uniform quality. The productivity is around 2 kg/hour for medium staple cotton.

A lap preparation machine for microspinning of cotton samples has been developed which is suitable for opening cotton samples weighing 60-

100 gms and then converting it into a mini lap in about 15 minutes.

An Instrument for the Measurement of Electrical Properties of Textile Materials has been fabricated. The performance of this instrument was judged by testing different kinds of textile samples. About 25 fabrics have been tested so far. For each test five readings at four varying voltages were taken. It was found that the grey fabrics have the electrical resistance in the range of 10^9 to 11^{11} ohms with an accuracy of ± 2% of the reading.

Multi component industrial yarns for varied end uses are prepared by employing a novel spinning technology namely Friction Spinning. CIRCOT has prepared nylon-cotton core-sheath yarns of different counts employing this novel system. It was noted that the cotton component in the coarser yarn helped in realizing higher yarn strength and also aided in bonding with chemicals, rubber components, etc. when composites were prepared using these yarns. However, generally the core content seems to decide the mechanical performance of the yarn with very little contribution from the sheath fibres.

Under a study on processing of banana pseudostem for fibre extraction and its utilisation for preparation of value added products it was seen that banana fibres could be spun on jute spinning system. Blending 20% jute in banana fibres improved the breaking extension and tenacity. Paper produced from cut fibres obtained from scutcher waste was of very good quality while those made from long textile grade fibres was even much better. The quality of the paper improved with use of NaOH in pulp preparation. About 15-20 kg of the banana fibres were spun into yarn and plain woven fabrics of 250-400 GSM were prepared. Fabric properties are being analysed.

Since it is difficult to assess the purity of commercially available natural dyes, an attempt was made to characterize them through spectroscopy and chromatography. HPTLC patterns of the extracts from marigold (3 types), chrysanthemum (2 types) and aster flowers were developed in a solvent system. It was observed that the basic HPTLC pattern of all marigold flowers was similar and was different from those of chrysanthemum and aster flowers. Part of aster HPTLC pattern resembled the basic pattern of chrysanthemum flowers. The basic HPTLC pattern could serve as a marker for identification of the dye and thereby the source flowers.

With the increasing pollution caused due to dyeing industries, new avenues for dyeing using environmental friendly dyes are being explored. Dyes extracted from the plant *Maba aungustifolia* commonly known as Kalindrin was utilized for dyeing cotton fabric. The dyeing was carried out both under acidic and alkaline conditions and at different temperatures. Two mordanting techniques were explored to study their

effect on the colour strength and fastness properties of the dyed samples. The modification introduced in the mordanting technique resulted in 11% improvement in colour strength with excellent colourfastness to washing, rubbing, perspiration and light. The overall results indicated that the natural dye Kalindrin (*Maba aungustifolia*) extracted from a sustainable leaf source can be effectively employed to dye cotton. The entire chain of collection, extraction and dyeing technology was noted to be environmentally and ecologically compatible.

In a project to study the DP finishing of dyed fabric, 12 ready for dyeing (RFD) cotton fabrics were dyed using hot brand reactive dye Procion Bril. Blue H-5G and Procion Bril. REd H-8B. CIELAB Colour Co-ordinate and K/s measurements were carried on all the samples. Two fabrics each of different shades were treated for durable press finish. Various quality parameters were estimated for all the samples. In case of blue dyed fabrics CRA values were highest for 3% shade treated at 3.5 pH and for samples dyed with red dye CRA values were same for 1.5% and 3% shades. Bothe samples tended to become yellowish as compared to untreated control samples. DP rating was about 4 to 4-5 for red dyed samples and 4 for blue dyed samples. Fastness to washing and perspiration improved marginally after DP treatment. Best physical properties were exhibited by samples dyed at 1.5% shade and treated for durable press with 4% PCA mixture, M:L at 1:3 pH at 3.5 and cured at 180°C.

Trials for coating Nanoparticles on paper were carried out by using a laboratory coater under conditions similar to commercial coating. Coated webs were cut into A4 size sheets and calendered. The optical and printing properties of the paper samples were evaluated. Results indicated that the brightness, whiteness and print density of nano zinc oxide coated paper samples were higher than those of bulk zinc oxide coated paper. There was improvement in the glossiness, smoothness and print uniformity when china clay was mixed with nano zinc oxide in equal proportion. There was no fungal and bacterial growth on and around the paper and that the nano zinc oxide coated paper exhibited more UV resistance than bulk zinc oxide coated sample.

Studies at CIRCOT showed that Nano silver could be produced by two novel methods (microbial and biochemical). The nanoparticles so produced were characterised in the context of application of silver nanoparticles for antimicrobial finishing of cotton textiles. Nano silver particles showed excellent antibacterial activity against two kinds of bacteria. Nanosilver coating on cotton fabric though gave significant antibacterial activity, it changed the colour of the fabric to uniform yellow or a patchy yellow depending upon the concentration.

At CIRCOT, a novel *in-situ* protocol

for preparation & application of nano-Zinc oxide on the cotton fabrics was developed. Here, the micro- and nano-pores present on the surface of cotton fabrics act as template for the growth of zinc oxide nanoparticles. Also, the fine porous surface holds back the particles very tightly against washing and other effects. Thus, cotton fabrics so prepared showed excellent antibacterial activity against *Staphylococcus aureus* and *Klebsiella pneumoniae*. These nano particle coated cotton fabrics can be of immense use in medical textiles where cross-infection is a major problem. In addition, use can be explored in various areas like water filters, medical gowns and so on.

Nanocellulose synthesis protocol using the aerobic fungus, *Trichoderma reesei* was standardized with the maximum yield of 31.17% in batch fermentation process with microcrystalline cellulose (MCC) as the sole carbon source. Efforts are on to separate out the different fractions of the enzyme and use them independently to enhance the nano cellulose yield in powder form. Nanocellulose in fibrillar form was also produced by mechanical means using high pressure homogenizer. A pretreatment of cellulose with Zinc chloride was found to help in producing nano fibrils. The nanocellulose powder and nanofibrils prepared were used as fillers in production of starch films. The tensile strength of starch film could be improved by 1.5 times due to the incorporation of 5% of nanocellulose. The oxygen permeability of nanocellulose impregnated starch film was noted to be reduced to one fifth the value of the virgin counterpart.

Under a project on **Commercial Technology Development for Value Addition to Cotton Plant By-produce**, (MM1 4.2 of TMC), trials on the prevention of fungi elaborating aflotoxin during cottonseed storage indicated that spraying seeds with 1% propionic acid inhibited the fungal growth for a period of six months. One hundred kg trial was extended to one tonne trial and samples withdrawn at monthly intervals indicated a significant reduction in the fungal population.

Under the CFC funded project on **Utilisation of Cotton Plant By-produce for Value Added Products** the supply chain mechanism was revisited and strengthened with the involvement of an identified NGO for collection of stalks from the farmers, chipping and the supply of chipped stalks to board manufacturing units. A market survey was also completed during the period to assess the demand for particle boards from cotton stalks.

In a project undertaken at CIRCOT for the preparation of value added products from a combination of cottonseed meal and cassava flour, delinted and dehulled cottonseed meal sample powdered and mixed with cassava flour (20:80) was subjected

to extrusion cooking. It was noted that it is possible to prepare good quality extruded products that could find application as animal feed with enhanced colour grade, puffiness and with free gossypol in tolerance limits

Patents Applied during the Current Year

1. Microbiological Pretreatment of Polyester Fabric to Improve the Moisture Regain and Wear Comfort.
2. Biological Softening of Lignocellulosic Material for Preparing Binderless Board.
3. Microbial Degumming of Mulberry Silk.
4. Roller Type Cotton Stalk Compacting Machine.
5. Miniature Lap Preparation Machine for Microspinning.
6. A Parallelized Yarn Bundle Preparation Machine for Yarn Strength Test.
7. A New Enzymatic Process for the preparation of Absorbent Cotton from non Spinnable Short Staple Cotton.
8. Process for Dyeing of Textiles Using Solvent Extracted Marigold Flower Waste.
9. A Biochemical Process for Preparation of Absorbent Cotton from Non Spinnable Cottons using Microbial Consortium.
10. A Bio-enrichment of Cattle Feed for Better Digestibility.
11. A Method for the Production of Cellulose Powder from Crop Residues.
12. Degumming of Decorticated Ramie Fibres by a Biochemical Method.
13. A Novel Adhesive Activated Polyester Fabric Substrate for Rubber Composites and the Process for Producing the Adhesion.
14. A Process for the Preparation of Cellulose Nano-particles using the Fungus *Trichoderma Reesei.*
15. A New Process of Dyeing of Cotton with Natural Dyes.

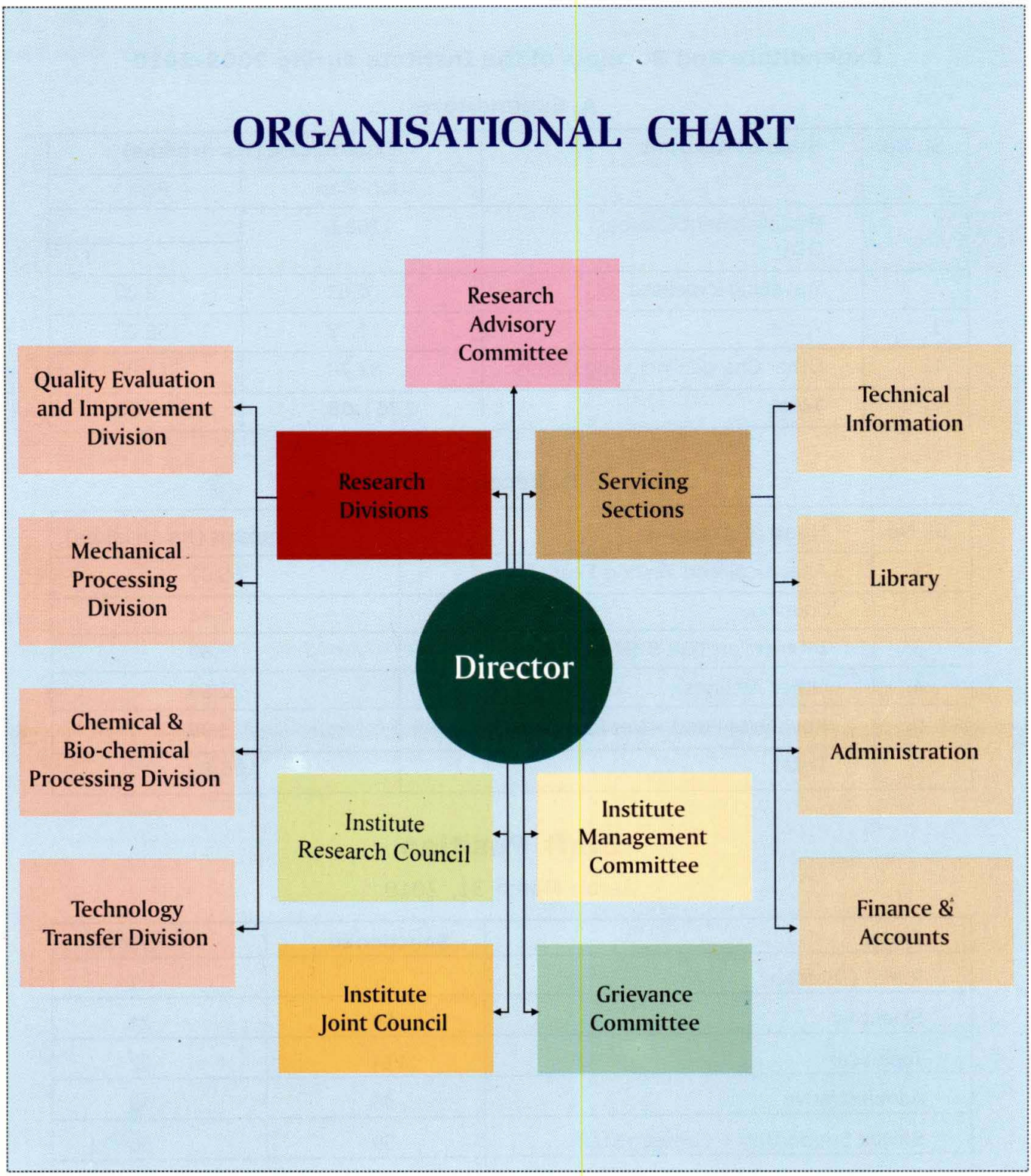
Revenue Generation :

The Institute generated Rs. 106.55 lakhs through commercial testing, training and consultancy during the current year as against the target of Rs. 66 lakhs set by the Council.

Organisation :

The Institute is headed by Director assisted by a team of scientists and technical Officers. A Head of Office and Finance and Accounts Officer assist him in matters of general administration and those connected with accounts and audit of the Institute respectively.

ORGANISATIONAL CHART



Financial Statement

Expenditure and Receipts of the Institute during 2009-2010

A. Expenditure

Sl. No.	Head of Account	Expenditure (Rs. in lakhs)	
		Non-Plan	Plan
1.	Establishment Charges OTA	1160.0	
2.	Travelling Expenses	6.61	9.00
3.	Works	11.73	150.00
4.	Other Charges including Library	82.74	341.00
	Total	**1261.08**	**500.00**

B. Receipts

Sl. No.	Head of Account	Amount (Rs. in lakhs)
1.	Analytical and Testing Fees	65.07
2.	Training	8.42
3.	Interest on TDR & STD	5.69
4.	Other receipts	22.69
5.	Revolving Fund – Net Receipts	3.95
	Total	**105.82**

Staff Position

As on March 31, 2010

Cadre	Sanctioned	In Position
R.M.P. (Director)	1	1
Scientific	50	24
Technical	114	92
Administrative	46	45
Skilled Supporting + Canteen Staff	59	56
Total	**270**	**218**

2

Research Achievements

A brief account of the Progress made in various research projects carried out during 2009–2010 both at the headquarters and at its various regional stations including the Ginning Training Centre, Nagpur is given below:

CORE AREA I : IMPROVEMENT IN GINNING OF COTTON

Influence of Storing Conditions on Bale Quality

An attempt was made to study if storage of seed cotton in tropical condition has any effect on the fibre quality characteristics and colour of the lint. During the reporting period the following observations were made.

- Two bales of Bunny cotton were procured and stored at ginning section, CIRCOT. The fibre parameters, colour grade and microbial counts were observed for the sample before packing the lint into bale. The first bale was opened after the storage period of one month. The samples were collected from five different layers of the bale and three places from each layer. Thus, the samples were collected from 1) Upper surface 2) 9 inch below the upper surface 3) Centre of the bale 4) 9 inch above the lower surface and 5) Lower surface.
- The fibre parameters, colour grade and microbial counts were observed for these samples. The same experiments were repeated for the second bale opened after three months.
- The results indicated that there was no significant change in the fibre properties of the lint collected from the bales stored for one month and three months, except slight change in yellowness of the lint. No definite trend was noticed in microbial count of various layers of lint collected from bales of 30 days and 90 days. However, on an average microbial count of bacteria, yeasts and actinomycetes were observed to be slightly decreased after 30 days of storage of bale and again increased after 90 days of storage. The fungi count was almost same for 30 days storage as that of initial one while it increased after 90 days of storage.

Performance Evaluation of Cyclones used in Modern Ginneries

Cyclones are popular devices that

are used in industries for cleaning gas and to prevent air pollution. In the ginning industry, cyclone separators are used for preventing air pollution in the ginning industry. During the period under report different numerical schemes were evaluated for the simulation of cyclone separator. Pressure Staggering Option (PRESTO), Second order, Body force weighted (BFM), and Standard schemes were evaluated for interpolation of pressure. Quadratic Upwinding Interpolation Scheme for Convective Kinetics (QUICK), Second Order Upwinding (SOU), First Order Upwinding (FOU), and Power law Schemes were tested for discretization of momentum, turbulent kinetic energy and its dissipation rate. Few prominent research groups recommend use of QUICK scheme for discretization of momentum, turbulent kinetic energy and its dissipation rate and FOU scheme for discretization of Reynolds stresses. Hence this type of combination was also evaluated. The SIMPLE, SIMPLEC and PISO schemes were evaluated for pressure velocity coupling. It is in practice to declare uniform linear velocity at the inlet of cyclone separator. But in actual practice the flow at the inlet of cyclone separator is highly turbulent. Hence the evaluation of turbulent velocity and uniform linear velocity at the inlet was also conducted. The turbulent velocity profile was declared through UDF file. The discrete phase model (DPM), PRESTO and QUICK schemes were used to determine collection efficiency of cyclone separator. Fourteen thousand four hundred lint particles (72x200) of which, max., mean and min. diameters were 10, 4 and 1μ, respectively were released from inlet surface. The mass loading was considered as 1g/s.

Though the convergence is fast with numerical schemes of Second order, BFM, and Standard for pressure interpolation but they fail to simulate tangential velocity and pressure drop accurately inside cyclone separator. The PRSTO pressure interpolation scheme simulates all the velocity components and pressure drop accurately inside cyclone separator.

The power law and FOU schemes behaved poorly and failed to predict even reverse flow inside cyclone separator. The quality of simulation is almost same with SOU, QUICK and combination of QUICK and FOU schemes for spatial discretization as far as velocities and pressure drop inside cyclone separator is concerned. The convergence with SOU is 8-10% faster than QUICK and combination of QUICK and FOU schemes. The prediction of RMS tangential and RMS axial velocity was better with QUICK schemes. The SOU scheme highly over-predicted RMS tangential whereas the combination of QUICK and FOU schemes prediction is inferior to QUICK scheme.

The SIMPLE, SIMPLEC and PISO pressure-velocity coupling algorithm gave almost same result. But the simulation time required with SIMPLE

and PISO is around 15-20% lesser than SIMPLEC. The declaration of turbulent velocity profile at inlet reduces the simulation time by 20-25%. The efficiency of cyclone separator was found as 87.39%.

Design and Development of Barcode Technology for Tagging Cotton Bales

A computerized software namely 'Cotton Bale Manager' has been developed with two important functionalities - (1) Design and generation of bale identification tag and (2) Computer interfacing of bale tags and management of bale database including the information of the bale ID and fibre quality parameters. The software is designed to generate unique bar-coded customized labels for every individual bale which is integrated with bale information along with its fibre properties. User can generate a sequence of customised labels with 16-bit bar-coded permanent bale ID. Each bale label includes information on factory name, press mark number, year of production, bar-coded bale ID and bar code. User can edit, save, and print the designed labels along with search facility to access information on designed labels. The software can read the bale bar-coded ID with the help of barcode scanner. *'Cotton Bale Manager'* also includes an integrated database which is developed using VB programming language in a Microsoft Data Access. The database is interfaced with the bale bar-coded ID's. Designed software will open the record for the bale if information has been already entered for that ID or the user can enter records for new bale IDs. User can browse the database and search the database using different criteria. All users can search and query the database and generate report satisfying the requested query.

The software is successfully tested. The bar-coded labels are generated and prepared with the help of this software for the bales made under NAIP cotton value chain project. Plastic stickers are used to prepare the bar-coded labels. The labels are printed on the bar-code printer. The size of the label is kept as 100 x 75 mm. These labels are affixed on the bales. The bale database including its bale marking parameters and fibre quality parameters are integrated with bale ID's.

Help menu has been incorporated in the program to assist user to understand 'Cotton Bale Manager'. Help covers-Brief Outline of Cotton Bale Manager, it discusses all the different menus in Cotton Bale Manager, Bale Label Details, Formation of Bale ID, Details of designed Database, Procedure to Scan Bale Labels, Troubleshooting in Bale Label Formation. User can fetch answer satisfying his queries about different functionalities programmed in the software.

Design and Development of an Axial Flow Cotton Pre-cleaner

The preliminary testing of the

machine was carried out and it was found working satisfactorily. It was observed that the principle of axial flow could be effectively used for pre-cleaning of cotton. The capacity of the machine was found to be between 5-7 quintals/hr. The machine was found to remove effectively the large trash particles, sand, dust, kawadi, etc. The cleaning efficiency of the developed machine was found to be 25-30%. The precleaning operation was found to bring down the trash content by about 1-1.5%.

Design and Development of Pneumatic Loading System for Double Roller Gin

The design and fabrication of a pneumatic loading system to be attached to the double roller gin has been completed. Pneumatic system with 75 PSI to 100 PSI with all accessories like compressor, hose pipes, cylinder safety valves, returning valves, pressure regulator, etc. has been put in place. A small trial has been conducted with the pneumatic loaded roller ginning machine but during trial it was observed that proper and uniform pressure is not at rear end for ginning. Hence, different pressure regulators have been attached one at gear and other at rear end of the machine, so that more pressure can be maintained at rear end to achieve uniform ginning throughout the roller. Scale-up trials will be conducted in the coming cotton season.

CORE AREA II : IMPROVEMENT AND QUALITY EVALUATION 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).

(b) Tests on Standard and Trade varieties of Indian cotton.

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

(a) Evaluation of the Quality of Cotton Samples under the All India Co-ordinated Cotton Improvement Project

The All India Co-ordinated Cotton Improvement Project (AICCIP) was launched in April, 1967 with a view to improve cotton productivity and quality through coordination of research efforts at various Institutes, Agricultural Universities, State Departments of Agriculture and other related agencies. CIRCOT is primarily involved in research pertaining to quality evaluation of cotton lint, its mechanical behaviour at various stages of processing upto spinning of yarn and evaluation of yarn characteristics.

The regional stations of CIRCOT in the cotton growing areas participate in quality evaluation of cotton strains developed and tested under the AICCIP. In general screening of initial breeding material and cotton germplasm, the samples are tested for quality parameters at the regional units of CIRCOT. Most of the cottons under National Trials are tested at regional unit, Nagpur. Advanced trials for testing of microspinning and full spinning and mill processing are being carried out at Headquarters, Mumbai. For the last five years fibre samples pertaining to ICAR Bt. cotton trials conducted under AICCIP are tested at Headquarters, Mumbai. Further, monitoring of various quality parameters, collection of data and finalization of reports are exclusively carried out at CIRCOT Headquarters, Mumbai.

Breeding materials, Initial Evaluation Trials (IET) and Preliminary Varietal Trials (PVT) constitute the initial stages of cotton breeding programme of AICCIP. Promising strains amongst these trials are taken under Coordinated Varietal Trial (CVT) called Advanced Trials. The samples under IET or PVT are tested only for fibre quality parameters by using the High Volume Instrument (HVI) whereas samples of CVT are evaluated for spinning tests and seed coat fragments, trash content and yarn parameters besides fibre attributes. Finally, before releasing the cotton variety/hybrid for commercial cultivation, its full spinning potential is checked. This is to ensure its acceptance by textile industry once it is released and cultivated on a large scale in farmer's field.

Cotton cultivation in India is carried out under three prominent zones. These are as follows :

Zone States

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

A large number of cotton samples have been received every year for quality evaluation from trials conducted under AICCIP by Agricultural Universities and private participants. The number of samples received during 2009-2010 season for different tests from agricultural trials at the Headquarters, Mumbai is given in Table 1 and those tested at each of the regional units of CIRCOT are presented in Table 2. The number of cotton samples received from different states and tested at CIRCOT under AICCIP for various quality parameters is given in Table 3.

The Annual Technological Report for the season 2009-2010 containing the quality parameters data generated on the cotton samples received from the cotton breeders throughout the country at CIRCOT, Mumbai and its regional units at Sirsa, Surat, Nagpur, Coimbatore,

Dharwad & Guntur) has been prepared and published. The cotton samples of the breeders pertain to the AICCIP Zonal Trials (North zone, Central zone and South zone) and National Trials. In all, the technological data on 2532 samples have been reported upto 31 March 2010, out of which 1006 samples belong to zonal trials while 1526 cotton samples correspond to National Trials. Out of the zonal trials, 409 cotton samples belong to North zone, 437 cotton samples to Central zone and 160 to South zone. Out of total samples tested 220 strains were found promising and can be promoted to the next higher stage.

NORTH ZONE

1. *G. hirsutum Trials :*

Preliminary Varietal Trial (PVT) Br.03 : The Br.03a trial of *hirsutum* genotype from the north zone samples were of medium staple with the average 2.5% SL in the range of 27 mm to 29 mm (previous year 26 mm), average fineness in the range of 4.5 to 4.8 (previous year 4.6) and possessing strength in the range of 19.8 g/t to 22.3 g/t (corresponding value for last year being 21.5 g/t). They could be spun to 20s and 30s count. The strain CSH. 3129 was found promising at four locations at Bhatinda, Faridkot, Ludhiana and Sriganganagar. CSH. 612, F.2168, Bihani 251, P57-S & LH.2107 strains were found to be promising under Br.03a trial at north zone.

Intra-hirsutum Hybrid Trial Br.05 : The samples under Br.05a (genotype *hirsutum* hybrids) were of medium staple length with the mean 2.5% SL value in the range of 27.8 mm to 29.1 mm (previous year 27 mm) except for Hisar (19.8 mm). The mean fineness was in the range of 4.7 to 6.7 (coarser) compared to previous year's value of 4.2 to 4.8 and the strength values were found to be in the range of 16.0 g/t to 22.1 g/t. Only CSHH.1907 strain was found worth considering.

2. *G. arboreum Trials :*

Co-ordinated Varietal Trial Br.24 and Desi Hybrid Trial Br.25 : The strains of Br.24a and Br.25a of *arboreum* genotype trials have yielded short fibres with 2.5% SL in the range of 21.3 mm to 22.9 mm (pre. year 22 mm) except the samples from Hisar whose values were found to be around 28.1 mm. The fibres were coarser with micronaire value in the range of 6.3 to 6.9 (pre. year above 6.0) except for the Hisar samples with micronaire value of 4.8. The strength was also found to be very low in the range of 16.5 g/t to 17.6 g/t, except Hisar samples having values 22.9 g/t. LD.937 and RG.542 strains from Hisar were found to perform well. Strain 2294 from Ludhiana was found to be promising.

CENTRAL ZONE

1. *G. hirsutum Trials :*

Preliminay Varietal Trial (PVT) Br.03 :

The strain belonging to Br.03a trial produced fibres with 2.5% span length in the range of 28.0 mm to 29.5 mm, (previous year 28.5 mm) and strength in the range of 20.4 g/t to 23.9 mm (previous year 22.5 g/t) at all the locations. The fineness values were found to be good and in the range of 4.3 to 5.1 (previous year 3.6 to 4.9). LH. 2132 strain was found promising at two locations whereas, CCH.2623, BS.41 and BS.51 performed well in one location. The samples under Br.03b exhibit location wise variations in 2.5% span length, fineness and the strength. The 2.5% SL, micronaire and strength were noted to vary from 24.7 mm to 29.7 mm, 3.8 to 4.8 and 18.4 g/t to 24.5 g/t respectively. Variety NDLH. 1938 was found to perform well at two locations where as TSH.9975, BS.79, AKH.9916, GJHV.358, P21-15, TSH.9975 were found to be promising at one location.

Co-ordinated Varietal Trial (CVT) Br.04: Br.04a trials samples have better 2.5% span length values ranging from 27.9 mm to 29.8 mm. The average micronaire values ranged from 4.3 to 4.8 and strength from 19.4 g/t to 23.3 g/t. BS.279 variety was found to be promising at four locations and ARCHH.7252, PHULE.688, GISV. 218 and TCH.1707 had good performance at one location only.

Intra-hirsutum Hybrid Trial Br.05 : Under Br.05a trial samples have shown good 2.5% span length in the range of 28.6 mm to 31.2 mm. The fineness varied from 4.2 to 4.6 and strength between 19.9 g/t and 23.2 g/t. Variety ARHH.259 and RAHH.139 were found promising at two locations. Br.05b trials were conducted at two locations only and NHH.206, Ajeet 199 and CINHH.128 varieties were found to be promising.

Inter-specific Hybrid Trial Br.15 : Br.15a had only one location and the varieties 102, MLCHB6, RAHB 198 were found to perform well.

2. *G. arboreum Trials :*

Co-ordinated Varietal Trials Br.24 : The Br.24b trials were undertaken at six locations and the 2.5% span length, micronaire and strength were found to vary in the range of 24.8 mm to 26.7 mm, 4.4 to 5.7 and 19.1g/t to 22.5 g/t respectively. Variety PA08 exhibited satisfactory performance at two locations.

Desi Hybrid Trial Br.25 : The Br.25b trial was conducted at six locations and the quality parameters were found to be poorer. The 2.5% span length, micronaire and strength were found in the range of 23.3 mm to 24.6 mm, 5.3 to 6.2 and 17.2 g/t to 20.4 g/t. The miscellaneous trials under this category were conducted at six locations. The 2.5% SL was noted to be in the range from 24.1 mm to 29.6 mm, micronaire value from 3.6 to 3.8 and strength in the range of 20.2 g/t to 21.5 g/t.

SOUTH ZONE

1. *G. hirsutum Trials :*

Preliminary Varietal Trial Br.03 : The Br.03a trial in South zone was conducted at four locations and the samples were found to be long staple type in the range of 27.3 mm to 32.1 mm. The fibres were finer as their micronaire value varied from 3.3 to 4.4 but the strength was not appreciable being in the range of 20.8 g/t to 22.2 g/t only. Variety NDLH.1938 was found to perform well at two locations.

Co-ordinated Varietal Trial Br.04 : The Br.04a trial was conducted at four locations. The 2.5% SL was again in the longer staple category ranging from 26 mm to 30.3 mm with finer fibres of micronaire value between 3.6 to 4.5. Again the strength was good as it varied from 20.9 g/t to 22.0 g/t only. BS.277 variety was worth noting at three locations. The trial Br.05a was conducted at two locations. The 2.5% span length, micronaire and strength were found in the range of 27.7 mm to 31.4, 3.6 to 4.1 and 21.9 g/t to 22.2 g/t respectively.

Intra-hirsutum Hybrid Trial Br.05 : The trial Br.05b was conducted at three locations and in all the three locations, the samples were found to be of long type having length in the range of 27.7 mm to 29.7 mm. The fibres were finer as well with micronaire value between 3.2 and 4.3 but the strength was again the matter of concern as it was in the lower range of 21.1 g/t to 21.8 g/t only. ARBHH.2062 and NHH.59 were found to perform well at two locations.

2. *Inter-specific Hybrid Trial Br.15:*

Br.15a trials had four strains as DHB.871, MLCHB.6, RAHB.301 and JKCHB.217. All the samples possessed very good quality parameters with 2.5% span length, micronaire and strength in the range of 33.9 mm to 34.8 mm, 3.2 to 3.3 and 24.7 g/t to 25.4 g/t respectively.

3. *Co-ordinated Varietal Trial Br.24 and Desi Hybrid Trial Br.25 :*

Br.24b and Br.25b trials were conducted at Dharwad only and no promising strains could be identified. In all, the South zone samples were found to be in the long staple category with finer fibres, but the strength values were being low.

NATIONAL TRIAL

A total of eight trials were conducted comprising 1526 cotton samples under National Trials (Table 4).

1. *Initial Evaluation Trial Br.02a :*

The Br.02a trial was conducted at eight locations. The 2.5% SL was found to be medium to long staple ranging from 25.2 mm to 30.3 mm. The fibres were finer and the micronaire value varied from 3.8 to 4.8 and the strength was in the range of 19.7 g/t to 22.8 g/t. The varieties TCH.1734, CCH.818

were found to perform satisfactorily at two and three locations respectively. The samples from Bhavanipatna, Hisar, Ludhiana and Raichur have shown good fibre quality.

2. *Initial Evaluation Trial Br.02b :*

The Br.02b trial was also conducted at eight locations and the fibre were found to have varying quality parameters. The cotton samples of Bhavanipatna, Dharwad and Nagpur have shown good fibre quality. The range of 2.5% span length, micronaire and strength were 24.2 mm to 29.7 mm, 3.6 to 5.0 and 18.6 g/t to 22.0 g/t respectively. The strains BS.31, KH.90a, H.1452 and AKH.2822 were found to be promising at two locations.

3. *Intra-hirsutum Hybrid Trial Br.05a :*

The maximum number of cotton samples 249 have come under Br.05a trial and this was conducted at eight locations. Most of the fibres possessed good quality as the staple length was found in the range of 26.1 mm to 31.6 mm, micronaire was from 3.6 to 4.6 and the strength in the range of 20.5 g/t to 22.8 g/t. A large number of strains were found promising in this trial whose quality parameters were close to CIRCOT standard quality norms. The varieties MRCH.365 at four locations, BHH.624, RAHH.951 and RAHH.952 at three locations, SABCH.33, BHH.16025, TCHH.2351, CSHH.3008, DHH.1057 and TULSI 252 at two locations performed well.

4. *Intra-hirsutum Hybrid Trial Br.05b :*

The Br.05b trial was conducted at four locations and the samples were found to belong to medium to long categories ranging from 25.8 mm to 31.3 mm. The fibres were average fine with their micronaire values lying between 3.7 to 4.7 and strength varying from 19.5 g/t to 22.8 g/t. Variety Bajrang was found promising at Bhavanipatna and Dharwad.

5. *Co-ordinated Varietal Trial Br.14 :*

Br.14a trial was also conducted at two locations but the fibres were found possess good quality parameters. The fibres were in extra long category ranging from 33.7 mm to 36.5 mm. The fibres were finer with micronaire value of 3.7 only and the strength was also very good in the range of 27.2 g/t to 30.1 g/t. Under this trial thirteen strains were found to perform well both at Dharwad and Surat locations. Eight strains promising at both the locations were TCB.26, GSB.40, RAB.8, CCB.5, DB.12, CCB.6, DB.10 and GSB.41.

6. *Inter-specific Hybrid Trial Br.15:*

The trials Br.15a conducted at four locations yielded good quality fibres. The 2.5% span length, micronaire and strength were found in the range of 33.8 mm to 36.3 mm, 3.0 to 3.6 and 25.3 g/t to 28.6 g/t respectively. The number of promising strains were maximum in this trial. The locations were Anand, Dharwad, Siruguppa and Talod. Among

them Talod samples performed better. The strains DHB.1075, SHHB.671, BDB.295, MCHB.7941, DHB.1055, RHB.618 and GSHB.929 at two locations, RAHB.972 and RHB.602 at three locations and ARBHB.1011 at all four locations were found to perform well satisfying the quality norms.

7. *Initial Evaluation Trial Br.22 (a/b) :*

Trials Br.22b was conducted at eleven locations and the overall quality parameters were noted to be poorer as 2.5% span length, micronaire and strength were in the range of 24.2 mm to 26.6 mm, 4.6 to 5.9 and 18.7 g/t to 21.1 g/t.

The samples under Br.22b and Br.25b trials have shown poor fibre quality whereas, the samples under Br.15a, Br.14a, Br.05b and Br.05a trials have shown very good fibre quality in the National trial category. Only one sample for full spinning was received from Pachora, Jalgaon and was processed for full spinning for 20s and 30s count. However only the yarn of 20s count had CSP of 2124 as against standard CSP of 2024.

TABLE 1 : NUMBER OF COTTON SAMPLES RECEIVED AT CIRCOT HEADQUARTERS FROM AGRICULTURAL TRIALS

Types of Tests	Average for the last five years (2004-05 to 2008-09	2009-10
Fibre and full spinning	35	12
Fibre and Microspinning	286	141
Fibre Test alone (HVI)	2986	1080
Mill Test	5	_
Standard Cottons	52	43
Trade Varieties	50	9
Germplasm	792	_
Research	130	142
Consultancy project	50	30
Total	**4386**	**1457**

TABLE 2 : NUMBER OF COTTON SAMPLES TESTED AT THE REGIONAL QUALITY EVALUATION UNITS DURING 2009-2010

Regional Units	No. of Sample Tested
Nagpur	7842
Surat	13523
Sirsa	2028
Dharwad	3420
Guntur	1440

TABLE 3 : STATE-WISE NUMBER OF COTTON SAMPLES TESTED AT CIRCOT UNDER AICCIP DURING 2009-2010 SEASON

State	Fibre and full spinning	Fibre and microspinning	HVI alone	Total
Punjab	-	-	411	411
Haryana	-	-	201	201
Rajasthan	-	-	230	230
Uttar Pradesh	-	-	45	45
Gujarat	-	-	353	353
Maharashtra	1(1)	-	490	491
Madhya Pradesh	-	-	210	210
Orissa	-	-	153	153
Karnataka	-	37	198	235
Andhra Pradesh	-	5	198	203
Tamil Nadu	-	-	-	-
Delhi	1(1)	-	-	1(1)
Total	**2(2)**	**42**	**2489**	**2533**

Note : The numbers in bracket shows the number of reports issued.

TABLE 4 : SUMMARY OF NATIONAL TRIALS FOR SEASON 2009-2010

Trial	No. of Entries	No. of Locations	Range of Fibre Properties		
			2.5% SL (mm)	Micronaire	Bundle Tenacity (3.2 mm g/t)
Br.02 a	40	8	21.4-35.6	2.4-6.2	15.9-26.2
Br.02 b	30	8	21.9-35.1	2.8-6.0	15.2-25.1
Br.05 a	32	8	23.5-35.3	3.0-5.5	17.2-26.7
Br.05 b	28	4	23.9-34.7	3.0-5.4	16.2-28.0
Br.14 a	12	2	30.8-41.6	3.1-4.3	25.0-32.1
Br.15 a	20	4	28.3-40.2	2.8-4.4	22.8-32.4
Br.22 (a/b)	32	11	16.8-30.4	3.1-7.0	13.4-26.8
Br.25	15	11	17.9-28.9	4.2-7.0	14.3-24.0

(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 the reporting period, 94 trade variety samples have been received from different locations such as Punjab, Haryana, Rajasthan, Gujarat, Maharashtra, Karnataka and Tamil Nadu states pertaining to the 2008-09 season. The fibre tests, spinning tests and yarn tests are being carried out on all these samples.

Evaluation of Quality of Standard Varieties of Indian Cotton

During the reporting period, 50 standard cotton varieties grown under ideal conditions were received from different Agricultural Universities and their regional units for 2008-09 season. The fibre tests, spinning tests and yarn tests were carried out on all the samples and the test reports are being issued in the form of Technological Circulars. Comparing the major fibre properties of these varieties with their respective values at the time of release it was observed that most of the varieties maintained 2.5% span length and micronaire values, but tenacity values were found to be lower than the assigned values at the time of release for some of the varieties.

Preparation and Marketing of CIRCOT Calibration Cotton Standards

During the year under report 563 containers of calibration cotton were sold and Rs.3,30,754/- revenue generated.

Fabrication and Evaluation of an Instrument for Electrical Properties of Textile Materials

An instrument is fabricated for measuring the electrical resistance of fabrics and textile materials. The performance of the instrument is evaluated by testing several kinds of fabrics. The electrical resistance values were found to be in the range of 10^7 – 10^{11} ohms for various kinds of samples. Five fabrics treated with nano zinc nitrate have also been tested and the resistances were found to be in the range of 10^8– 10^{10} ohms. The error and deviation in consecutive measurements are within the tolerance limits.

Structure-Property Relationships of DREF Friction Spun Yarns

During the reporting period the 12 DREF friction spun yarns of 2s Ne, 3s Ne and 5s Ne with various carding drum speeds were spun by using DREF-3000 machine. In the core nylon6 filament of 420/48D and in the sheath cotton sliver of 9.5 ktex were used. The ratios of core and sheath of DREF friction yarns were 15:85, 23:77 and 39:61 for 2s Ne, 3s Ne and 5s Ne respectively. While preparing yarns, the sheath sliver input 9.5ktex was kept constant for each yarn count. Carding drum speeds for yarns with ascending counts were given 3500/minute, 4000/minute, 4500/

minute and 5000/minute. DREF friction Spun yarns were subjected to tensile measurements such as breaking strength (kgf), elongation % and work of rupture. From the analysis of results, the following deductions could be made.

- Strength and elongation % of DREF yarns did not change significantly with varying carding drum speeds.
- Tensile properties of DREF yarns depend mainly on core nylon6 filament content.

Design and Development of Rotating Flat System for CIRCOT Mini Card

The fabricated rotating flat system with components of rubberized cotton belt with wire point strips, power drive system and roller guide system were mounted on the mini card and tested. Only power drive system succeeded. Belt and roller guide need further improvement.

The rubberized cotton belt with wire point strips was found to be sagging. Therefore, HSS strips (605x 12.5x2.5mm) were fabricated and fixed on belt in between two wire point strips with 3 rivets. By this the belt slackness could be removed. The whole flat system is subsequently mounted and tested again.

For roller drive system, the four brackets were extended. By this the roller adjustment on cylinder could be achieved. The problem of less grip of belt with the drive has been noted during trials. This problem is being addressed at present.

A Linear Model to Estimate Locational Effects on Cotton Varieties and Prediction of Fibre Properties

In the final analysis of the project under study, taking into account of the larger database of 6 years (2004 to 2009), (Table 5) the following deductions were made:

1. *Individual location effects (only magnitude)*

(i) *2.5% S.L. :* The effect ranged from 0.1 to 0.8 for Brahma, Bunny and MCU.5 whereas, those for DCH.32, H.4 and MECH.1 were higher, ranging upto 1.6. J.34 had the highest range, from 0.1 to 2.6.

(ii) *Micronaire Value :* The location effect for J.34 ranged from 0 to 0.9 while for all other varieties it was lower ranging from 0 to 0.4.

(iii) *Tenacity :* The effect for varieties Brahma, Bunny and DCH.32 were in the range 0 to 0.9 whereas for H.4, J.34, MCU.5 and MECH.1 the effect was higher ranging from 0 to 1.5.

2. *State-level location effects (only magnitude)*

At State-level, the effects attained stability and showed a definite pattern.

The positive effects observed for samples from Andhra Pradesh, Gujarat, Madhya Pradesh, Orissa and Punjab indicated favorable conditions, while those from Haryana, Karnataka and Maharashtra had negative influence on length and tenacity. Rajasthan samples exhibited fluctuating effects. Samples from Karnataka, Madhya Pradesh and Orissa generally had a positive influence on Micronaire Value.

3. *Prediction intervals for fibre properties (State-level)*:

Prediction intervals for fibre properties of varieties at State-level were estimated. The intervals were quite accurate in predicting the fibre properties.

4. *Prediction intervals for fibre properties (combined over States)*

The same observation as in (3) above applies here also. This can be seen from the table presented in Table 5.

GIS Based Development of Spatial Fibre Quality Maps for Cotton Grown in Nagpur and Vidharbha Regions of Maharashtra

The objective of this project was to design and develop spatial database for cotton fibre quality parameters in GIS environment by collecting the cotton samples using GPS for the Nagpur district and to develop the GIS based fibre quality spatial maps. The seed cotton samples were collected from different spatial locations by using GPS from the Nagpur district. The stratified sampling method was adopted for sample collection. Seed cotton samples were collected from 300 spatial locations from 8 talukas of Nagpur district. The locations from each taluka and villages were selected such that they were widely distributed across the particular taluka. The samples of predominantly grown cotton varieties in that particular area were collected. The samples were ginned by using a laboratory gin. The testing of samples on HVI for measurement of fibre quality parameters is in progress.

EXTERNALLY AIDED PROJECT

A Value Chain for Cotton Fibre, Seed and Stalks: An innovation for Higher Economic Returns to Farmers and Allied Stake Holders (NAIP : Component 2)

During the reporting period, four CIC meetings on March 16, July 25, December 19, 2009 and January 8, 2010 and two CAC meetings on July 27 and December 22, 2009 were conducted. The following activities have been undertaken :

1) Quality seed of RCHB.708 Bt. seed was supplied to 110 project farmers of Coimbatore and Bunny Bt. seed was supplied to 30 project farmers of Nagpur

2) Sowing was completed as per

TABLE 5:PREDICTION INTERVALS FOR FIBRE PROPERTIES OF VARIETIES (OVERALL)

Variety	Number of samples	Fibre Property	Mean	95% Pred. limits		99% Pred. limits	
				95% LL	*95% UL*	*99% LL*	*99% UL*
Ageti RG	34	2.5% SL	29.6	29.0	30.1	28.8	30.3
		Mic	3.9	3.8	4.0	3.8	4.0
		Tenacity	21.7	21.4	22.0	21.2	22.1
Brahma	199	2.5% SL	29.5	29.2	29.7	29.1	29.8
		Mic	3.7	3.7	3.8	3.7	3.8
		Tenacity	22.5	22.3	22.7	22.3	22.7
Bunny	320	2.5% SL	31.0	30.8	31.1	30.8	31.2
		Mic	3.6	3.6	3.6	3.6	3.6
		Tenacity	23.2	23.1	23.3	23.0	23.4
DCH.32	248	2.5% SL	34.2	34.0	34.4	33.9	34.4
		Mic	3.0	2.9	3.0	2.9	3.0
		Tenacity	27.1	26.8	27.3	26.7	27.4
H.4	473	2.5% SL	29.8	29.7	29.8	29.6	29.9
		Mic	3.5	3.5	3.5	3.5	3.5
		Tenacity	22.5	22.4	22.5	22.3	22.6
J.34	444	2.5% SL	27.4	27.2	27.5	27.1	27.6
		Mic	4.3	4.2	4.3	4.2	4.3
		Tenacity	21.9	21.8	22.0	21.7	22.1
LRA.5166	38	2.5% SL	28.2	27.9	28.5	27.8	28.6
		Mic	3.6	3.5	3.7	3.4	3.8
		Tenacity	21.2	20.9	21.6	20.8	21.7
MCU.5	128	2.5% SL	31.5	31.3	31.7	31.3	31.7
		Mic	3.8	3.8	3.9	3.8	3.9
		Tenacity	24.0	23.8	24.2	23.7	24.3
MECH.1	55	2.5% SL	29.8	29.4	30.1	29.3	30.3
		Mic	3.8	3.7	3.9	3.7	3.9
		Tenacity	23.4	23.0	23.7	22.9	23.9
RG.8	39	2.5% SL	18.5	18.2	18.8	18.1	18.9
		Mic	7.2	7.1	7.3	7.1	7.4
		Tenacity	14.9	14.6	15.2	14.5	15.4

requirement at Nagpur and Coimabtore.

3) At Nagpur 341 qtl of *kapas* from first picking procured amounting Rs. 11,41,000/-.

4) At Coimbatore 466 qtl of *kapas* from the fist picking was procured amounting Rs. 21,66,000/-

5) From the *kapas* procured at Nagpur for the season 2008-09, 8-8.5 tonne 30s count combed yarn was prepared.

6) Doubling of yarn completed.

7) *Kapas* procured at Coimbatore for the season 2008-09. All the 142 bales were transported from Coimbatore to SSM Spinning Mills, Hindupur. Spinning of 80s count yarn from one group out of the seven groups segregates based on Micronaire value has been completed. Approximately 800kg of yarn is made.

8) Preliminary trials were under taken on bio-scouring of yarn samples in the anaerobic treatment plant constructed at Rampura near Bailhongal. Systematic trials are planned as the samples from Nagpur have been received.

9) Cleaning done and chipping completed at Nagpur. Four tonnes of chips supplied to M/s. Arbindo and 11 tonnes to GTC, Nagpur. One tonne particle board made at Nagpur.

10) 15 tonnes of cotton seed transported from Coimbatore to Tirupur and Fifteen tonnes of cotton seed transported from Hinganghat to GTC, Nagpur.

11) Pre-treatment using 0.1% cellulase and 0.2% Papain gave slightly higher yield of oil than control (untreated).

12) Work for installation of anaerobic treatment plant at NDDB, Sabarmati.
Plant commiAshram, Bidaj is completed and commissioned.

13) Trials have been initiated for the standardisation treatment of cotton seed meal to get gossypol free protein.

14) The following awareness workshop were conducted :

- At Vadapaddur on June 6, 2009 to receive feedback from the farmers and to discuss the future cource of action
- At Nagpur on November 11, 2009 for clean cotton picking and
- At Vadapaddur on December 7, 2009 for utilization of cotton stalks

A Value Chain on Utilisation of Banana Pseudostem for Fibre and other Value Added Products (NAIP Component 2)

Various activities which were carried

out in this reporting period are :

- Standardized fibre extraction procedure, Varieties identified for evaluation.
- One hundred samples pertaining to 25 varieties received from Navsari and 8 samples from NRCB, Tiruchirapalli were tested for tensile parameters.
- Ten varieties were evaluated for chemical composition.
- Softening Trials:
  - o Four anaerobical retting trials were conducted to soften the banana fibres.
  - o Preliminary trials to soften the fibres for yarn preparation were conducted with 4 different softening agents.
- Yarn Preparation:
  - o About 80 Kg yarn was produced using the Jute Spinning System and sent to MANTRA for fabric preparation.
  - o As a preliminary trial, 2 Kg yarn was produced on Medlari Charkha, Quality parameters of yarn evaluated.
  - o Yarn obtained from automatic plant was having better tenacity.
  - o Yarn prepared on Medlari Charkha was finer (tex of about 500 Tex), as compared to machine made yarn (tex of about 580 Tex)
- Application of sap as mordant:
  - o Process for application of sap as mordant was standardized.
  - o Dyeing trials conducted with 3 natural dyes.
  - o Excellent dye uptake with good fastness properties, observed.
- Prepared and evaluated cellulose powder from banana fibres
  - o Process for MCC preparation by chemical method standardized.
- Yarn Making Machine for banana fibre has been received and will be installed shortly.

A Value Chain for Coconut Fibre and its by-products: Manufacture of Diversified Products of Higher Value and Better Marketability to Enhance the Economic Returns of Farmers (NAIP: Component 2)

In this project, a joint survey was conducted by CIRCOT along with TMNRRDC from July 12 to 18, 2009 at Tiruvananthapuram, Ernakulum, Alleppey and Tenkasi to study the status of different extraction machineries used for coconut fibre, their processing and spinning methods in order to prepare a baseline survey to initiate the project.

Designs for a prototype disintegrator, defibering machine with cleaner and fibre segregator have been made. The following are the observations of the survey :

- The fibre retting process requires about 9-10 months, which is very time consuming.
- Retting process is polluting the backwater and ecosystem; hence it is not environment friendly.
- Disintegrator and defibering used for retted husk are not energy efficient.
- Generally 30- 50 hp motors are used to operate the machines. It is underutilization of power. Energy consumption is very high and production rate also is not high.
- Manual beating and loosening of husk, removal of exocorp is tedious, time consuming job and unhygienic. It is hazardous for the health of the labour.
- Beating of disintegrator has not been optimized.
- Breakage of fibres (over 30%) during disintegrating and defibering operations are mainly due to the fact that the number of beating bars and combing nails is not optimized.

Design and Development of Rubber Dams for Watersheds (NAIP Component 4)

In the second year of the project following research activities have been completed :

1. Fifteen low GSM fabric substrates varying in weave, GSM and fibre content have been prepared as per the box and behnken's experimental design plan.
2. Testing and characterization of all above fabric substrates.
3. Nine combinations fabric substrates with varying fibre content in wrap and weft were prepared.
4. Testing, Analysis and characterisation of all the above 9 samples.
5. Analysis and optimization of experiments involving activated polyester as per the following experimental plan executed by M/s. Kusumgar Corporates.

Level	Weave	GSM	Grill bond %
-1	Matt	350	0
0	Mockleno	450	1
1	Honeycomb	550	2

6. SEM on longitudinal and cross-sectional views of activated polyester yarn were made.
7. Procurement:

   a. DOE analysis software procurement completed &

softwaren is in use for optimisation experiments.

b. Installation & trial run of Lab core & other Design spinning machines procured by ICB method from Pinter S. A. Barcelona, Spain completed. Cotton covered nylon core sample spinning is done, fabric is prepared and sent for testing.

Observations:

1. Aramid X Aramid combination has highest strip tensile strength.

2. In case of mixed warp and weft combination, fibre which is present in warp determines the strength value of the fabric substrate.

3. Nylon X Nylon and Nylon X polyester combinations yield highest extensibility.

4. Fabric prepared from aramid has least extensibility due to low fibre extension at break.

5. Aramid X Aramid and Nylon X Nylon fabric exhibits higher tear strength.

6. Pure aramid and pure polyester indicate higher index puncture strength.

7. Nylon and polyester combination fabric has the lowest puncture strength.

8. Amongst the three weave designs, viz. matt, mockleno, honeycomb, the fabric made with mockleno weave results in the highest peel strength, both in warp and weft direction.

9. Effect of GSM on warp peel strength was found almost linear. Higher the GSM higher is the warp peel strength. But for weft, it maximizes at 450 GSM.

10. Warp peel strength linearly increases with grill bond pick-up up to 1%; thereafter it tends to flatten/ drop, both for warp and weft.

11. The optimum experimental combinations required for designing the fabric substrate was determined from the various contour and solid plots as follows: mockleno weave, 450 GSM and 1% grill bond. This produces peel strength of atleast 5 KN/m as against minimum design cut off requirement of 3.82 KN/m. This will produce a fabric of 1 mm thickness.

12. In order to allow a safer margin, following specifications have been decided for bulk fabric preparation of the protodam:

Fibre content	Nylon 6
Fabric GSM	550
Weave	Mockleno
Adhesive	1% grill bond

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

Ecofriendly Pre and Post Processing of Fabrics Prepared from Organic Cotton and Finishing with Chitosan

Woven fabric prepared from organic cotton was enzymatically bioscoured and bleached with hydrogen peroxide, washed and dried. To improve the antibacterial property, bioscoured and bleached fabrics were treated with 0.25% chitosan solution, dried and cured. The antibacterial property of the fabric was evaluated both qualitatively and quantitatively by using *Staphilococcus aureus.* The fabric showed very good antibacterial property. Therefore, fabric samples were subjected for wash fastness test and 25 washings were given. The fabric samples were evaluated for antibacterial activity after 5, 10, 15, 20, 25 washings. The fabric showed 100% reduction in the count of *S. aureus* even after the 25th washing. This indicates that the chitosan treatment has imparted good antibacterial property.

Enzymatically bioscoured and bleached fabric was dyed with berberine dye, treated with chitosan, dried and cured. The antibacterial property of the dyed fabric was evaluated using *S. aureus*. The fabric showed 100% reduction in the count indicating good antibacterial property.

Development of Protective Clothing for Agricultural Pesticide Spraying Operations

Due to the need to develop a protective clothing during the spraying operations for the farming community a research work was undertaken at the Institute. During the year under report, grey fabrics purchased from the market were scoured by kier boiling and were bleached with hydrogen peroxide. These were then tested for various characteristics such as ends and picks per inch, fabric weight, drop absorbency and pesticide protective performance. Number of ends and picks per inch did not change much in comparison to the fabric washed 5 times but fabric weight was reduced by about 2.8% to 5.9% as impurities got removed during scouring and bleaching. All samples showed instantaneous wetting upon testing for drop absorbency and pesticide penetration through these samples ranged from 21 % - 34% for both ironed and non-ironed samples. These values were not very different from those obtained for grey washed samples (20% to 38% for ironed and 17% to 35% for non- ironed). Therefore these fabrics in the grey stage itself can be used as low cost level 1 pesticide protective clothing as they satisfy the specified percent pesticide penetration requirement of 5% - 40%.

Twelve commercial ready for dyeing fabrics comprising of 100% Cotton woven and knits, polyester cotton blends and a woolen and nylon fabric

were procured and tested for physical characteristics and percent pesticide penetration. Percent pesticide penetration varied from ~ 24% to 83% with cotton knits showing lowest pesticide penetration and woolen fabric having highest pesticide penetration. Only two cotton knits and two twill fabrics (one cotton and another blended) passed level 1 pesticide protection criteria. It was observed that grey cotton knits given a hot soda detergent wash provided better pesticide protection than the scoured and bleached sample.

Out of these commercial RFD fabrics, one 100% cotton twill and two polyester cotton blends were finished with a commercial oil water repellent finish on a laboratory stenter. Finished cotton fabric did not show water repellency but blends appeared to have water repellency. These were tested for pesticide protective performance and one of these passed level 1 criteria for protective clothing (pesticide penetration through the fabric < 5%). This fabric also showed ~ 14% strength enhancement in both warp and weft directions while the other fabric did not show such improvement.

Synthesis and Characterization of Nano-Cellulose and its Application in Biodegradable Polymer Composites to Enhance Their Performance (NAIP : Component IV)

Nanocellulose acts an excellent filler in composites due to their high crystallinity, biodegradability and their ability to form hydrogen bonds with the matrix. Preparation of nanocellulose by conventional sulfuric acid hydrolysis process is energy intensive, not environmental-friendly and the surface of nanocellulose is chemically modified. In this sub-project, a novel microbial and mechanical routes for the synthesis of nanocellulose was attempted. The nano-cellulose was also evaluated for their use as fillers in nanocomposites. The short staple cotton 'Bengal Desi' was used as the raw material for preparation of nanocellulose.

The cotton fibres were converted to microcrystalline cellulose (MCC) by conventional hydrochloric acid hydrolysis. Subsequent conversion of MCC to nanocellulose was carried out by hydrolysis using the fungus, *Trichoderma reesei*. Controlled fungal degradation of MCC resulted in nanocellulose of size less than 100 nm and the yield was 23%. This nanocellulose was characterized by using various microscopic techniques like atomic force microscopy, scanning electron microscopy and polarized optical microscopy. The size of the nano-cellulose was estimated using dynamic light scattering particle size analyzer. This nanocellulose was used as filler in the preparation of starch film to improve its mechanical and functional properties (reducing gas and water vapour permeability). Simultaneously, nanocellulose was prepared using high pressure homogenizer (at 40,000 psi) that imparts shear and frictional forces.

Homogenization resulted in the nanocellulose with very high aspect ratio (more than 100). The starch film is being prepared with the incorporation of nanocellulose of very high aspect ratio and its analysis is in progress. A dedicated website www.nanocellulose.in is developed for this sub-project to reach the stakeholders. Recently, a patent application was filed on preparation of nanocellulose by microbial process.

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

Utilisation of Cotton Plant Byproduce for Value added Products

Under this project which is in the last leg of completion, an NGO was identified at Nanded to supply ready to use cotton stalk chips. M/s Sevabhari Sensthre at Nanded mobilised farmers, collected cotton stalks, chipped in the field and supplied to M/s. Godavari Particle Board Industries. They could supply about 500 ton ready to use chips. CIRCOT provided one tractor and a chiper to undertake the work.

A market survey was undertaken by M/s. Mac Donald Co., Mumbai for the particle boards and hard boards prepared from cotton stalks. The survey clearly indicated that cotton stalks can serve as an additional raw material and industries are of the view that they are ready to use cotton stalks provided the same is made available at their factory site.

As a culmination of this project, an International Workshop was held from November 9 - 11, 2009 at Hotel Pride in Nagpur. About 25 foreign participants and 50 Indian delegates participated in the workshop that generated very good interaction among the participants.

Preparation of Value Added Products from Cottonseed Meal by Extrusion Cooking

Samples were prepared from cottonseed cake by powdering and then boiling in hot water for 20 min. The water is drained then. The cottonseed powder was dried in sun to a moisture content of 8%. The results of analysis of these samples are given in Table 6.

TABLE 6 : CHARACTERISTICS OF COTTONSEED POWDER

Sample Cottonseed Cake	Dry Wt.	Moisture (%)	Reducing Sugar (%)	Total Sugar (%)	Nitrogen (%)	Protein (%)
CSM Meat	96.2	3.8	0.7	3.7	4.0	25.1
Cottonseed Cake A (Control)	96.7	3.3	1.0	10.4	5.0	31.5
Cottonseed Cake B (Treated)	96.3	3.7	1.0	8.3	4.8	30.1

These samples were taken and powdered and mixed with cassava flour in the ratios 20:80, 30:70 and 40:60. Moisture stabilization was done by adding water making the moisture content to 16%. The samples were passed through the extrusion cooker. The cooker temperature was kept at 85^0 C and the die temperature was varied from 150-180^0 C. Good colour grade and puffing were obtained with 20:80 and 30:70 ratios. With 40:60 cottonseed to cassava flour ratio, gelatinization and puffing was not enough.

Degumming of Ramie Fibres and Preparation of Terry Towels (Technology Mission on Jute)

About 50 kg of decorticated ramie fibres were degummed employing CIRCOT's method. The degummed fibres were blended with Bunny cotton (30:70) and spun on cotton system. Blended yarn samples having a CSP of 2300 was converted into woven material in Sholapur on powerlooms. Weaving of the yarn was done on a terry-loom. After the towel sort was produced, the entire lot was subjected to a shearing process on one side to increase its absorbency and to impart a soft feel to the fabric. Thirty towels were made and they confirm to all the water absorbency parameters.

CORE AREA V : TECHNOLOGY MARKETING

Training, Commercial Testing, Transfer of Technology and Consultancy are dealt under this core area. These activities are discussed in detail in Chapters 3, 4 and 5.

Zonal Technology Management and BPD Unit at CIRCOT, Mumbai (NAIP Component 1)

Under this project, during the year under report the following activities have been carried out.

- Thirty-one members have registered with ZTM-BPD Unit and an annual registration fee of two thousand was collected as a registration fee from each member. BPD is providing various business incubation services like interaction with scientists and business support services to these registered members.
- A Bankable Project Proposal has been prepared for "Particle Board manufacturing Plant from cotton stalks" and given to M/s. MITCON Consultancy Services, Pune. This proposal is meant for setting up of particle board unit at Wardha District under cooperative system. This project is yet to take off, however BPD is in constant touch with MITCON about the further developments.
- Two Business Development Programmes on CIRCOT Technologies were conducted - one at CAI, Mumbai on August 1, 2009 and the other at SIMA, Coimbatore

on 22 December 2009. More than 65 entrepreneurs participated in each programme. These programmes generated a lot of enquiries about CIRCOT technologies and consequently some of the interested entrepreneurs have registered with BPD.

A structured format for collecting technology information from Zonal institutes of western region has been developed and circulated. A Model Memorandum of Understanding, Guidelines and Rules for incubation facilities and Certificate of Membership format were also formulated.

- Presentations about ZTM-BPD unit were made at various ICAR institutes located in Mumbai, Nagpur and Pune and scientists were sensitized about the Business Planning and Development Unit and its role in technology commercialisation.

- BPD presented a market research paper titled, "Demand assessment of Agribusiness technologies of Cotton and its by-products" at International Conference on Agripreneurship and Rural Development [ICARD2009] held at Banaras Hindu University Campus, Varanasi, India in 05 Dec 2009.

3

Technology Assessed and Transferred

The greatest satisfaction and boost for a researcher's morale and research organization is the translation of research results to the needy end-user. It has to percolate easily and also in time without any obstruction.

Scientists at CIRCOT devote their time and energy in developing newer technologies in the field of post-harvest processing of cotton and eco-friendly finishing of textiles and are also striving hard to bring them to the forefront and popularise them in many ways. There has been a continuous monitoring of the transferred technologies and processes and a regular upgrading of the already developed innovations so as to provide continued benefit to the users. The Institute maintains a constant liason with private organizations and entrepreneurs so that their needs are met and at the same time the Institute also generates revenue. This chapter sums up the technologies developed and consultancies offered by the Institute during the year. Attempts were made for popularisation and commercial adoption of viable technologies through Awareness Meets conducted periodically at various places.

Consultancies Undertaken :

1. Design and development of Modern Ginning Machinery and Cleaning System for M/s. Bajaj Steel Industries Ltd., Nagpur
2. Cross Sectional & Surface Morphological Study of Drug Pellets by SEM for M/s. Sandoz India Pvt. Ltd., Thane
3. Transfer of Technology of Staple Length Measuring Tools for Cotton Breeders, Private Seed Companies
4. A complete ERP Software for Ginning & Pressing Industries jointly developed by CIRCOT and SSPS, Hyderabad. MoU signed with SSPS
5. Consultancy Services relating to Fibrography of KSL research products in cotton for M/s. Krishidhan Seeds Ltd, Aurangabad, Jalna
6. Preparation of Executive Folders from Linter Pulp for DIPA, New Delhi
7. Automatic Grooving Machine developed at CIRCOT at GTC, Nagpur. MoU signed with M/s. Raji Industries Ltd., Nagpur

8. For Validating the Water Purification System for M/s. Hemmopharma Ltd., Navi Mumbai

9. Installation of a Biogas Plant on Cotton Dust for M/s. Rasi Tex (India) Pvt. Ltd., Dist. Salem, T.N.

10. For Evaluating the Performance of the Party's Equipment for Water Purification for M/s. ION Exchange (India) Ltd., MIDC, Thane, Belapur Road

11. Evaluation of Limiting Oxygen Index on Treated Fabric Sample for Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu

12. Evaluation of Durability to Washing and Evaluation of Ionic Charge Retention through Microbial Technique for M/s. Creative Portico (India) Pvt. Ltd., Mumbai

Commercial Testing :

Nearly 31,000 cotton samples were tested during the reporting period at the Headquarters and at various regional stations. Place-wise break-up samples tested is given under Table 7 The total revenue generated through commercial testing was around Rs. 66 lakhs.

TABLE 7: NUMBER OF SAMPLES TESTED AND REVENUE GENERATED

Name	No. of Samples	Amount (Rs.) in Lakhs
Mumbai - HQ	9560	17,81,228
Coimbatore	4154	8,12,675
Dharwad	1095	2,26,885
GTC, Nagpur	5205	10,67,052
Guntur	8321	22,43,439
Sirsa	324	52,250
Surat	2600	5,30,521
Total	31259	67,14,050

Patents Filed :

1. Microbiological Pretreatment of Polyester Fabric to Improve the Moisture Regain and Wear Comfort

2. Biological Softening of Ligno-cellulosic Material for Preparing Binderless Board

3. Microbial Degumming of Mulberry

Silk

4. Roller Type Cotton Stalk Compacting Machine
5. Miniature Lap Preparation Machine for Microspinning
6. A Parallelised Yarn Bundle Preparation Machine for Yarn Strength Test
7. A New Enzymatic Process for the preparation of Absorbent Cotton from non Spinnable Short Staple Cotton
8. Process for Dyeing of Textiles Using Solvent Extracted Marigold Flower Waste
9. A Biochemical Process for Preparation of Absorbent Cotton from Non Spinnable Cottons using Microbial Consortium
10. A Bio-enrichment of Cattle Feed for Better Digestibility.
11. A Method for the Production of Cellulose Powder from Crop Residues
12. Degumming of Decorticated Ramie Fibres by a Biochemical Method
13. A Novel Adhesive Activated Polyester Fabric Substrate for Rubber Composites and the Process for Producing the Adhesion under NAIP-Comp. 4
14. A Process for the Preparation of Cellulose Nano-particles using the Fungus *Trichoderma reesei*
15. A New Process of Dyeing of a Cotton with Natural Dyes.

4

Education and Training

Education

The Institute has been given permanent recognization by the University of Mumbai for pursuing Post graduation in Physics, Physical Chemistry, Organic Chemistry, Bio Physics and Microbiology and Ph.D in Physics and Textile Manufacture, Biophysics and Microbiology under Section 88 of the Maharashtra Universities Act 1994 as amended by the Maharashtra Universities (amendment and continuance) Act 2000. The Institute has two guides for M.Sc. and four for Ph.D.

As of now four students each have registered for Ph.D in Physics and in Microbiology and one student for M. Sc. Physics. Further, the Institute has been recognised as a guiding centre for M.Sc. and Ph.D. courses in Home Science (Textiles) of the SNDT Womens' University, Mumbai. At present, one student from SNDT is availing this facility to pursue his work for the award of Ph.D. degree.

Training

At the headquarters, Mumbai regular training programmes on cotton quality evaluation is conducted for the benefit of the cotton trade and industry personnel. At GTC, Nagpur training courses are offered to sponsored personnel from the ginning industry like fitters, supervisors and middle level management staff on the operation and maintenance of various ginning machines. At every training, importance of clean cotton for ensuring better remuneration to farmers or ginners is emphasized.

The Institute also organises special training courses on the operation of High Volume Instrument (HVI) and Advanced Fibre Information System (AFIS) and interpretation of their test results at the Headquarters. All 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 containing details of test methods and statistical interpretations of results, etc. is provided to the trainees. The Institute also conducts special training programmes to personnel sponsored from industry on specified topics depending on demand.

(a) Training on Quality Evaluation of Textile Fibres for Personnel from Trade and Textile Industry

During the reporting period, 29 sponsored personnel were given training in three batches; apart from this a special training for one week duration was given to 20 trainees

(b) Training on Ginning and Baling for Fitters, Operators and Managers from Ginning Industry

At the Ginning Training Centre at Nagpur, regular training programmes are conducted for the benefit of gin operators and middle level management staff on various aspects of ginning, maintenance of various ginning machines, problem solving during different ginning operations. Training was imparted to 350 persons in twelve batches. Importance of contaminant free cotton in bringing better remuneration to respective stake holders was stressed in the training programmes.

5

Linkages and Collaboration

CIRCOT does not have an agricultural farm attached to it. However, the Regional Quality Evaluation units of CIRCOT are located in major cotton growing areas and situated within the agricultural university premises or other ICAR institutes engaged in cotton research. These serve as extension units for the Institute. Scientists of CIRCOT participate in the meetings connected with AICCIP during which time they interact with the scientists of agricultural universities and provide inputs on post-harvest technology operations and help them improving the quality of strains as per the requirement of the industry since they have a knowledge of which kind of quality cottons are expected by the textile mills. The regional units of CIRCOT are used as windows for promoting CIRCOT technologies for efficient utilisation of cotton fibre, crop by-products and other agro-waste materials. The Institute has been providing technological support to breeders from private seed industry for development of Bt. cottons by providing data on the spinnability, fibre quality, oil content, etc. through contract/ consultancy research. The Institute has also established linkages with NGOs like *Varshad Vikas Seva Pratistan,* Akola for carrying out field trials on the Low Cost Sliver making machine developed by the Institute and also its upgradation. It has also established collaboration with the Indian Rubber Manufacturers' Research Association (IRMRA), Water Technology Centre for Eastern Region, (WTCER), (ICAR) and a reputed private manufacturer of technical textiles *viz.* M/s. Kusumgar Corporate under the National Agricultural Innovation Project (NAIP). A website has also been designed under the NAIP project **Zonal Technology Management and BPD Unit at CIRCOT** to cater to the needs of the entrepreneurs by showcasing the various technologies and processes developed by the Institute.

Active participation in various exhibitions, *Kisan melas*, etc. serve as technology extension and out-reach activities by the Institute Besides this, the Institute also undertakes collaborative research programmes with private sector, other research bodies in post harvest technology and value addition to cotton and other natural fibres.

The Director and Scientists of

CIRCOT serve as resource personnel in various committees constituted by the Bureau of Indian Standards for cotton and textiles and they participate in various seminars, symposia, conferences, etc. organised within the country that constitute a platform for the exchange of their knowledge and expertise in different fields of research. The Director and many scientists are members of advisory panels of institutions like ATIRA, BTRA, SITRA, CCI, CITI, CAI, etc. Many of the Scientists also act as experts in several committees like Technology Development Board (TDB) under the Department of Science and Technology (DST) for assessment of proposals for setting up/expanding cotton processing industry.

Many scientists are invited to give lectures and to participate in discussions related to cotton in particular and natural fibres in general organised by other institutions. They also publish their research findings both in scientific and popular journals, apart from participating in seminars, conferences and exhibitions displaying technologies and processes developed or improved by the Institute.

Publications of research findings in national and international journals constitute an important mode of extension activity. Publications in popular journals help to bring research closer to the user community.

The Institute conducts regular training courses on Cotton Quality Evaluation including elementary statistics applicable to textile testing for the sponsored personnel from the cotton trade and industry while at the Ginning Training Centre of CIRCOT at Nagpur both theoretical and practical training skills are imparted on different aspects of ginning and maintenance of ginning machines. A hostel with facilities to accommodate about 20 trainees is presently available at GTC, Nagpur.

Another important form of extension activity is supply of information in response to various queries received on cotton fibre, yarn and fabric, consultancy services, contract research and bringing out regular pamphlets on various processes developed and innovations brought about by the Institute for use by different stake holders.

Technical Queries: Queries from various private organisations, educational institutions, semi government, state and central government agencies were received and replies sent promptly. Information on various technologies and devices developed by CIRCOT, instruments designed, methods of tests standardised for cotton fibre, yarn and fabric, quality levels of different cotton varieties, by-products and agro-waste utilisation, etc. were also supplied to many entrepreneurs.

Commercial Testing: The Institute

receives a number of fibre, yarn, fabric and other miscellaneous samples for tests on payment basis from industries, textile and other educational institutes, and state government bodies.

The details of number of commercial samples tested at CIRCOT, Mumbai during the period 2009-10 together with samples tested in the recent past are presented below in Table 8.

TABLE 8 : DETAILS ON SAMPLES TESTED AT CIRCOT

Sr. No.	Type of Tests	Average during X Plan (2002-03 to 2006-07)	XI Plan		
			2007-08	2008-09	2009-10
1.	Ginning, Fibre, Trash Content and Spinning	8438	1961	5253	8965
2.	Yarn	254	160	35	40
3.	Fabric	445	418	616	396
4.	Miscellaneous	516	332	180	159
	Total	9653	2871	6084	9560

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 in a tabular form.

Sr. No.	Party's Name	Test
1.	M/s. Aanjaheya Biotech Pvt. Ltd., Mumbai	X-Ray Diffraction Analysis
2.	M/s. Amerdeep Udyog, Mumbai	Paper testing
3.	M/s. Amit Cotton, Shadnagar (AP)	Oil content, Gossypol content and Linter %
4.	BARC, Mumbai	Scanning Electron Microscopy
5.	M/s. Bher Process paints (I) Pvt. Ltd., Pune	Scanning Electron Microscopy
6.	M/s. Bombay Dyeing, Mumbai	Friction measurements on fibre
7.	M/s. Cadila Healthcare Ltd. Thane (MS)	Scanning Electron Microscopy

Sr. No.	Party's Name	Test
8.	M/s. Carver Technology & Equipment Pvt. Ltd. Mumbai	Cellulose yield, Ash content, Trash & Moisture %
9.	M/s. Carver Technology & Equipment Pvt. Ltd. Mumbai	Linter %
10.	M/s. Coro Chem, Mumbai	Scanning Electron Microscopy
11.	M/s. Cottor Plants (I) Pvt. Ltd., Mumbai	Cellulose Yield
12.	M/s. Croda Chemical India Ltd., Mumbai	Surface tension properties
13.	M/s. Dura Colour, Ahmedabad	Surface tension properties
14.	M/s. G.S Oil Ltd., Adilabad	Linter, Cellulose %
15.	M/s. Godfrey Phillips India Ltd., Mumbai	Denier of Tow for filter
16.	M/s. Indian Commodities.com, Mumbai	Oil content %
17.	M/s. Kotak Exim, Mumbai	Honey dew in cotton
18.	M/s. Mittatex Exports, Mumbai	Cellulose yield
19.	M/s. Mumbai University Press, Mumbai	Paper testing
20.	M/s. Naik Coastal Marine people, Ratnagiri, Maharashtra	Particle Board
21.	M/s. Reliance Industries Ltd., Mumbai	Scanning Electron Microscopy
22.	M/s. Reliance Life Science, Navi Mumbai	X-Ray Scan
23.	M/s. Shraddha Analytical Services, Mumbai	X-Ray Scan
24.	M/s. SP INK, Ahmedabad	Surface tension
25.	M/s. Textiles & Engg. Institute (DKTE), Ichalkaranji	FTIR, SEM
26.	M/s. Textiles & Engg. Institute, Ichalkaranji	X-Ray Scan
27.	The Institute of Science, Mumbai	Scanning Electron Microscopy
28.	M/s. TIT & S,Bhiwani, Haryana	Antibacterial activity
29.	M/s. Trimula cotton & Agro Products Pvt. Ltd., Guntur	Cellulose yield %
30.	UICT, Mumbai	Scanning Electron Microscopy
31.	M/s. White Gold Cotton Testing Lab, Ahmedabad	Linter, Hull, Kernel %

Exhibition / Publicity

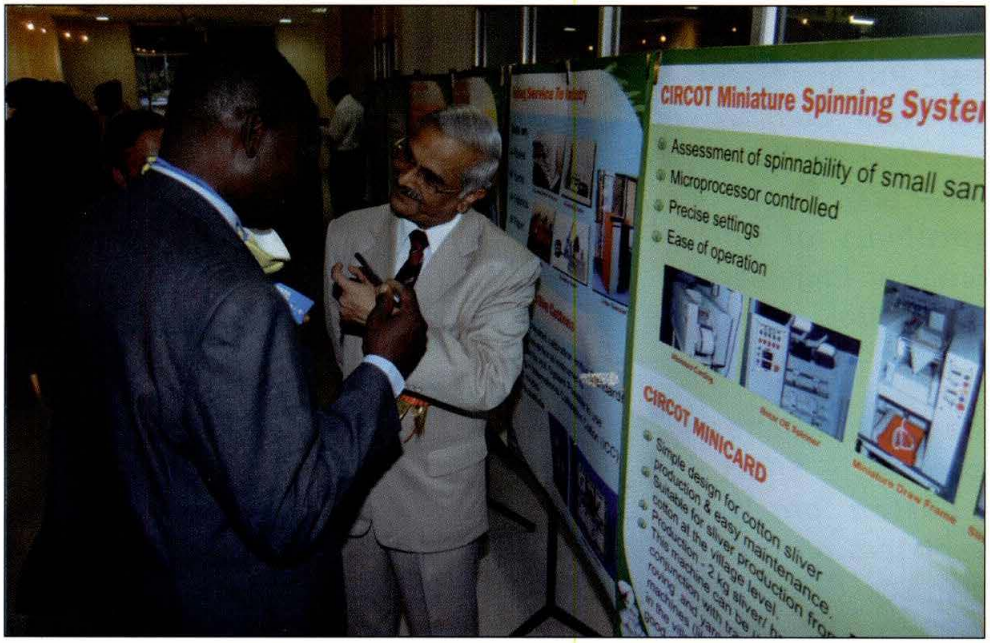
The Institute participated in a number of exhibitions showcasing the technologies developed and those available for commercialisation. Large number of entrepreneurs and farmers evinced interest in the technologies.

Exhibition :

- Participated in Krishimela 2009 at Bengaluru from November 19 – 22, 2009.
- Participated in the exhibition on Natural Fibres of India at ANGRAU, Hyderabad from October 26 – 28, 2009. Received Best Stall Award.
- Participated in the exhibition at NRCC, Nagpur on February 27 and 28, 2010.
- Participated in Pusa Krishi Vigyan Mela at IARI, New Delhi from March 4 – 7, 2010. Received Best Stall Award.

Apart from participating in the above exhibitions, the institute arranges exhibitions to showcase technologies developed whenever important dignitaries visit the Institute and during the workshop / conferences / seminars arranged by the Institute at the Headquarters or at GTC, Nagpur. Two such exhibitions were held during the visit of Shri Chaman Kumar, Additional Secretary and Financial Advisor, New Delhi on February 9, 2010 and during the visit of the His Excellency Mr. Hui Liangyu, Vice Premier of the State Council of the People's Republic of China along with other dignitaries on March 28, 2010. An exhibition was also arranged during the International Workshop of CFC Project on October 9, 2009 at GTC, Nagpur.

Shri Chaman Kumar, Additional Secretary and Financial Adviser, DARE at the exhibition organised at CIRCOT during his visit



Dr. S. Sreenivasan, Director, CIRCOT explaining one of the delegates during International Workshop at Nagpur

6

Publications

A. Annual Report

Annual Report of the Central Institute for Research on Cotton Technology for the year 2008-2009.

B. Research Publications

1. Mahangade, R.R., Verma, J.K., Varadarajan, P.V. and Bosco, H. – *Influence of New Mordanting Technique on the Colour Strength and Fastness Properties of Cotton Fabric Dyed with Kalindrin,* Colourage, Vol. 57 (1), pp. 71 – 74, January 2009.

2. Sheela Raj and Sreenivasan, S. – *Total Wear Comfort Index as an Objective Parameter for Characterization of Overall Wearability of Cotton Fabrics,* Journal of Engineered Fibres and Fabrics, Vol. 4 (4), pp. 29-41, 2009.

3. Yadav, A., Nachane, R.P. and Ahmed, M. – *Effect of Micronaire of Cotton on Wear Comfort Parameters of Knitted Fabrics*, J. Indian Soc. Cotton Improv. Vol. 34, No. 2, pp. 107-112, August 2009.

4. Mahangade, R.R., Verma, J.K., Varadarajan, P.V. and Bosco, H. – *New Dying Technique for Enhancing Colour Strength and Fastness Properties of Cotton Fabric Dyed with Natural Dyes,* Indian Journal of Fibre and Textile Research, Vol. 34 (3), pp. 279 – 282, September 2009.

5. Chitranayak, Makwana, D.N. and Yadav, A. – *Bt. Cotton : Quality Aspects*, J. Indian Soc. Cotton Improv. Vol. 34, No. 3, pp. 168-174, December 2009.

6. Yadav, A., Nachane, R.P., Ahmed, M and Chitranayak – *Mechanical Behaviour of Knitted Fabrics under Bending and Shear Deformation,* J. Indian Soc. Cotton Improv. Vol. 34, No. 3, pp. 175-179, December 2009.

C. Other Publications from CIRCOT

1. CIRCOT News – Vol. 11 (1), October 2008 to March 2009 and Vol. 11 (2), April 2009 to September 2009

2. CIRCOT Ginning Bulletin – Vol. 9 (2), October 2008 to March 2009 and Vol. 10 (1), April to September 2009.

D. Paper Presented at Seminar / Conferences, etc.

1. Vivekanandan, M.V., Sheela Raj, Sreenivasan, S. and Nachane, R.P. – *Parameters Affecting Warm-Cool Feeling in Denim Fabrics,* presented in the 50th Joint Technological Conference of ATIRA, BITRA, SITRA and NITRA at ATIRA on March 4 and 5, 2009.

2. Sheela Raj and Sreenivasan, S. *Influence of Fibre Geometry on the Wear Comfort of Cotton Fabrics* presented in the 50th Joint Technological Conference of ATIRA, BITRA, SITRA and NITRA at ATIRA on March 4 and 5, 2009.

3. The following papers were presented at the International Conference on Emerging Trends in Production, Processing and Utilisation of Natural Fibres organised by ISCI, IFS, ICAR and Texas Tech. University held at Mumbai from April 16 – 18, 2009.

    - Bharimalla, A.K., Chattopadhyay, S.K., Yadav, A. and Ravindran, C.D. - *Design and Development of Geo Check Dam (Rubber Dam) for Watershed (Poster Presentation).*

    - Chattopadhyay, S.K., Dey, S.K. and Sreenivasan, S. – *Composite Yarns from Natural Fibres for Production of Technical Textiles.*

    - Chattopadhyay, S.K., Bharimalla, A.K., Ravindran, C.D., Yadav, A. – *Design and Development of Rubber Dam for Watershed.*

    - Chitranayak, S.K. – *Electrical Properties of the Textile Materials.*

    - Deshmukh, P.S. – *Hand Operated Coconut Dehusker.*

    - Dey, S.K. and Chattopadhyay, S.K. – *Engineering of Ramie - A Potential Textile Fibre for the Future.*

    - Mahangade, R.R., Varadarajan, P.V. and Verma, J.K. – *Studies on the Effect of Metal Tannic Acid Mordant Complex on the Fastnesss Properties of Cotton Fabric Dyed with Natural Dyes.*

    - Sreenivasan , S. – *Technology Interventions in Cotton for Enhancing its Diversified Use.*

    - Sundaramoorthy, C., Chattopadhyay, S.K. and Ravindran, C.D. - *Determinants of Demand for Raw Cotton in Domestic and Export Market.*

    - Vigneshwaran, N. Kathe, A.A., Varadarajan, P.V. and Balasubramanya, R.H. - *Nanofinishing of Cotton Textiles.*

- Yadav, A., Nachane, R.P., Vivekanandan, M.V., Banerjee, S. and Ahmed, M. – *Wear Comfort Studies on Cotton Knitted Fabrics Produced from Fibres of Different Varieties*.

4. Sreenivasan, S. – *Quality Profile of Indian Cottons for Diversified Applications* presented at the National Seminar on Natural Fibres of India at Hyderabad on October 26 – 28, 2009.

5. Sreenivasan, S. – *Supply, Demand and Quality Issues in Indian Cotton,* presented at the Brainstorming Session on Cotton at CICR, Nagpur on July 9, 2009.

6. Sreenivasan, S. and Ravindran, C.D. – *Quality of Cotton in Released Bt. Hybrids* presented at the National Symposium on Bt. Cotton: Opportunities and Prospects held at CICR, Nagpur on November 17 – 19, 2009.

7. Sreenivasan, S. – *Current Status and Future Prospects for Diversified Utilisation of Cotton* presented at the 6th International Conference on Advances in Textiles, Machinery, Non-wovens and Technical Textiles ATNT 2009 at Coimbatore on December 7 – 9, 2009.

8. Tiwari, S. – *Effect of Dimethyl Polysiloxane on Thermal Polymerization of Cotton Seed Oil* presented at the 64th Annual Convention and International Conference on Oils, Fats, Fuels and Surfactants (ICOFFS 09) held at Crown Plaza, New Delhi from December 9 – 11, 2009.

9. Sreenivasan, S. – *Value Addition of Natural Fibres: A Sustainable Economic Activity for Upliftment of Rural Women* presented at the 28th Biennial National Conference of Home Science Association of India held at Kolkatta from January 7 – 8, 2010.

7

List of On-Going Projects During 2009-2010

CORE AREA I : IMPROVEMENT IN GINNING OF COTTON

Sl. No.	Name of the Project	Principal Investigator	Associates
1.	Influence of Storing Conditions on Bale Quality	Dr. S.B. Jadhav	Shri S.K. Shukla Dr. S.G. Gayal
2.	The Performance Evaluation of Cyclones used in Modern Ginneries	Shri S. K. Shukla	Shri V.G. Arude Dr. T.S. Manojkumar Smt. Jyoti Mintu Nath
3.	Design and Development of Barcode Technology for Tagging Cotton Bales	Smt. Jyoti Mintu Nath	Shri V.G. Arude Shri S. K. Shukla
4.	Design and Development of an Axial Flow Cotton Pre-cleaner	Shri V.G. Arude	Shri S.K. Shukla Dr. T.S. Manojkumar
5.	Design and Development of Pneumatic Loading System for Double Roller Gin	Shri A.K. Bharimalla	Dr. S.B. Jadhav Shri R.S. Prabhudesai

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

Sl. No.	Name of the Project	Principal Investigator	Associates
1.	Evaluation of the Quality of Cotton Samples under the All India Co-ordinated Cotton Improvement Project	Director	Scientists and Technical Personnel
2.	Evaluation of Quality of Major Trade Varieties Grown in Different Parts of the Country	Director	Scientists and Technical Personnel
3.	Evaluation of Quality of Standard Varieties of Indian Cotton	Director	Scientists and Technical Personnel
4.	Preparation of Calibration Cotton Standards	Dr. R.P. Nachane	Scientists and Technical Personnel

Sl. No.	Name of the Project	Principal Investigator	Associates
5.	Fabrication and Evaluation of an Instrument for Measuring Electrical Properties of Textile Materials	Shri Chitranayak	Dr. R.P. Nachane Dr. D.N. Makwana Shri Achchhelal Yadav Shri Virendra Prasad
6.	Structure-Property Relationships in DREF Friction Spun Yarns	Shri Achchhelal Yadav	Dr. S.K. Chattopadhyay Shri R.K. Jadhav
7.	Design and Development of Rotating Flat for CIRCOT Mini Card	Shri P.S. Deshmukh	Dr. S.K. Chattopadhyay Shri R.K. Jadhav Shri D.U. Kamble
8.	A Linear Model to Estimate Locational Effects on Cotton Varieties and Prediction of Fibre Properties	Dr. C. D. Ravindran	Shri S. Vancheswaran
9.	GIS Based Development of Spatial Fibre Quality Maps for Cotton Grown in Nagpur and Wardha Districts of Vidharbha Region of Maharashtra	Shri V. G. Arude	Dr. (Smt.) J. M. Nath Shri U. D. Devikar
10.	Evaluation of Liquid Moisture Management Properties of Commercially available Cotton and Cotton Blended Fabrics	Dr. R.P. Nachane	Shri M.V. Vivekandandan Dr. (Smt.) Sheela Raj
11.	Design and Development of an Apparatus for Measurement of Moisture Vapour Transfer Rate (MVTR) of Fabrics based on Dish Method	Shri. A.K. Bharimalla	Shri M.V. Vivekanandan Dr. R. P. Nachane

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

Sl. No.	Name of the Project	Principal Investigator	Associates
1.	Production of Titanium Dioxide Nanoparticles and their Application in Cotton Textiles for Antibacterial and Self Cleansing Properties	Shri Virendra Prasad	Dr. N. Vigneshwaran Dr. A.J. Shaikh Dr. Sujata Kawlekar
2.	Eco friendly Pre and Post Processing of Fabrics Prepared from Organic Cotton and finishing with Chitosan	Dr. S.G. Gayal	Dr. (Smt.) Sujatha Saxena Dr. R.P. Nachane Kum. C.P.D'Souza
3.	Development of Protective Clothing for Agricultural Pesticide Spraying Operations	Dr. (Smt.) Sujatha Saxena	Dr. R.P. Nachane Dr. P.V. Varadarajan Shri Chitranayak

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

Sl. No.	Name of the Project	Principal Investigator	Associates
1.	Preparation of Value Added Products from Cottonseed Meal by Extrusion Cooking	Dr. T.S. Manojkumar	Shri V.G. Arude Dr. A.A. Kathe Dr. Sudha Tiwari

EXTERNALLY FUNDED PROJECTS

Sl. No.	Name of the Project	Funding Agency	Principal Investigator	Associates
1.	Utilisation of Cotton Plant By-produce for Value added Products	CFC, Netherlands	Dr. R.H. Balasubramanya	Dr. A.J. Shaikh Dr. P.V. Varadarajan Dr. R.M. Gurjar Dr. Manoj Kumar Shri S.K. Shukla Shri V.G. Arude
2.	Improved Management and Degumming technology of Ramie for Higher Productivity	MM 1.1.3 (TMJ)	Dr. R.H. Balasubramanya	Dr.N. Vigneshwaran
3.	Quality Evaluation of Cotton Fibre	MM 1.1.3 (TMC)	Dr. R.P. Nachane	Technical Officers of the QEI Division
4.	Development and Evaluation of Cleaning Machinery for Mechanically Picked Seed Cotton	(MM 2.3) (TMC)	Shri Gautam Majumdar, Sr. Scientist, CICR, Nagpur	Dr. S.B. Jadhav, Sr. Scientist, CIRCOT, Mumbai
5.	Molecular Mapping of Fibre Quality and Lint Yield Traits : Construction of Framework Linkage Map in Desi Cotton (*Gossypium* spp.)	Dept. of Biotechnology, Govt. of India	Dr. V.N. Waghmare, Sr. Scientist, Division of Crop Improvement, CICR, Nagpur	Dr. A.B. Dongre, Principal Scientist, CICR, Nagpur Dr. Vinita Gotmaare, Sr. Scientist, CICR, Nagpur Dr. S.B. Jadhav, Sr. Scientist, CIRCOT
6.	A Value Chain for Cotton Fibres, Seed, Stalks: An Innovation for Higher Economic Returns to Farmers and Allied Stake Holders	National Agricultural Innovation Project (Component 2)	Dr. R.P. Nachane	Dr. R.H. Balasubramanya Dr. P.V. Varadarajan Dr. A.J. Shaikh Dr. S.G. Gayal Shri R.M. Gurjar Dr. D.N. Makwana Shri D.V. Mhadgut Dr. S. Venkatakrishnan

Sl. No.	Name of the Project	Funding Agency	Principal Investigator	Associates
7.	Design and Development of Rubber Dams for Watersheds	National Agricultural Innovation Project (Component 4)	Dr. S.K. Chattopadhyay	Dr. C.D. Ravindran Shri A.K. Bharimalla Shri A. Yadav
8.	A Value Chain on Banana Pseudostem for Fibres and other Value Added Products	National Agricultural Innovation Project (Component 2)	Dr. A.J. Shaikh	Dr. R.H. Balasubramanya Dr. R.P. Nachane Shri R. M. Gurjar
9.	A Value Chain for Coconut Fibre and its By-products : Manufacture of Diversified Products of Higher value and Better Marketability to enhance the Economic Returns of Farmers	National Agricultural Innovation Project (Component 2)	Dr. S.K. Chattopadhyay	Shri Ashok Kumar Bharimalla Shri C. Sundaramoorthy
10.	Synthesis and Characterisation of Nano-cellulose and its Application in Biodegradable Polymer Composites to Enhance their Performance	National Agricultural Innovation Project (Component 4)	Dr. N. Vigneshwaran	Dr. R.H. Balasubramanya Dr. R.P. Nachane Dr. A.J. Shaikh Dr. S.G. Gayal Shri Ashok Kumar Bharimalla Shri Achchhelal Yadav
11.	Zonal Technology Management and Business Planning & Development Unit at CIRCOT, Mumbai	National Agricultural Innovation Project (Component 1)	Dr. N. Shanmugam	Dr. P. V. Varadarajan Dr. T.S. Manojkumar Dr. S. Venkatakrishnan

8

SRC, RAC and Management Committee

Institute Research Council Meeting

The **One Hundred and Ninth Institute Research Council (IRC) meeting** of CIRCOT was held at the Committee Room on May 7 and 8, 2009 to discuss in detail about the progress made in each of the different projects under various Core Areas during the period from April 2008 to March 2009. The following new proposals were approved in the core area mentioned below:

Core Area II : Improvement and Quality Evaluation of Fibre, Yarn and Fabric

- A Linear Model to Estimate Locational Effects on Cotton Varieties and Prediction of Fibre Properties
- GIS Based Development of Spatial Fibre Quality Maps for Cotton Grown in Nagpur and Wardha Districts of Vidharbha Region of Maharashtra

Half-yearly IRC Meeting

The Half-yearly IRC Meeting was held on October 30 and 31, 2009 in which discussion on the progress made during April to September 2009 in

Half-yearly Institute Research Council Meeting in Progress

various research projects took place. Dr. S. Sreenivasan, Director was in the Chair and all the HODs and Scientists attended all the sessions. The Technical Officers of respective divisions attended the sessions relevant to them.

Following two new project proposals were approved with some modifications in **Core Area II : Improvement and Quality Evaluation of Fibre, Yarn and Fabric.**

- Design and Development of an Apparatus for Measurement of Moisture Vapour Transfer Rate (MVTR) of Fabrics Based on Dish Method
- Evaluation of Liquid Moisture Management Properties for Commercially available Cotton and Cotton Blended Fabrics.

Research Advisory Committee Meeting

The Sixteenth Research Advisory Committee Meeting was held on March 17, 2010. The meeting was presided over by Dr. Anwar Alam, Chairman, RAC and Vice Chancellor, Sher-e-Kashmir University of Agricultural Sciences and Technology. The Heads of Divisions presented the research achievements in their divisions. This was followed by a detailed discussion and some of the salient suggestions made by the members are presented below :

1. The project on Cotton Value-Chain should also strive to part with some benefits to farmers made in the value-addition to seed and fibres.
2. The efficiency of pre-cleaners developed for use in the village level needs to be evaluated by conducting field trials.
3. A method to identify Bt. and Non-Bt. cottons to be developed to prevent the practices of adulteration.
4. The work of CIRCOT on oil content in Bt. hybrids has to be continued and more work needs to be done to determine the oil content in Bt. and Non Bt. cottons and its relationship with the type of event used in producing the transgenic cotton.
5. Presently, 90% of cottons produced in the country are in the 27-30 mm range and is a matter of great concern, keeping the textile mills requirements, cottons in various other length range needs to be promoted.
6. Work on standard varieties and trade varieties may be continued only on the popular varieties, under cultivation irrespective of whether they are from private or public organisations.
7. Attempts may be made to prepare briquettes or pellets from cotton stalks, as with less investment

Dr. Anwar Alam, Chairman, RAC and other Members Examining the Finished Fabric from Cotton during the RAC Meeting

more profits can be derived. Due to high lignin content cotton stalks briquettes will have high calorific value and can be an excellent domestic fuel.

8. More efforts need to be made to improve the cleaning efficiency of pre-cleaner. The machine may be commercialized only after its satisfactory performance under field trials.

9. Organic cotton has only niche market. Its cultivation and certification processes are very cumbersome. Hence there is no need to have a balanced approach towards investment of resources.

10. CIRCOT and CICR should undertake more collaborative projects especially on the biochemical aspects of cotton including preparation of gossypol free edible protein using enzymatic route.

11. Efforts need to be made with ICAR and ASRB in getting scientists recruited.

12. Efforts are to be made to improve the Bale Press Machines. R&D work needs to be made to modify the Bale Press to make it more energy efficient.

13. Bale management should be given more importance.

14. Value addition of Cotton Stalks by way of particle board, briquetting, etc., is important. In addition, attempts may be made to prepare compost from wastes available during processing of cotton stalk (i.e. collection, cleaning and chipping).

15. Technology Transfer activities be given high priority and be expanded as it proves our worth and in addition helps in revenue generation.

16. Clean cotton picking concept to be popularized through awareness meets. Attempts may be made to get subsidy for use of cloth bags, headgear, apron, etc. during cotton picking.

17. Due to non availability of labour for post harvest operations, mechanical harvesting of cotton is the need of the hour. Attempts may be made to adapt the Brush type cotton pickers developed abroad and suitable pre-cleaners may be designed under the TMC. Development of cotton picker may be resolved jointly by CIAE, Bhopal, CICR, Nagpur and CIRCOT, Mumbai in collaboration with private agencies. The country needs mechanical harvester *vis-à-vis* suitable pre-cleaners for both machine picked and hand- picked cottons.

Management Committee Meeting

The Sixty-Seventh and Sixty-Eighth meetings of the Institute Management

Sixty-Eighth Institute Management Committee Meeting in Progress – Dr. K.K. Singh, ADG (PE), ICAR is seen on the right side of Dr. S. Sreenivasan, Director, CIRCOT

Committee were held during October 14, 2009 and March 23, 2010 respectively. R egular items like confirmation of the minutes of the previous meeting, action taken on the recommendations of the previous meeting, discussion on the progress of research presented by the Heads of Divisions, progress of works, report on the Official Language Implementation were discussed in the meeting. During the 67th Meeting, several hospitals & AMA's were recommended for approval by the Council for the treatment of staff members at Coimbatore, Sirsa and Dharwad. Filling-up of vacant posts in the Institute was also discussed and the action taken in this regard was explained to the IMC members during the 68th meeting.

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 technical conferences besides meetings connected with the work of this Institute.

Sr. No.	Meetings / Conferences / Seminars /Symposia, etc.	Place	Date	Participants
1.	Annual Workshop of All India Coordinated Cotton Improvement Project	Hyderabad	06-04-2009 to 08-04-2009	Dr. S. Sreenivasan Dr. R.P. Nachane Dr. D.N. Makwana Shri Chitranayak Dr. Matish Chandra
2.	International Conference on Emerging Trends in Production, Processing and Utilisation of Natural Fibres	Mumbai	16-04-2009 to 18-04-2009	Scientific and Technical Personnel
3.	Design of Experiments (DOE)	Bangalooru	18-05-2009 to 20-05-2009	Dr. S.K. Chattopadhyay Dr. C.D. Ravindran
4.	Mechanisation of Cotton Harvesting	Nagpur	22-05-2009	Dr. S. Sreenivasan Dr. A.J. Shaikh Dr. T. S. ManojKumar
5.	Brainstorming Session on Mechanisation of Cotton Harvesting	Noida	03-06-2009	Dr. S. Sreenivasan Dr. A.J. Shaikh
6.	9th Agricultural Science Congress	Srinagar	22-06-2009 to 24-06-2009	Dr. A.J. Shaikh Dr. Matish Chandra
7.	Brainstorming Session on Cotton Facing the New Challenges	Nagpur	09-07-2009	Dr. S. Sreenivasan
8.	National Meet on Conservation in Agriculture	New Delhi	17-07-2009	Dr. S. Sreenivasan
9.	Workshop on Fuel Cell Technology and Hydrogen Energy	New Delhi	23-07-2009 and 24-07-2009	Smt. N.M. Ashtaputre

PARTICIPATION IN CONFERENCES, MEETINGS, WORKSHOPS, SYMPOSIA

Sr. No.	Meetings / Conferences / Seminars /Symposia, etc.	Place	Date	Participants
10.	NANOTECH INDIA Conference 2009	Cochin	14-08-2009 to 16-08-2009	Dr. N. Vigneshwaran
11.	Special Interactive Workshop on Administrative and Financial Matters	Hyderabad	11-09-2009	Dr. S. Sreenivasan Shri R. K. Singh Smt. M. V. Kamerkar
12.	Training on LibSys Software	Mumbai	14-09-2009 to 18-09-2009	Smt. P.R. Mhatre Smt. M.P. Kamble
13.	Network & Information Security Programme	Mohali	05-10-2009 to 10-10-2009	Shri D. Radhakrishna-murthy
14.	National Seminar on Natural Fibres	Hyderabad	27-10-2009 and 28-10-2009	Dr. S. Sreenivasan Dr. A.J. Shaikh Shri Ashok Kumar Bharimalla Shri G.B. Hadge
15.	Discussion on Mega Project on Natural Fibres	New Delhi	31-10-2009	Dr. S. Sreenivasan Dr. N. Vigneshwaran Shri C. Sundaramoorthy
16.	66th Hindi Workshop	Dalhousie	03-11-2009 to 05-11-2009	Smt. M.V. Kamerkar Smt. T.P. Mokal
17.	International Workshop on Utilisation of Cotton By-Produce for Value Added Products	Nagpur	09-11-2009 to 11-11-2009	Dr. S. Sreenivasan Dr. R.P. Nachane Dr. S.G. Gayal Shri R.M. Gurjar Dr. A.J. Shaikh Dr. P.V. Varadarajan Dr. T. S. Manojkumar Shri V.G. Arude Shri S.K. Shukla Dr. (Smt.) Jyoti Nath
18.	National Symposium on Bt. Cotton : Opportunities and Prospects	Nagpur	17-11-2009 to 19-11-2009	Dr.S. Sreenivasan Dr. C.D. Ravindran Shri Chitranayak

Sr. No.	Meetings / Conferences / Seminars /Symposia, etc.	Place	Date	Participants
19.	Leveraging Innovation for Knowledge Economy	Bangalooru	19-11-2009 and 20-11-2009	Dr. R.P. Nachane
20.	Meeting of Sub Group on Cotton for National Fibre Policy	New Delhi	20-11-2009	Dr.S. Sreenivasan
21.	Launch of ABI-ICRISAT and BPDU Meet	Hyderabad	25-11-2009	Dr.S. Sreenivasan Dr. N. Shanmugam Dr. S.B. Pal
22.	Meeting on National Fibre Policy	New Delhi	03-12-2009	Dr.S. Sreenivasan
23.	Conference Paperex 2009 & Trade Fair on Pulp, Paper and Convention Industry	New Delhi	04-12-2009 to 07-12-2009	Dr. A.J. Shaikh
24.	The Conference on Advances in Textiles, Machinery, Nonwovens and Technical Textiles – ATNT – 2009	Coimbatore	07-12-2009 to 09-12-2009	Dr. S. Sreenivasan Dr. R.P. Nachane Dr. S. Venkatakrishnan
25.	Conference on Oils, Fats and Surfactants	New Delhi	09-12-2009 to 11-12-2009	Dr. (Smt.) Sudha Tiwari
26.	ICAFM – 2009 Conference	Trivandrum	09-12-2009 to 12-12-2009	Dr. N. Vigneshwaran
27.	50th Annual Conference of AMI	Pune	15-12-2009 to 18-12-2009	Smt. A.A. Kathe
28.	BPDU Programme on Cotton	Coimbatore	22-12-2009	Dr. S. Sreenivasan Dr. R.P. Nachane Shri R.M. Gurjar Dr. P.V. Varadarajan Dr. N. Shanmugam Dr. S.B. Pal Dr. S. Venkatakrishnan Shri K. Thiagarajan
29.	International Conference on Frontiers of Interface between Statistics and Sciences	Hyderabad	30-12-2009 to 02-01-2010	Dr. C.D. Ravindran

PARTICIPATION IN CONFERENCES, MEETINGS, WORKSHOPS, SYMPOSIA

Sr. No.	Meetings / Conferences / Seminars /Symposia, etc.	Place	Date	Participants
30.	28th Biennial Conference on Impact of Social Change & Technological Advance on Family and Community	Kolkata	07-01-2010	Dr. S. Sreenivasan
31.	Globalisation of Hindi and Official language Implementation	Mumbai	11-01-2010 to 16-01-2010	Smt. K.R. Joshi Smt. T.P. Mokal
32.	Meeting on Sub Group on Cotton for National Fibre Policy	New Delhi	27-01-2010	Dr. S. Sreenivasan
33.	44th ISAE Convention	New Delhi	28-01-2010 to 30-01-2010	Shri V.G. Arude
34.	Research Advisory Committee Meeting of BTRA	Mumbai	05-02-2010	Dr. S. Sreenivasan
35.	BIS Meeting for Physical Methods of Testing Textiles (TXO1)	Mumbai	19-02-2010	Dr. S. Sreenivasan Dr. R.P. Nachane
36.	International Conference on Post-harvest Management and Valorization of Agri-horticultural Produce and Exhibition	New Delhi	19-02-2010 and 20-02-2010	Dr. A.J. Shaikh
37.	Meeting on Mega Project on Natural Fibres	New Delhi	26-02-2010	Dr. S. Sreenivasan Dr. R.P. Nachane Dr. S.G. Gayal Dhri R.M. Gurjar Dr. N. Shanmugam
38.	Standing Committee Meeting of TMC - MM1	New Delhi	03-03-2010	Dr. S. Sreenivasan
39.	ZITMC Workshop on IPR	Nagpur	05-03-2010 and 06-03-2010	Dr. S. Sreenivasan Dr. R.P. Nachane Shri R.M. Gurjar Dr. T.S. Manojkumar Shri V.G. Arude Dr. (Smt.) Jyoti Nath
40.	International Seminar on Organic Textiles	Mumbai	12-03-2010	Dr. R.H.Balasubramanya Dr. R.P. Nachane Dr. A.J. Shaikh Dr. S.G. Gayal

10

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

International Conference on Emerging Trends in Production, Processing and Utilisation of Natural Fibres

In keeping with the UN declaration to celebrate the year 2009 as the year of Natural Fibres, all the Institutes working on natural fibres came together under the umbrella of ICAR along with Indian Society for Cotton Improvement (ISCI) and Indian Fibre Society (IFS) and celebrated this year by organising an International Conference titled **Emerging Trends in Production, Processing and Utilisation of Natural Fibres** from April 16 - 18, 2009 at Mayfair, Worli, Mumbai. As already noted, this conference was a joint effort of the Indian Society for Cotton Improvement (ISCI), Indian Fibre Society (IFS), ICAR and Texas Tech University, USA.

The three day conference was attended by over 250 delegates from India and abroad. The delegates from India included researchers from ICAR, SAU's, and academic institutions, policy makers from various government bodies and personnel from private seed and fibre industries. The participants from abroad especially USA and Kenya included Vice Chancellor, MOI University, Kenya, Associate Dean of Texas Tech University and Vice President (Operations), Plains Cotton Growers Inc., Lubbock, Texas, USA. The conference deliberated on issues pertaining to all natural fibres *viz.* Cotton, Jute, Ramie, Sisal, Sun hemp, Agave, Coconut fibre, Banana fibre, Wool and other animal fibres including Silk. The diverse themes covered for discussion included fibre Production and crop protection, dry and wet processing, natural fibre blends, byproduct utilization, application of emerging technologies such as non-wovens and technical textiles, production economics, international trade and marketing, policy issues and regulatory norms. The environmental and sustainability aspects with reference to all natural fibres were also discussed in the conference.

Dr. R.S. Paroda, former Secretary DARE, Government of India & Director General, ICAR and Chairman, TAAS inaugurated the conference on April 16, 2009. The Guest of Honour for the

inaugural function include Dr. P.L.Gautam, Chairman, National Biodiversity authority, Dr. H.P. Singh, DDG (Horti), Dr. M.M. Pandey, DDG (Engg), Mr. A.B. Joshi, Textile Commissioner, Govt. of India and Mr. Roger Haldenby, Vice president, Plains Cotton Growers Inc., USA. The book of papers in two volumes was released by the chief guest during the occasion. The Inaugural function concluded with a cultural programme.

During the morning session on each day plenary lectures were organized as part of the conference. Dr. S. Nagarajan, Chairman, PPV&FRA and Dr. C.D. Mayee, Chairman, ASRB and President ISCI delivered the plenary lectures during the first day followed by Mr. M. Ramasamy, CMD, Rasi seeds, Attur and Mr. Lav Bajaj, M/s Bajaj steel Industries Ltd, Nagpur on the second day and Dr. C.B. Chaporkar M/s. MAHYCO Seeds Ltd. delivered the plenary lecture on the final day.

The subject matter of the conference was covered in 15 Technical sessions. Each technical session commenced with a thematic presentation in the form of a Lead paper from various experts specializing on Natural Fibres from India and abroad. In all 70 Oral presentations were made during the conference. The technical

Lighting of the Lamp at the International Conference on Natural Fibres 2009 by Dr. C.D. Mayee, Chairman, ASRB at Mayfair, Worli, Mumbai

Dr. R. S. Paroda, former Secretary, DARE and Director General, ICAR releasing the Book of Papers
Left to Right – Dr. M.M. Pandey, DDG (Engg.), Dr. P.L. Gautam, Chairman, National Biodiversity Authority, Ministry of Environment & Forests, Govt. of India, Dr. R. S. Paroda, former Secretary, DARE and Director General, ICAR, Dr. H.P. Singh, DDG. (Horticulture), ICAR, Dr. C.D. Mayee, Chairman, ASRB, Mr. Roger R. Holdenby, President (Operations), Plains Cotton Growers Inc., Lubbock, Texas, USA

session on the first day covered Crop Production and Protection aspects of cotton, Jute & allied fibres, Wool, Silk & other natural fibres. Ginning, Spinning, Retting, Yarn Manufacture, Fibre & Yarn Preparation and Fabric Manufacture (Weaving/Knitting/Non woven/ Technical Textiles) were taken up for discussion during the second day. Technical sessions in the last day dealt with chemical processing, value addition, by-product utilization, extension & education.

A poster session each was organized both on 16th and 17th April during 1.30 to 2.30 pm. The poster session was inaugurated by Dr. H.P. Singh, DDG (Horticulture). There were around 58 Poster presentations during the conference among which two best posters were selected on each day and awards were given. During the second day of the conference an impressive fashion show was organized by the students of the National Institute of Fashion Technology (NIFT) displaying

enchanting fabrics made from natural fibres. The Fabrics made from banana pseudo stem fibres, wool and silk were the main attractions of the fashion show.

The Conference concluded with a plenary session chaired by Dr. R.P. Kachru, former ADG (P.E), ICAR. In this session a concept note on the proposed Mega project on **Comprehensive Utilisation of Natural Fibres: Production, Processing and Byproduct Utilisation** was presented by Dr. S. Sreenivasan, Director, CIRCOT, where he sought the comments from delegates to enrich the present proposal. The session concluded with summary of recommendations presented by the chairman.

The major recommendations that emerged from the three day conference are listed below:

- Constitution of an independent centralized committee of experts which is linked with concerned fibre based research institutes under ICAR, SAU and industries to address the aspects of production, productivity, value addition and marketing of the natural fibres. (Ministry of Agriculture)
- Creation of a centralized market intelligence unit to co-ordinate with all fibre based institutes under ICAR. [DDG (Engg.)]
- Develop protocol for grading of all known natural fibres (CICR, CIRCOT, CRIJAF, NIRJAFT, CPCRI, NRC Banana, DOPR)
- Natural Fibre clothing as comfort and functional wear to be emphasized and promoted. (CICR, CIRCOT, CRIJAF, NIRJAFT, CPCRI, NRC Banana, DOPR)
- Infuse bio-technology as a tool to enhance production & productivity of natural fibres especially with regard to banana to enhance quality of fibres. (CICR, CRIJAF, CPCRI, NRC Banana)
- Concerted efforts are needed in the area of production technology with inbuilt varietal resistance in all fibre crops. (CICR, CRIJAF, CPCRI, NRC Banana, DOPR)
- The role of Endophytes to be looked into in augmenting soil nutrients and plant protection in all fibre crops. (ADG [plant protection])
- High yielding and high strength medium staple Bt. cotton varieties to be given priority as the demand for medium staple cotton is increasing. (CICR, CIRCOT)
- The share of medium staple cotton varieties in the 20s-30s counts is to be enhanced, since the industrial demand for this type of staple is on an increase. (CICR, CIRCOT)

- To diversify and promote the utilization of inferior cotton varieties into technical textiles so that it benefits farming in areas where superior and better quality cotton varieties cannot be promoted. (CIRCOT, NIRJAFT)
- Natural fibre clusters should be developed to process the fibres along with by-products and residues into value added products with farmers as one of the stake holders. (Ministry of Agriculture).

The Fifth Review Meeting of the project on Utilisation of Cotton Plant By-produce for Value Added Products

The Fifth Review Meeting of the project on Utilisation of Cotton Plant By-produce for Value Added Products was held on June 12, 2009 at Dr. V. Sundaram Committee Room at CIRCOT, Mumbai. Dr. S. Sreenivasan, Director, CIRCOT welcomed the members and briefed them on the progress made and also the results on the revisited effort on the establishment of cotton stalk supply chain, market survey conducted and the progress made with regard to the arrangements being made for the forthcoming International Workshop scheduled to be held at Nagpur from November 9 - 11, 2009.

Dr. R.H. Balasubramanya, Principal Investigator of the project presented the findings made during September 2008 to May 2009, action taken on the

The Review Meeting on the Project ***Utilisation of Cotton Plant By-produce for Value Added Products*** *in progress*

points raised in the fourth Review Meeting, the targets set for the year 2009 and the progress made during the same period. Some of the key suggestions that arose during the meeting are summarized below:

- We need not think of establishing a Board Industry exclusively for cotton stalks.
- Existing Board Industries to be enthused to use cotton stalks after putting in place an Industry-farmer group MoU for supply of quality raw material.
- The study has clearly brought out that entrepreneurs can be made to do the job of getting cotton stalks, chip and supply to Board Industries with some incentives. This project needs to be continued with main focus on the cotton stalks supply chain alone on a larger scale with active involvement of existing board industries through identified entrepreneurs in rural areas.
- CFC could be approached to do this emergent task with a proposal for two years.
- The opinion of ICAC to be taken quickly and action initiated accordingly.

Fourth and Fifth Consortium Committee Meeting (CAC) of the Project A Value Chain for Cotton Fibre, Seed and Stalks : An Innovation for Higher Economic Returns to Farmers and Allied Stake Holders

The fourth and fifth Consortium Committee was conducted on July 27, 2009 and December 22, 2009 at CIRCOT. Shri Suresh Kotak, Chairman presided over both the meetings. Dr. S. Sreenivasan, Director welcomed all those present and mentioned about the salient achievements under the CVC project. The meeting confirmed the minutes of the third and fourth CAC meetings and also discussed about the action taken on the previous minutes of the meeting, discussed the progress made till date. During the fourth CAC meeting Dr. J.P. Mittal, National Co-ordinator, NAIP remarked that the presentation at the CAC meeting should be more comprehensive for better appreciation by the members. One of the important point that was discussed was provision for Farm Facilitators / Labourers for monitoring the crop and interacting with the farmers on-day-to-day basis. Dr. J.P. Mittal asked the P.I. to give a suitable letter with justification for this to NAIP. During the fifth CAC meeting the Committee approved the change in organization from Forest Research Institute, Dehradun to Indian Plywood Industry's Research and Training Institute (IPIRTI), Bangalore for the purpose of providing training on the Utilisation of Crop Residues. Dr. R.H. Balasubramanya, Head, CBPD and Dr. N. Gopalakrishnan, Co-PI proposed Vote of Thanks for the fourth and fifth meetings.

Third CAC Meeting of NAIP Sub Project (Comp. II) : A Value Chain on Utilisation of Banana Pseudostem for Fibre and other Value Added Products

This meeting was conducted at CIRCOT, Mumbai under the Chairmanship of Dr. P. Rethinam, Plantation Crops Management Specialist, Coimbatore on August 27, 2009. After discussing the Action Taken Report of the II CAC meeting, there was activity-wise presentation by each of the partners. After an elaborate discussion, the following were the suggestions of the committee:

1. Visit to National Research Centre for Banana, Tiruchirapalli for knowing the PHT being adopted in fibre extraction as well as for training (edible products)

2. Establishing one raspador unit in North-eastern region for extracting fibre from wild varieties of banana

3. Timely submission of a crisp and point-to-point half-yearly report and SoE.

4. Completing procurement of equipment and machinery before the end of December 2009.

Dr. P. Rethinam, Plantation Crops Management Specialist and Chairman, CAC being welcomed by Dr. S. Sreenivasan, Director, CIRCOT

5. Giving proper justification for additional equipment and for modification/fabrication
6. Using only natural fibre yarn for blending with banana fibres
7. High value paper making should be developed from banana fibre to meet the cost for extracting it.
8. MSR and grease proof paper could be an option for developing high value paper and use of hydrogen peroxide during bleaching could be employed as it is a an environmentally friendly process.

The Committee recommended the following to be carried out :

- Based on the experience of CIRCOT, inputs can be given to the manufacturer for the fabrication of a yarn making system suitable for spinning banana pseudostem fibre. The same system may be purchased from the same fabricator without following another NCB procedure for procuring yarn making system at NAU, Navsari (NAU)
- Purchasing additional laboratory instruments from the balance amount left after the procurement of the sanctioned instruments with proper justification

Excess expenditure made by M/s. J.K. Paper may be adjusted from the NAU budget.

Hindi Workshop

The following four workshops were organised during the period :

Sl. No.	Period	Chief Guest	Subject	No. of Staff Participated
1	June 15 and 16, 2009	Shri Naresh Kumar, In-charge, Central Translation Bureau	Official Language Implementation for Administrative Staff	9
2	September 24 and 25, 2009	Shri Mahendra Jain, Lecturer, Hindi Teaching Scheme	Talk on Official Language Policy to Administrative Staff	7
3	December 18 and 19, 2009	Shri Anand Srimali, Assistant Director, Hindi Teaching Scheme (Typing & Stenography)	Importance of Grammar and Spelling for Administrative Staff	8
4	February 19 and 20, 2010	Shri Sanjeev Negam, Retd. Marketing Manager, Dena Bank	Implementation of Official Language for Technical Officers	11

Hindi Day Celebration

For the first time the institute observed a year long celebration in 2009 for Hindi. Various competitions were held from July onwards to popularise Hindi. The Institute celebrated Hindi Week from September 14 to 19, 2009. Shri Rajesh Jowhari, Poet and Announcer and Dr. (Smt.) Ratna Sharma, Head of Hindi Department, Gurugobind Khalsa College were the Chief Guests on the occasion. A poster presentation competition was held on September 19 with the theme ***Kapas Prodhogiki ke Kshtra mein Adhunic Upalabdhiya***. There were 12 poster presentations by the staff. Dr. (Smt.) Shilpa Charankar, Principal, SNDT College, Matunga, Dr. S.R. Shukla, Registrar, UICT, Shri A.R. Khare, Retd. Deputy Director, VJTI were the Judges for the competition. Shri Kishan Sharma, Anouncer, Akashwani and Smt. Kamal Wankhade, Jt. Director, Doordarshan, Mumbai were the Chief Guests on September 22, the concluding day.

Dr. S. Sreenivasan, Director, CIRCOT Lighting the Lamp at Inaugural Function of Hindi Day Celebration

Vigilance Awareness Week

The Vigilance Awareness Week was celebrated at CIRCOT, Mumbai from November 3 to 7, 2009. Dr. S. Sreenivasan, Director, CIRCOT inaugurated the function. Staff members were administered oath on November 3, 2009. On November 5 an essay competition was held on the topic **How Effective is Vigilance in Government Offices?** The competition was held in Hindi, Marathi and English. The following were the winners:

Hindi	I Prize	Shri Chitranayak
	II Prize	Smt. N.M. Deshmukh
Marathi	I Prize	Shri Sunil Marabhal
	II Prize	Smt. H. G. Pednekar
English	I Prize	Shri P. Deshmukh
	II Prize	Smt. V. V. Desai

Shri R. Sekar, Vigilance Officer, Doordarshan Kendra, Mumbai delivered a lecture on the Prevention and Control of Corruption in Government Offices. All the staff members attended this lecture and were highly benefited by the deliberations.

Shri R. Sekar, Vigilance Officer, Doordarshan Kendra, Mumbai being received by Dr. S. Sreenivasan, Director, CIRCOT, Mumbai

Proceedings of International Workshop on "Utilization of Cotton Plant By-produce for Value Added Products

An International Workshop on "Utilization of Cotton Plant By-produce for Value Added Products" was organized during 9-11 November 2009 at Hotel Pride, at Nagpur by Central Institute for Research on Cotton Technology (CIRCOT), Mumbai, in collaboration with the International Cotton Advisory Committee (ICAC), Washington and the Common Fund for Commodities (CFC), Netherlands. This workshop was organized as a culminating effort of the CFC funded project on Utilization of Cotton Plant By-produce for Value Added Products. It was attended by delegates from India and abroad. Twenty-one foreign

delegates from different cotton growing countries like, USA, Egypt, Nigeria, Cameroon, Uganda, Tanzania, Kenya, Mozambique, etc. participated in the workshop, out of which 10 delegates were sponsored by CFC/ICAC.

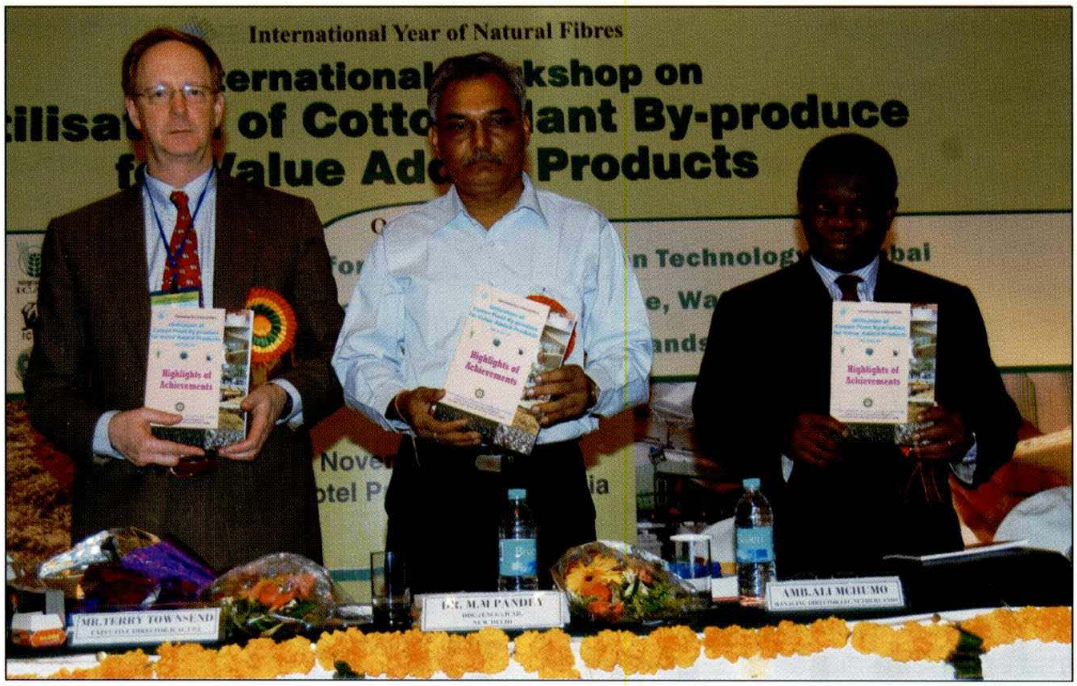
The inaugural session was chaired by Dr. M. M. Pandey, DDG (Engg.) ICAR, New Delhi. Mr. Terry Townsend, Executive Director, ICAC, Washington, USA, Amb. Ali Mchumo, MD, CFC, Netherlands, Mr. Sietse Van der Werff, Sr. Project Manager, CFC, Netherlands, Dr. K. R. Kranthi, Director, CICR were the guests of honour.

The workshop had two technical sessions. Session I deliberated on the Presentation of Project findings and this session was chaired by Dr. M.M. Pandey, DDG (Engg.), ICAR, New Delhi. Dr. A.J. Shaikh, Co-PI presented the progress made under both component I and II.

Session II deliberated Composite Boards from Cotton Stalks and other Crop Residues on November 10, 2009. This session was chaired by Dr. N.S.L. Srivastava, Joint Director, SPRERI, Gujarat and nine interesting papers were presented.

Session III deliberated on Alternate Uses of Cotton Stalks and other Crop Residues on 10th November 2009. The session was chaired by Dr. R.P. Kachru, Former ADG (Engg.), ICAR, New Delhi and four interesting papers were discussed in the session. Session IV was an Interactive Session on 10th November 2009 and was chaired by Dr. Y.S. Nerkar, former VC, MPKV, Rahuri. This session witnessed a general presentation followed by interesting interaction with all delegates.

Mr. AMB. ALI MCHUMO, Managing Director, CFC, Netherlands lighting the lamp to Mark the Inauguration of the Workshop



Dr. M.M. Pandey, DDG (Engg.), ICAR Releasing the Book-let on the Highlights of Achievements of the Project

The following were the recommendations made in the workshop :

Policy Issue

1) The taxation issue is a serious one coming in the way of commercial utilization of cotton stalk for board manufacture. The workshop recommends that attempts be made to extend the same taxation benefits currently enjoyed by bagasse boards to cotton stalk based boards to make it more cost competitive.

2) Value-addition to crop residues should be declared as a National Agenda of India and attempts be made to get carbon credit for this activity.

3) The technology developed by CIRCOT is more suitable for adoption in many Afro-Asian countries. Hence policy initiatives are needed to set up few particle board industries not only in India but also in cotton growing countries of Africa (ICAC/Govt. of African Countries).

Researchable Issues

1) Systematic data on availability of cotton stalk in various cotton growing countries of the world to be created(CIRCOT/CICR).

Management Issue

1. The pilot plant facility created should continue to run on a regular basis and it should be utilized for imparting training to prospective entrepreneurs from India and other member countries of ICAC/CFC (CIRCOT/ICAC/CFC).

2. Concerted efforts need to be made to popularise the technology developed by conducting awareness meets(CIRCOT/DAC).

3. Creation of few supply chain centres across the country to promote entrepreneurship for a sustainable supply of cotton stalk to industry. Appropriate government agencies, national and international funding agencies may be approached.

Business Development Programme

ZTM-BPD-CIRCOT Unit organised a one day business development programme at Cotton Association of India, Cotton Green, Mumbai on August 1, 2009 to interact with different cotton industries which are directly or indirectly involved with cotton related product; the objective was to provide awareness about technologies and services available with CIRCOT and the functioning of ZTM-BPD-CIRCOT unit. Dr R.H. Balasubramanya, Head, CBPD welcomed the audience and Dr. S. Sreenivasan, Director, CIRCOT inaugurated the programme. The following papers were presented during the meet.

- Zonal Technology Management and Business Planning and Development

Shri P.D Mepani, Director, CAI being welcomed by Dr. S. Sreenivasan, Director, CIRCOT at the Business Development Programme at Cotton Association of India

unit at CIRCOT, Mumbai by Dr. N. Shanmugam and Dr S.B. Pal, ZTM-BPD Unit, CIRCOT

- Cotton Business Scenario in India by Shri P.D Mepani, Director, CAI
- Types of Financial Assistance and Different Aspects of Business Plan by S.N. Jena, Deputy General Manager, NABARD
- Business Support for Small Industries by Shri Sanatan Sahoo, Asst. Director, MSME
- GinERP Software by Shri Sailesh Bhogaraju, SSPS, Hyderabad
- Introduction of Individual Bale Tagging Concept in Indian Cotton by Dr R.P Nachane, CIRCOT
- Biogas and Compost from Cotton Waste by Dr R.H Balasubramanya, CIRCOT
- Technology for Synthesis of Zinc Oxide Nanoparticles by Dr. N. Vigneshwaran, CIRCOT
- Setting up Enterprises: Cotton Biomass as Raw Materials by Dr. A.J. Shaikh & Shri R.M Gurjar, CIRCOT

The meeting ended with Vote of Thanks by Dr. N. Shanmugam, P.I.

Business Development Programme for CIRCOT Technologies

A Business Development Programme for CIRCOT Technologies was arranged at the Southern India Mills' Association (SIMA), Coimbatore on December 22, 2009. Shri P.D. Damodaran, Chairman, SIMA CD&RA welcomed the audience while Shri T. Rajkumar, Vice Charman, SIMA inagurated the programme. Dr. S.

Dr. S. Sreenivasan, Director, CIRCOT on the Innovativeness in NAIP Projects and Business Incubation Concepts

Sreenivasan, Director, CIRCOT gave a talk on the Innovativeness in NAIP Projects and Business Incubation Concepts. The following talks were arranged during the function.

- Zonal Technology Management and Business Planning and Development Unit by Dr. N. Shanmugam PI of the project and Dr. S.B. Pal, Business Manager, BPD
- Setting up Enterprises : Cotton Biomass as Raw Materials by Dr. A.J. Shaikh, Head, Transfer of Technology and Shri R.M. Gurjar, Principal Scientist, CIRCOT
- Technology to Dye Cotton Yarn & Fabric with Natural Dyes by Dr. P.V. Varadarajan, Principal Scientist, CIRCOT
- Technology for Producing Biogas from Textile Mill Waste by Dr. S.B. Pal, Business Manager and Dr. S. Venkatakrishnan, Technical Officer, CIRCOT

In this awareness meet, 65 companies participated and few of them have registered as members of the BPD unit. Several queries have been received for the technologies developed by the Institute. Some consultancies have also been provided to a few. Cotton samples are being received for testing at the Institute from some firms after the meet. The meeting ended with Vote of Thanks to the Chair.

Quami Ekta Week

Quami Ekta Week was celebrated at the Institute during November19-25,

Shri B.R. Satam, Skilled Supporting Staff receiving Second Prize for his Essay from the Chief Guest Dr. Murugendra Rai, Lecturer, Guru Nanak Khalsa College

2009. All the staff members were administered Oath on November 19. On November 24, an essay competition on the topic **Linguistic States – Good or Bad for the Country?** was conducted. Along with this, the Flag Day was observed on November 24, 2009 wherein the staff members contributed financially towards rehabilitation of physically handicapped children. The following were the winners in the essay competition:

Hindi	I Prize II Prize	Shri Chitranayak Smt. K.R. Joshi
Marathi	I Prize II Prize	Shri Sunil Marabhal Shri B.R. Satam and Shri C.M. More
English	I Prize II Prize	Shri Achchhelal Yadav Smt. Bindu Venugopal

Dr. Murugendra Rai, Lecturer, Hindi Division, Guru Nanak Khalsa College, Matunga, Mumbai gave a lecture on Communal Harmony during the celebrations.

Choupal

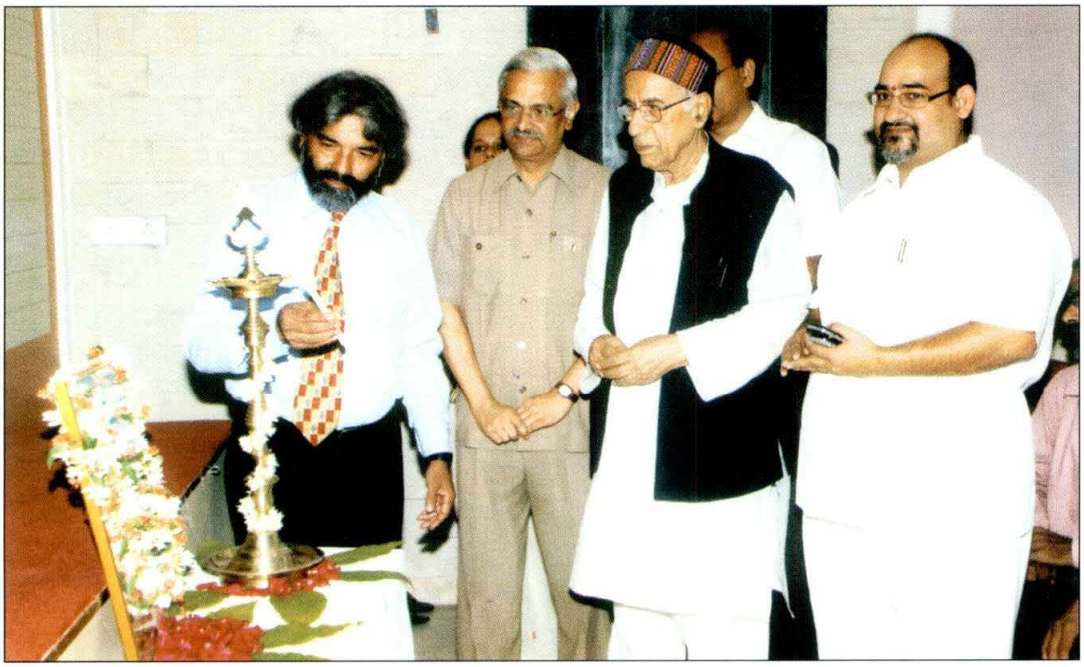
The institute in collaboration with the Town Official Language Committee, North Mumbai organised this function on December 16, 2009, the first one of its kind in the Institute. The subject for discussion was *Sarkari Karyalyon mein Hindi ki samasyaye vs. Samadhan Avam Bajar ki Hindi vs. Hindi ka Bazar.* Dr. S. Sreenivasan, Director, CIRCOT acted as the Chairman for the function. The participants included Dr. Rajeshwar Unniyal, Member-Secretary, Town Official Language Committee, Dr. (Smt.) Sunita Yadav, Assistant Director, Hindi Teaching Scheme, Dr. S.G. Gayal,

Dr. (Smt.) Sunita Yadav, Assistant Director, Hindi Teaching Scheme, Lighting the Lamp

Principal Scientist and Head, Chemical and Bio-chemical Processing Division, CIRCOT were the other members who actively participated in this discussion. This function was well attended by staff from various Central Government organizations in Mumbai. Kum. Taruprabha Shail and Shri Virendra Kulkarni were awarded prizes for their excellent oration. The programme was telecast in *Amchi Mumbai*.

Felicitation to Shri Rajvinder Singh

A programme was held on February 6, 2010 to felicitate Shri Rajvinder Singh, a non-resident Indian poet settled in Germany for his outstanding work in Hindi. This function was jointly organised by CIRCOT with Shruti Sanvad Sahitya Kala Academy. Shri Nandkishore Nautial, Senior Journalist presided over the function. Shri Rahi, Editor, Yashobhumi also attended the function.



Shri Rajvinder Singh, a non-resident Indian poet settled in Germany felicitated for his outstanding work in Hindi

International Women's Day

The International Women's Day was celebrated during the year on March 9, 2010. The theme for the year 2009 was **Equal Rights, Equal Opportunities: Progress for All**. On this occasion Dr. (Smt.) Savitri Kulkarni, Associate Dean, Welingkar Institute of Management Development & Research, Matunga, Mumbai gave a talk on the Stress Management. During the function, women staff members who were winners of various events in the ICAR Zonal Sports Meet held at CSWRI, Awikanagar, Rajasthan from February 10 – 14, 2010 were felicitated.

Dr. (Smt.) Savitri Kulkarni, Associate Dean, Welingkar Institute of Management Development & Research, Matunga delivering a talk on ***Stress Management***

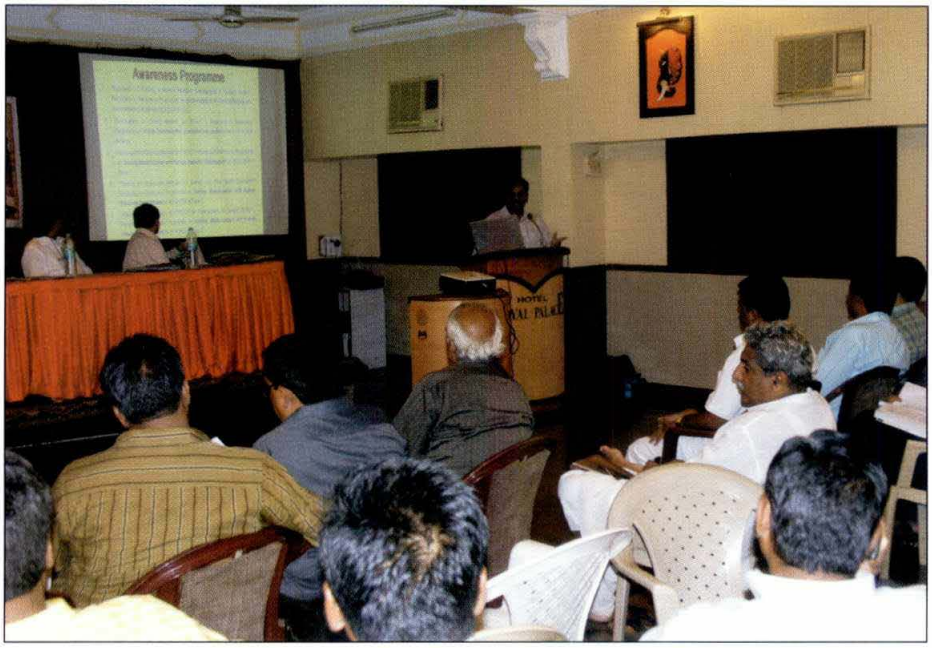
Awareness Meet

- An Awareness meet was organized for the Khandesh Ginners on June 25, 2009. They were briefed about the Emerging Trends in Modern Ginning & Pressing Factories with Reference to Cotton Quality.

- For the ginning industry personnel an awareness programme was conducted at Nagpur on August 20, 2009. This was sponsored by M/s. Bajaj Steel Industries.

- For the Cotton Merchant and Ginners another interactive workshop was arranged at Khandawa, Indore, Madhya Pradesh on September 4, 2009.

- An Awareness meet at Nandura Village, Babhulgaon Taluka, Yeotmal was arranged on November 24, 2009 to impress upon the farmers that clean cotton would fetch better remuneration. They were also told as what cotton fibre parameters would have to be looked in a "good" cotton.



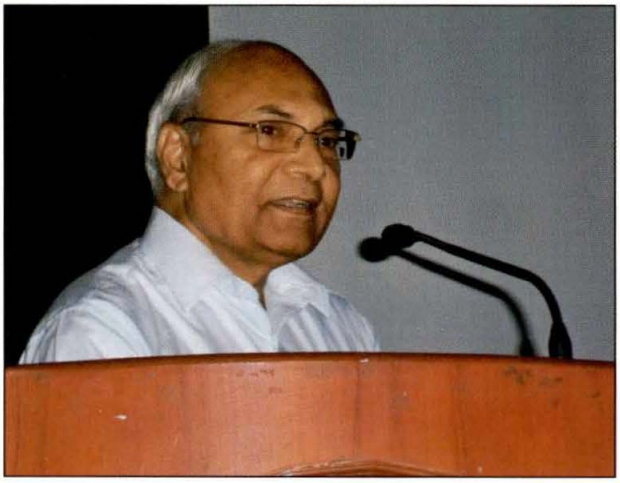
Awareness Meet for the Ginners at Khandesh, Jalgaon

Internal Seminars

During the year the following lectures were been arranged on various topics as indicted below for the benefit of the staff members of CIRCOT.

Dr. Mauria, ADG (IPR & Policy), ICAR during his talk on IPRs and Technology Transfer Issues in ICAR on August 7, 2009

1. IPR Policy in ICAR by Dr. R.P. Nachane on June 4, 2009.
2. Stress Management by Shri C. Sundaramoorthy on July 31, 2009.
3. Presentation on Team Building for the Scientists of CIRCOT on July 31, 2009.
4. IPRs and Technology Transfer in ICAR by Dr. Mauria, ADG (IPR & Policy), ICAR on August 7, 2009.
5. Designing Experiments to Control Variation and Minimise Error by Dr. C.D. Ravindran on December 4, 2009.



Dr. N.S.L. Srivastava, on Briquetting of Crop Residues with Special reference to Cotton Plant Stalk – Market Potential in India

6. Applications of Small Angle X – Ray Scattering (SAXS) in Nanoscience and Nanotechnology by Dr. Dillip Kumar Bisoyi, Associate Professor, Department of Physics, National Institute of Technology, Rourkela on January 25, 2010.
7. Briquetting of Crop Residues with Special reference to Cotton Plant Stalk – Market Potential in India by Dr. N.S.L. Srivastava, Member, RAC and Deputy Director Sardar Patel Renewable Energy Research Institute, Gujarat on March 18, 2010.

11

Distinguished Visitors

- **Chinese Delegation :**
  - His Excellency Mr. Hui Liangyu, Vice Premier of the State Council of the People's Republic of China with other dignitaries on March 28, 2010
  - Mr. Zhang Yan, Ambassador of People's Republic of China to India
  - Mr. Zhang Yong, Deputy Secretary General, State
  - Mr. Zhang Zhijun, Vice Foreign Minister
  - Mr. Niu Dun, Vice Minister of Agriculture
  - Mr. Chen Jian, Vice Minister of Commerce
  - Mr. Huang Shouhong, Deputy Head of State, People's Republic of China

His Excellency Mr. Hui Liangyu, Vice Premier of the State Council of the People's Republic of China examining the mats prepared from banana pseudostem fibre

His Excellency Mr. Hui Liangyu, Vice Premier of the State Council of the People's Republic of China in conversation with Dr. M.M. Pandey, DDG (Engg.).

- Mr. Roger K. Haldenby, Vice President, Operations, Plains Cotton Growers Inc., Lubbock, USA on April 22, 2009

- **Malawi Delegation :** Study Tour to India on Cotton and Textile Industry on April 27-May 1, 2009
  - Mr. Chris Kachiza, Director, Industry, Ministry of Industry and Trade – Leader of Delegation
  - Ms. Christine Mtambo, Deputy Director of Crops, Ministry of Agriculture – Member
  - Mr. J. Mvula, Principal Crops Officer, Ministry of Agriculture - Member
  - Ms. Elufe Nyirenda, Economist, Ministry of Industry and Trade - Member
  - Mr. G. Kajomba, Economist, Ministry of Industry and Trade - Member
  - Mr. Francis Mwamadi, Small Enterprise Development Officer, Ministry of Industry and Trade - Member
  - Satheesh Kumar, S., Trade Secretary at Malawi High Commission Delhi Area, India
  - Mr. McDonald S. Mizati, First Secretary, The High Commission of the Republic of Malawi, New Delhi – 1-5-2009

Malawi Delegation during their interaction with Director at CIRCOT

Members of Malawi Delegation at GTC, Nagpur interacting with Dr. T.S. Manoj Kumar, Scientist-in-Charge

- Shri A.B. Joshi, Textile Commissioner to GTC, Nagpur on June 28, 2009

Shri A.B. Joshi, Textile Commissioner during his visit to GTC, Nagpur

- Dr. P. Rathinam, Former ADG, ICAR and Chairman CAC of NAIP Project on value Chain on Banana on August 28, 2009.

- Shri E.K. Majhi, Joint Secretary (TMC), Ministry of Agriculture, Department of Agricultural Research & Education, Govt. of India on October 5, 2009.

- Ms. Licinia Cossa and Mr. Frederick Itungula from Nairobi to GTC, Nagpur on November 15 and to CIRCOT, Mumbai on November 16, 2009

- A Team from Mozambique – November 16, 2009

- The following team from Uganda visited CIRCOT, Mumbai on December 21, 2009 and then GTC, Nagpur.

  - Mr. Olumn R. Reaagan MP, Chairman, Standing Committee on Commissions, Statutory Authorities and State Enterprises, Republic of Uganda
  - Mr. Samuel Semanda
  - Mrs. Jolly Sabunae

- Shri Chaman Kumar, Additional secretary and Financial Adviser, DARE

Director, CIRCOT with the Standing Committee on Commissions, statutory Authorities and State Enterprises, Republic of Uganda

Shri Chaman Kumar, Additional secretary and Financial Adviser, DARE during the inauguration of the BPD Unit at CIRCOT on February 9, 2010

- Dr. M.M. Pandey, Deputy Director General (Engg.) at GTC, Nagpur

Dr. M.M. Pandey inaugurating the Newly Developed Automatic Roller Grooving Machine at GTC, Nagpur on May 23, 2009

12

Infrastructural Facilities

Library : The institute library procures books pertaining to not only cotton research but also on general interest, management, computers, etc. They are purchased both through Institute funds as well as through NAIP project funds.

During period 2009 - 2010, 101 new books were added to the library. This consists of 23 books in Hindi and 28 books in English. Apart from this 50 books were purchased through NAIP-CVC funds

The total number of books by the end of March 2010 was 6555. Eighteen Indian and 24 foreign journals were subscribed. The total financial outlay for the library during 2009 - 10 was Rs. 22 lakh apart from Rs. 4,36,791 from the IPR and NAIP funding. CDROM Database of ASTM, TAPPI, AATCC, Standard Test Methods, World Textile Abstracts and Analytical Abstracts were subscribed on annual basis.

An one-time purchase of Textile Research Journals back volumes from volume 1 to 68 i.e. from 1931 to 1998 for 15 years on login password mode with FT on-line access on SAGE Publication website was made.

The library facilities are being utilized not only by the staff of the Institute but also by the students and researchers from various colleges affiliated to Mumbai University, sister research institutions and personnel from the textile industry. Xerox service is provided to the visitors on request for a prescribed charge.

An On-line registration with Lexis Nexis, USA for Total Patents database under ITMU - IPR Fund was subscribed. With this, it is possible to access and retrieve data on any patent information worldwide.

All the database services are available free of cost to any interested end-user.

During the reporting period the following major equipment were procured.

1. Analytical Ultra Centrifuge
2. Carding and Draw Frame
3. Electrically Heated Lab Model Stenter
4. Electro Mechanically Operated Material Testing system
5. Environment Chamber

6. Environmental Chamber
7. Freeze Drying System
8. High Volume Instrument
9. High Volume Instrument
10. Hydrogen Gas Chromatograph
11. Liquid Chromatography
12. Moisture Management Meter
13. Research Rotary Digester
14. Server
15. Tensile Strength Tester
16. Ultra High Pressure Homegeniser
17. Viscometer

13

Personnel

Major events during 2009-2010 relating to CIRCOT personnel are listed below:

A. APPOINTMENTS

Sl. No.	Name	Grade to which Appointed	Date of Appointment
		Scientist	
1.	Shri Nirmal Kumar	Scientist	22-6-2009
2.	Dr. Chitermal Parihar	Scientist	24-6-2009
3.	Dr. V. Mageshwaran	Scientist	15-03-2010
		Administration	
4.	Shri J.R. Mangle	Junior Accounts Officer	10-07-2009
5.	Smt. V.N. Walzade	Telephone Operator	31-03-2010

B. PROMOTIONS

Sl. No.	Name	Post to which Promoted	Effective Date of Promotion
		Technical	
1.	Shri C.V. Shivgan	Technical Assistant T-3	16-01-2003
2.	Shri B.V. Shirsath	Technical Assistant T-3	10-09-2006
3.	Shri D.M. Correia	Technical Assistant T-3	18-09-2006
4.	Shri C.V. Shivgan	Technical Assistant T-4	16-01-2008
5.	Shri V.L. Rangari	Technical Officer T-6	02-01-2009
6.	Shri U.D. Devikar	Technical Officer T-6	28-02-2009
		Administrative	
1.	Shri J.R. Mangle	Assistant	10-07-2009
2.	Shri R.K. Pallewad	Assistant	02-03-2010
3.	Smt. S.P. Paiyala	Senior Clerk	02-03-2010

Advance Increment

Sl. No.	Name	Grade	No. of Incredment/s	Date from which effected
		Technical		
1.	Shri R.P. Kadam	Technical Assistant T-3	Two	29-06-2008
2.	Smt. V.G. Udikeri	Technical Assistant T-3	Two	04-08-2008
3.	Shri B.B. Gaykar	Technical Officer T-5	Three	07-10-2008
4.	Smt. Binu Sunil	Technical Officer T-5	One	27-10-2008

TRANSFER

Scientist

1. Dr. Chitermal Parihar, Scientist transferred to Project Directorate on Maize, Seed Production Centre, Kushmahovt, Bihar w.e.f. 30-09-2009.
2. Shri Nirmal Kumar, Scientist transferred to NBSS & LUP, Nagpur w.e.f. 05-10-2009.

Administrative

Shri M.B. Khubdikar, Administrative Officer was transferred to National Insittute of Abiotic Stress Management (NIASM), Malegaon, Baramati w.e.f. 18-08-2009.

C. RETIREMENTS

Scientist

1. Shri D.V. Mhadgut, Scientist retired on 30-11-2009.
2. Dr. D.N. Makwana, Sr. Scientist retired on 28-02-2010.
3. Dr. P.V. Varadarajan, Principal Scientist retired on 28-02-2010.

Technical

Smt. R.K. Shahani, Technical Officer T (7-8) retired on 30-06-2009.

Shri T.S. Mhaske, Technical Assistant T-1-3 retired on 30-06-2009.

Shri J.B. Dhodia, Technician T-1-3 retired on 31-07-2009.

Shri V.B. Suryanarayanan, Technical Officer (T-7-8) retired on 31-10-2009.

Shri G.S. Deorukhkar, Technical Assistant T-1-3 retired on 30-11-2009.

Shri B.H. Umredkar, Technician T-1-3 retired on 31-03-2010.

Administrative

Ms. S. F. Harrison, Assistant retired on 28-02-2010.

Resignation

Shri A.P. Modak, Senior Technical Assistant T-4 resigned from service on 30-06-2009.

D. TRAINING

Sl. No.	Name of the Training Programme	Period and Place	Participant(s)
1.	First Annual Workshop of Component 4 of NAIP at IVRI, Izzatnagar, Bareilly	April 14-15, 2009 IVRI, Izzatnagar, Bareilly	Dr. N. Vigneshwaran
2.	Design of Experiments (DoE)	May 18-20, 2009 Bangalore	Dr. S.K. Chattopadhyay Dr. C.D. Ravindran
3.	International Auditor Course	October 5-7, 2009 Mumbai	Shri R.S. Pathare Shri R.R. Chhagani
4.	Creative Writing in Agriculture	October 5-9, 2009 New Delhi	Shri M. Mohan
5.	Modified Assured Career Progression Scheme	November 4–5, 2009 Mumbai	Shri J.R. Mangale
6.	Travelling Allowance/LTC/ Joining Time	November 12–13, 2009 Mumbai	Shri S.V. Kasabe Smt. S.M. Desai Smt. V.V. Janaskar Smt.J.R. Chavkute
7.	IT – based Decision Support Systems for Multimedia Content Development	November 17–27, 2009 Hyderabad	Shri M. Mohan
8.	Security Management in Research and Educational Institutes	November 19, 2009 Karnal	Shri S.V. Kokane
9.	Computer Fundamentals	December 07–11, 2009 Mumbai	Shri K. Parleshwar Shri J.R. Mangale Smt. S.R. Shirsat Smt. S.G. Parab Smt.J.R. Chavkute
10.	Basics of Budgetary Exercise	December 14–15, 2009 Mumbai	Shri S.D. Ambolkar Shri T.D. Dhamange
11.	Intellectual Property and its Commercialisation in Agriculture	December 15–24, 2009 Hissar	Shri A.K. Bharimallah

Sl. No.	Name of the Training Programme	Period and Place	Participant(s)
12.	Management Development Programme : Level III	January 15–23, 2010 Mumbai	Shri Venu Thanikal Shri S.V. Kasabe Shri A.B. Dalvi Shri B.S. Bhenwal Smt. Sandra Harison Smt. V.V. Desai Smt. S.D. Ambre Shri A.P. Natu Smt. J.J. Karanjavkar Shri J.R. Mangale Smt. S.R. Shirsat Shri N.V. Kambli Smt. S.D. Dudam Smt. T.T. D'Souza Smt.U.N. Bhandari Smt. Viniya Rajesh Naik Shri S.D. Ambolkar Shri R.K. Pallewad Shri P.V. Jadhav Shri V.M. Sable Smt.J.R. Chavkute
13.	Management Development Programme : Level II	January 27–February 4, 2010 Mumbai	Dr.(Smt.) Sujatha Saxena Dr. N. Vigneshwaran Shri Chitranayak Shri Ashok Kumar Bharimalla Shri Achchhelal Yadav Shri V.M. Kulmethe Dr. (Smt.) A.A. Kathe Shri S. Sekar Dr. S.J. Guhagarkar Shri D. Radhakrishna-murthy Dr. R.D. Nagarkar Shri P.K. Mandhyan Dr. E.A. Pachpinde Shri R.S. Pathare Shri S. Vancheswaran Shri T. Venugopal Shri M. Mohan Shri R.K. Jadhav Shri D.L. Upadhye Smt. K.K. Kale Shri K.W. Khamkar Smt. S. Koshy
14.	Orientation to General Financial Rules	March 4-5, 2010 Mumbai	Shri J.R. Mangale

Obituary

Shri K.B. Rajagopal, Technical Officer (T-7-8) expired on 22-04-2009.

E. ACCOLADES

1. Shri Chitranayak, Scientist received a Memento and a Certificate from ASHIRWAD, a social and Cultural organization, Mumbai for writing several Technical articles in Hindi magazines on November 9, 2009.
2. Shri Chitranayak, Scientist and Smt. P.R. Mhatre, Senior Technical Assistant secured Seventh and Tenth place respectively in the All India Praveen Examination conducted in May 2009 by the Directorate of Hindi Teaching Scheme, Mumbai.

Shri Chitranayak, Scientist receiving a Memento and a Certificate from ASHIRWAD

ICAR Inter-Institutional Sports Meet

ICAR Zonal Sports Meet was held at CSWRI, Avikanagar, Rajasthan from February 10 – 14, 2010. A contingent of 49 sports personnel representing CIRCOT with Shri Chitranayak, Scientist as *Chief-de-Mission* and Shri A.R. Gujar, L.D.C, as Manager actively participated in Chess, Carom, Volleyball, Kabbadi, Table Tennis, Badminton and 100 x 4 m relay. The winners in various events are as follows :

Smt. T.T. Souz	Best Women Athlete First prize in Long Jump and Javelin Throw & Second in Shot-put
Shri B.B. Gaykar	Life Time Achievement Award (for actively participating in the ICAR sports for a long period)
Shri P.G. Gogale	Life Time Achievement Award (for actively participating in the ICAR sports for a long period)
Dr. S.J. Guhagarkar, Dr. R.D. Nagarkar, Shri P.V. Jadhav, Shri H.S. Koli and Shri Manoj Ambare	Table Tennis Team
Smt. Smita Paiyala and Smt Sandhya Parab	Table Tennis (Women)
Smt. Smita Paiyala	First Prize Carrom
Shri S.K.Parab	Scond Prize Carrom
Smt. Smita Paiyala and Smt. Snehal R. Shirsat	Badminton(Women)-Winner
Smt. Kiran Joshi	First in Chess
Shri R.S.Prabhudesai	Second in Chess
Shri Nandu V. Kambli, Shri Manoj Ambare, Shri S.P. Naik and Shri S. Surkule	4 x 100 Meter Relay Race
Smt. Sandhya Parab	100 and 200 Meter Race

Shri B.B. Gaykar receiving Life Time Achievement Award (for actively participating in ICAR sports for a long period) by Dr. S.A. Kareem, Director, CSWRI, Avikanagar

An Array of Medals Won By CIRCOT in Various Sports Events

Management Development Training at L. N. Welingkar Institute of Management Development & Research

The prime aim of reinvesting in the employees in any organization is to make them understand their roles. When people know and feel that they are a part of something bigger, they are generally motivated to do better. They are also better equipped to function in their roles in the organisation. Imparting proper management training enables employees to handle new responsibilities apart from handling the people under them. Even senior level officers and scientists need a refresher from time to time, to update and to invigorate their skills and motivation to do the best in the organisation.

Training for Administrative Staff in progress

As a noval and first of its kind in the ICAR set-up, the Institute has drawn up an ambitious plan to get their staff trained in the managerial skills so that they perform better in their day-to-day responsibilities. For this the employees were drawn from diverse levels and given training on how handle new responsibilities, how to handle the people under them apart from exposing them to a host of subjects like time management, inter-personal management, positive attitude, etc. Hence, based on the staff level, three different batches of training were organized at L. N. Welingkar Institute of Management Development & Research institute at Matunga. The training was definitely appreciated by all the staff members and all of them felt it as a great opportunity to bring the best in each one of them.

STAFF WORKING AT THE CENTRAL INSTITUTE FOR RESEARCH ON COTTON TECHNOLOGY AS ON 31-03-2010

(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.R.P. Nachane, M.Sc., Ph.D. , F.T.A., C.Text., F.T.I.
3. Dr. A.J. Shaikh, M.Sc., Ph.D.
4. Dr. S.K. Chattopadhyay, B.Sc.Tech.(Text.)., M.Tech.(Text.Engg.)., Ph.D. (Tech.), F.T.A., C.Engg., F.I.E.

Principal Scientist

1. Dr. S.G. Gayal, M.Sc., Ph.D.
2. Shri R.M. Gurjar, M.Sc.

Senior Scientist

1. Dr. S. B. Jadhav, M.Sc., Ph.D.
2. Dr. C.D. Ravindran, M.Sc., Ph.D.
3. Dr. N. Shanmugam, M.Tech., MIE, D.T.T., C.Eng., Ph.D. (Tech)
4. Dr. (Smt.) Sujatha Saxena, M.Sc., Ph.D.

Scientist

1. Shri Achchhelal Yadav, M.Sc.
2. Shri Ashok Kumar Bharimalla, M.Tech. (Agril. Engg.)
3. Shri Chitranayak, AMIETE., M.Tech. (Electronics)
4. Shri P. S. Deshmukh, M.Tech (Agril.Engg.)(Farm Machinery & Power)
5. Dr. V. Mageshwaran, M.Sc., Ph.D.
6. Shri K.H. Sawakhande, M.Sc.
7. Dr. N. Vigneshwaran, M.Sc. (Agri.), Ph.D.

Technical Personnel

Technical Officer T (7-8)

1. Dr. S.J. Guhagarkar, M.Sc., Ph.D.
2. Dr. (Smt.) A.A. Kathe, M.Sc., Ph.D.
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. Shri D. Radhakrishnamurthy, M.Sc., M.Phil.
7. Shri S. Sekar, B.Sc.

Technical Officer T-6

1. Smt. N.M. Ashtaputre, M.Sc
2. Shri S. Banerjee, M.Sc.
3. Shri R.R. Chhagani, M.Sc.
4. Shri S.M. Gogate, B.Sc.
5. Shri G.B. Hadge, M.Sc.
6. Shri R.K. Jadhav, B.Sc.
7. Dr. (Smt). S.R. Kawlekar, M.Sc., P.I.M.R, Ph.D
8. Shri H.S. Koli, M.Sc., LL.B.
9. Dr. Matish Chandra, M.Sc., Ph.D.
10. Shri M. Mohan, M.Sc., Dip.J.
11. Shri D.N. Moon, B.Sc.
12. Shri C.M. More, M.Sc.
13. Dr. E.A. Pachpinde, M.Sc., Ph.D.
14. Shri R.S. Pathare, B.Sc.
15. Shri B.R. Pawar, M. Sc., LL.M.
16. Shri R.S. Prabhudesai, M.Sc., D.C.M.
17. Dr. (Smt.) Sheela Raj, M.Sc., Ph.D.
18. Dr. (Smt.) Sudha Tiwari, B.Sc., Ph.D.
19. Shri S. Vancheswaran, B.Sc.
20. Shri T. Venugopal, B.E.(Civil)
21. Shri M.V. Vivekanandan, M.Sc.

Technical Officer T-5

1. Smt. Bindu Venugopal, B.Sc.
2. Smt. Binu Sunil, M.Sc.
3. Shri B.B. Gaykar
4. Smt. K.K. Kale, B.A.
5. Shri D.U. Kamble, B.Sc.
6. Shri S.V. Kokane, B.A.
7. Shri R.R. Mahangade, M.Sc.
8. Smt. P.S. Nirali, M.Sc.
9. Smt. C.D. Prabha, M.Sc.
10. Shri P.N. Sahane, D.I.F.T.
11. Smt. N.A. Sonkusle, B.Sc.
12. Shri D.L. Upadhye, SSC (Tech.), D.M.E., N.C.T.V.T.(I.T.I.& C.T.I.)

Senior Technical Assistant T-4

1. Smt. K.R. Joshi, M.A. (Hindi Translator)
2. Shri V.D. Kalsekar, B.Sc.
3. Smt. P. R. Mhatre, B.Sc., M.Lib.
4. Shri R.S. Narkar, B.Sc., D.C.I.A.
5. Shri C.V. Shivgan, H.S.C., Cert.Wireman, Cert.Electrician, Cert.Elec.Supr. (PWD)., Cert. M. & A.W.(Technician)
6. Kum. C. P. D'Souza, M.Sc.

Technical Assistant T-3

1. Shri M.G. Ambare, M.Sc.
2. Shri D.M. Correia, S.S.C., I.T.I., N.C.T.V.T. (Mechanic)
3. Shri N.D. Kambli, B.Sc.
4. Smt. H.G. Pednekar, B.A.
5. Shri S. Patil, B.E. (Civil)

Category T-I-3

1. Shri A.R. Bane, Cert. Cot. Spin.
2. Shri M.B. Chandanshive, Cert.Cot.Spin.(Machinist/Fitter)
3. Shri M.Y. Chandanshive
4. Shri B.R. Jadhav
5. Shri S.K. Parab, Cert. Cot. Spin.
6. Shri D.A. Salaskar
7. Shri B.K. Sawant
8. Shri S.M. Sawant
9. Shri S.A. Waghela
10. Shri G.G. Ambare

Technical Assistant T-2

1. Shri R.R. Gosai
2. Shri R.P. Kadam, B.Sc.
3. Smt. M.P. Kamble, B.A., B.Lib.
4. Shri D.M. Raje
5. Shri M.K. Shaikh

Technical Assistant T-1

1. Shri M.M. Kadam
2. Shri S.G. Phalke
3. Shri Mahabir Singh

Auxiliary Personnel

Canteen staff

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

Administrative Personnel

Head of Office (Officiating)

Smt. M. V. Kamerkar, B.A.

Finance and Accounts Officer

Shri R. K. Singh, M.Sc.

Jr. Accounts Officer

Shri S. V. Kasabe, B.Com., L.L.B.

Assistant Administrative Officer

1. Shri K. W. Khamkar, B.A.
2. Shri S. N. Salve
3. Smt. S. Koshy, B.Com.

Assistant

1. Shri B.D. Sawant
2. Shri A.B. Dalvi
3. Shri D.G. Kulkarni
4. Shri B.S. Bhenwal
5. Smt. V.V. Desai
6. Smt. S.D. Ambre
7. Smt. T.P. Mokal, B.A.
8. Smt. S.M. Desai
9. Shri A.P. Natu
10. Smt. J.J. Karanjavkar
11. Shri K. Parleshwar
12. Smt. V.V. Janaskar, B.Com., M.A.
13. Shri J. R. Mangale, B.Com.
14. R. K. Pallewad, B.A.

Private Secretary

Shri Venu Thanikal

Personal Assistant

1. Smt. S.D. Dudam, M.A.
2. Smt. T.T. Souza

Stenographer Gr. III

1. Smt. U.N. Bhandari
2. Smt. R.R. Tawde, B.Com.
3. Smt. Viniya Rajesh Naik, B.A.

Upper Division Clerk

1. Smt. S.R. Shirsat, B.A.
2. Shri N.V. Kambli
3. Smt. N.M. Deshmukh, M.A., LL.B.
4. Shri S.D.Ambolkar
5. Shri P.V. Jadhav
6. Smt. S.P. Paiyala

Lower Division Clerk

1. Smt. S.G. Parab, B.A.
2. Shri V.M. Sable
3. Smt.J.R. Chavkute
4. Smt. B.D. Kherodkar
5. Shri S.S. Angane
6. Shri A.R. Gujar
7. Shri T.D. Dhamange, B.Com.
8. Shri S.N. Bandre
9. Smt. V. N. Walzade (Telephone Operator)

Skilled Supporting Staff

1. Shri M.Z. Rathi
2. Shri N.J. Kharat
3. Shri R.B. Jadhav
4. Shri M.B. Gurve
5. Shri O.T. Thapa
6. Shri B.R. Satam
7. Shri D.M. Chougule
8. Shri S.D. Gurav
9. Shri M.K. Ghadge
10. Smt. T.V. Bhowar
11. Smt. B.R. Piwal
12. Shri D.B. Temgire
13. Shri C.S. Salvi
14. Shri K.T. Mahida
15. Shri P.G. Gogale
16. Shri M.M. Katpara
17. Shri M.A.A. Rashid
18. Shri G.N. Mayawanshi
19. Shri H.B. Vesmiya
20. Shri M.J. Sumra
21. Shri C.P. Solanki
22. Shri S.K. Bobate
23. Shri P.P. Patil
24. Shri R.G. Tak
25. Shri R.P. Karkate
26. Shri D.G. Gole
27. Shri C.D. Acharekar
28. Shri M.K. Prabhulkar
29. Shri J.D. Sakpal
30. Shri V. Murugan
31. Shri S.B. Worlikar
32. Shri S.D. Magar
33. Shri S.R. Tondse
34. Shri V.B. Poojari
35. Shri S.P. Naik
36. Shri M.N. Kamble
37. Smt. K.B. Thapa
38. Shri D.K. Kasar
39. Shri D.R. Gawde
40. Shri S.S. Surkule
41. Shri S.M. Chandanshive
42. Shri P.E. Gurav
43. Shri Mahes C. Solanki

LIST OF STAFF AT THE QUALITY EVALUATION UNITS

COIMBATORE

Technical Officer T-(7-6	: Dr. S. Venkatakrishnan, MSc., Ph.D., A.T.A.
Technical Officer T-6	: Shri K. Thiagarajan, M.Sc.
Sr. Technical Assistant T-4	: Shri M. Bhaskar, Dip. Ref. & Air-Cond.

DHARWAD

Technical Officer T-5	: Shri K. Narayanan,B.Sc.
Technician T-3	: Kum. V.G. Udikeri, B.Sc.
Skilled Supporting Staff	: Shri C.J. Bagalkoti
Skilled Supporting Staff	: Shri A.F. Gudadur

GUNTUR

Technical Officer T-6	: Shri S. Mukundan, M.Sc.
Skilled Supporting Staff	: Shri V. Subbaiah

NAGPUR

Scientist (Sr. Scale)	: Dr. T.S. Manojkumar, M.E. (Agril.), Ph.D. (Agril. Processing)
	: Shri Vishnu Govind Arude, M.Tech
	: Shri Sujeet Kumar Shukla, M.Tech (Mech. Engg.).
Scientist	: Smt. Jyoti M. Nath, M.Sc.
Technical Officer T-7	: Shri V.M. Kulmethe, B.Sc.
Technical Officer T-6	: Shri N.V. Bansode, B.Sc.
	: Shri U.D. Devikar, B.Sc.
	: Shri V.L. Rangari, B.Sc.
Technical Officer T-5	: Shri S.L. Bhanuse, B.Sc.
	: Shri R. G. Dhakate, B.Sc.
	: Shri S.N. Hedau, B.Sc.
Technician T-3	: Shri B.V. Shirsath, B.A., I.T.I.
	: Shri C.L. Mundale

Technician T-1-3	: Shri B.H. Umredkar
Technician T-2	: Shri P.S. Panchbudhe, B.A.
Technician T-1	: Shri H.S. Bhabar
	: Shri S.V. Kokane
Stenographer (Gr. III)	: Shri R.D. Shambharkar, M.A.
Senior Clerk	: Shri B.D. Dhengale
	: Shri S.A. Telpande, M.Com.
Skilled Supporting Staff	: Shri M.P. Tohokar
Skilled Supporting Staff	: Shri A.R. Chutale
	: Shri J.P. Patel
	: Shri R.B. Kautkar
	: Shri R.G. Matel
	: Shri R.C. Rokde
Skilled Supporting Staff	: Shri M.G. Bhandakkar
	: Shri R.S. Umare

SIRSA

Technical Officer T-6	: Dr. Hamid Hasan, M.Sc., Ph.D.
	: Dr. Jal Singh, M.Sc., Ph.D.
Technician T-1	: Shri Sanwarmal Saini
Supporting Staff	: Shri Satyanarayan Gope

SURAT

Technical Officer T-6	: Shri G.G. Mistry, B.Sc.
Technical Officer T-5	: Shri M.B. Patel, B.Sc., L.L.B.
Technician T-1-2	: Shri J.B. Dhodia
Senior Clerk	: Shri J.I. Parmar, B.Com.
Skilled Supporting Staff	: Shri K.M. Rathod
Skilled Supporting Staff	: Shri M.G. Sosa