



ANNUAL REPORT 2020



भा.कृ.अनु.प. - केंद्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान, मुंबई
ICAR-Central Institute for Research on Cotton Technology (ICAR-CIRCOT), Mumbai
Towards Doubling Farmer's Income through Sustainable Processing Technology & Value Addition to by-product



INDIAN COUNCIL OF AGRICULTURAL RESEARCH

**SARDAR PATEL OUTSTANDING
ICAR INSTITUTION AWARD 2019**

(For Small Institute Category)

**ICAR-CENTRAL INSTITUTE FOR RESEARCH ON COTTON TECHNOLOGY,
MUMBAI**

CITATION



ICAR-CENTRAL INSTITUTE FOR RESEARCH ON COTTON TECHNOLOGY, MUMBAI has been awarded Sardar Patel Outstanding ICAR Institution Award 2019 in the category of Small Institute. ICAR-CIRCOT, is a premier Institute of ICAR working under the Agricultural Engineering SMD, with seasoned strength of 50 scientists. The Institute is mandated to carryout Basic and Strategic research on processing cotton and its agro-residues, development of value

added products & cotton quality assessment besides providing skill development, innovation services and value addition services. ICAR-Central Institute for Research on Cotton Technology (CIRCOT), Mumbai established in 1924 evolved as the premier Institute with a vision for Global Excellence in Cotton Technology. Making an exciting beginning in 1928 by identification of cotton fabrics excavated from the Mohenjo-Daro of Indus Valley in 3000 B.C. and now reaching a status of establishing India's First Nanocellulose Pilot Plant. In 2015, CIRCOT has made significant contribution for the development of ginning sector, promotion of cotton through development of cotton rich blends, calibration cotton & norms for cotton quality assessment, Environment friendly wet processing technologies, functional finishing technologies for cotton textiles and value addition to biomass for its commercial utilization. CIRCOT is an NABL accredited laboratory providing international testing services to the cotton industry. The Institute generates revenue through technology commercialization, research consultancy, skill development, seminars, training services and commercial testing services. Institute has a vibrant Agri-business Incubation Centre that nurtures vibrant and sustainable start-ups. CIRCOT undertakes skill development programme and provides incubation service in ginning technology, nanotechnology, microscopy, biomass utilization, chemical & material characterization, fabric convert, textile technology etc. to create employment opportunities and establishment of start-ups. CIRCOT's role in development of cotton sector in African countries is noteworthy. CIRCOT is geared up towards sustainable cotton processing and value addition in harmony with Human health, Society and Environment.



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ANNUAL REPORT 2020



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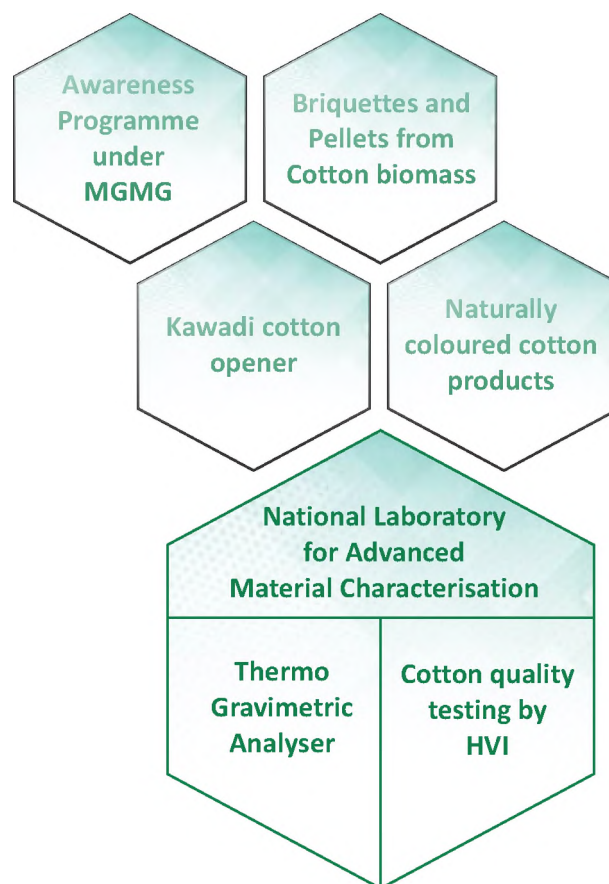
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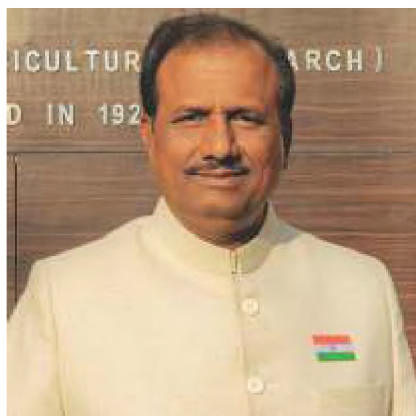
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ABBREVIATIONS

ABI	Agri-Business Incubation
AFIS	Advanced Fibre Information System
AFM	Atomic Force Microscopy
AICRP	All India Coordinated Research Project
AKMU	Agricultural Knowledge Management Unit
ASRB	Agricultural Scientists Recruitment Board
ASTM	American Society for Testing and Materials International
BIS	Bureau of Indian Standards
BNPM	Bank Note Paper Mill
DBSKKV	Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth
CBPD	Chemical & Biochemical Processing Division
CIRCOT	Central Institute for Research on Cotton Technology
CTRL	Cotton Technological Research Laboratory
DR Gin	Double Roller Gin
FTIR	Fourier Transform Infrared Spectroscopy
GTC	Ginning Training Centre
HDPS	High Density Planting System
HVI	High Volume Instrument
ICAR	Indian Council of Agricultural Research
ICCC	Indian Central Cotton Committee
ICT	Institute of Chemical Technology
IFS	Indian Fibre Society
IJSC	Institute Joint Staff Council
IMC	Institute Management Committee
IP	Indian Pharmacopoeia
IRC	Institute Research Council
ISAE	Indian Society of Agricultural Engineers
ISCI	Indian Society for Cotton Improvement
ISO	International Organization for Standardization
ITMF	International Textile Manufacturers Federation
ITMU	Institute Technology Management Unit
MFC	Micro Fibrillated Cellulose
MGMG	Mera Gaon Mera Gaurav
MoU	Memorandum of Understanding
MPD	Mechanical Processing Division
NABL	National Accreditation Board for Testing and Calibration of Laboratories
NAIF	National Agriculture Innovation Fund
NRCG	National Research Centre for Grapes
PMC	Project Monitoring and Evaluation Committee
QEID	Quality Evaluation and Improvement Division
QRT	Quinquennial Review Team
R&D	Research and Development
RAC	Research Advisory Committee
RAFTAAR	Remunerative Approaches for Agriculture and Allied Sector Rejuvenation
RKVY	Rashtriya Krishi Vikas Yojana
RPM	Revolutions per minute
SEM	Scanning Electron Microscopy
SBEE	Society of Benin Electrical Engineering
SNDT	Shreemati Nathibai Damodar Thackersey (Women's University)
TAP	Technical Assistance Programme
TTD	Technology Transfer Division
USDA	United States Department of Agriculture
VJTI	Veermata Jijabai Technological Institute

PREFACE



The cotton sector has been impacted by the COVID pandemic due to the demand destruction and supply chain disruptions. Despite the good crop of about 26.2 million tonnes, the global consumption has declined unprecedentedly to 22.7 million tonnes resulting in higher stocks and downward pressure on prices. The cotton spinning and textile manufacturing that were non-operational globally during lockdown in March-April 2020 revived faster with mills at Vietnam, Bangladesh and India reporting operations at about 75% of capacity by July 2020. The revival of the spinning sector has reversed the downward pressure on the cotton prices.

ICAR-CIRCOT made a significant contribution during pandemic to facilitate cotton procurement operation by organizing training programme on Grading and Procurement for agricultural officers of Maharashtra state. The institute catered to the cotton quality evaluation needs of the Government's procurement operation under MSP. The institute also published COVID advisories for the stakeholders in four languages to ensure safe revival of the sector.

The institute has adapted itself to the new way of functioning in on-line mode without any disruption in service to its stakeholders. The institute has been actively carrying out its mandated activities addressing the needs of the stakeholders in post-harvest processing of cotton, development of value added products, quality assistance to the country's cotton breeding programme and rendering commercial services including skill development, consultancy, incubation and testing.

ICAR-CIRCOT, marching on its path towards its centenary, has attained yet another milestone as an Institute of Excellence by bagging the prestigious Sardar Patel Outstanding ICAR Institute Award under the small institute category. The scientists also won awards and accolades for their attainments as a team and also in individual sphere of excellence. The institute has been very vibrant on the resource generation despite pandemic generating a revenue of Rs 305 lakhs during the year.

The incubation activity of the institute became vibrant with the award of RAFTAAR Agri-Business Incubation Centre (R-ABI) of DAC&FW with provision for seed stage and pre-seed stage funding for the innovative ideas incubated in the institute. The first Cohort of 14 ideas incubated in the R-ABI of the institute has received a total grant-in-Aid funding of Rs.1.44 crores. Two of the incubatees products viz., innovative lysimeter for on-farm management and cotton interlined sleeping bag for comfort were released during the ICAR foundation day on July 16, 2020.

The contributions of all the scientific and technical staff towards the institute's achievements are duly acknowledged and their continued support to lead the institute towards global excellence is solicited.

Mumbai

P. G. Patil
Director

EXECUTIVE SUMMARY

ICAR-CIRCOT's dedicated scientific and technical workforce is always striving hard towards achieving sustainability & inclusive growth in the cotton sector. The Institute undertakes research activities in 5 major core areas viz.

- I. Pre-ginning and Ginning;
- ii. Mechanical processing: Technical textiles and Composites;
- iii. Characterization - Cotton and other natural fibres, yarns and textiles;
- iv. Chemical and Biochemical processing of cotton and its biomass & by-product utilization;
- v. Business incubation, Entrepreneurship and Human Resource Development.

The salient achievements made by the institute during 2020 are:

Research

Four process technologies and seven machineries / value added products have been developed during 2020.

Process technologies

- Green process protocol for extraction of protein concentrates from cottonseed meal
- Hydrogen peroxide- Nanosilver based disinfectant formulation
- Chemo-Mechanical Process for Production of Nano-Sulphur
- Process protocol to get bleached cotton linters with high Degree of Polymerization

Machineries / Value added products

- Rotary tubular drum dryer for quarantine of pink bollworm from cottonseed
- Marker fibre for the traceability of cotton textiles
- Development of Improved Kawdi Cotton Opener:

- Cotton Interlined Sleeping Bags for Better Comfort
- Biodegradable wound dressing Pad with Antimicrobial Properties
- Heat Generating Smart Textiles Products
- Processed cotton linters for filter making applications

Publications

- Published 39 research papers in peer reviewed journals; 17 conference papers 4 training manuals, 2 Book chapters and 16 popular articles were published.

Skill Development initiative

- 12 training programmes including 11 specialized (self-sponsored) trainings & 1 Farmers training have been organized, benefitting 192 participants. Five of these special training programmes on Cotton grading were specially designed and conducted for the Agricultural Officers of Maharashtra state to help to procure the cotton lying unsold in farmers' fields due to Covid19 lockdown.
- Revenue generated from training during 2020 was ₹ 16.94 lakhs.

Technology Management and Popularisation

- 11 consultancies were undertaken and 17 MoUs were signed for Research collaboration, technology commercialization and incubation.
- Organized / participated in 3 exhibitions, 2 industry-interface meets as well as participated in various meetings, seminars, workshops and conferences for popularizing institute technologies among stakeholders.
- Mera Gaon Mera Gaurav (MGMG) activities were conducted in cotton growing villages in Wardha district of Maharashtra where

scientists and technical officers demonstrated farmer friendly technologies for enhancing farm income. In 2020, ICAR-CIRCOT conducted 2 webinars, 4 village visits, 14 interface meetings, 4 demonstrations and awareness programs in which about 370 farmers from the adopted villages participated.

- One television talk on “Post-Harvest Technologies of Cotton” was delivered on DD Sahyadri.

Accreditation, Awards and Recognition

- Accredited with ISO 9001:2015 for Quality Management System by Bureau of Indian Standards.
- NABL accreditation for Mechanical and Chemical testing of cotton fibre, yarn and fabrics under ISO/IEC 17025:2017.
- Sardar Patel Outstanding ICAR institute Award 2019 in the small institute category
- Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2019 in the category of Agricultural Engineering awarded to Dr.Ashok Kumar Bharimalla, Senior Scientist of the institute.

Commercial Services

- ICAR-CIRCOT continued as Approved Assayer with Indian Clearing Corporation Ltd. and Multi Commodity Exchange of India Ltd.
- During 2020, a total of 42,722 samples were tested at Mumbai headquarters, GTC Nagpur and other regional units generating a total revenue of ₹ 2,75,80,703/- through commercial testing.
- ICAR-CIRCOT calibration cotton(an import substitute for USDA standards for calibrating textile testing equipment) - 148 containers sold to stakeholders generating revenue of ₹ 1,39,860/- during the year 2020.

- ABI centre at ICAR-CIRCOT: Two incubatees graduated and three new incubatees are admitted during 2020 for developing new enterprises in 'Development of starch based film for packaging', 'Development of Paddy straw based particle boards' and 'Preparation of bio-degradable products using agro biomass (banana fibre, rice straw, bagasse)'.
• RAFTAAR - Agri Business Incubation Centre (R-ABI) of RKVY by the Department of Agricultural Cooperation and Farmers welfare has started functioning at ICAR-CIRCOT. Five applicants for pre-seed stage funding and ten applicants for Seed stage funding are incubated in 1st Cohort.

Financial Management

- All transactions in the Institute are 100% digital and cashless.
- The Institute ensured complete utilization (100%) of the sanctioned budget allocation during 2019-20 and 86.73% during 2020-21 (up to 31 December 2020).
- The revenue generation was ₹ 305.93 lakhs during the year 2020.

Other activities

- Cleanliness programmes under *Swachh Bharat Abhiyaan* in the Institute premises and at the staff quarters were regularly conducted throughout the year with active participation of the staff.
- Covid 19 Advisories published in four languages for the stakeholders



1. Introduction

ICAR-CIRCOT, Mumbai was inaugurated on 03rd December 1924 by the then viceroy & Governor-General of India as the Technological Laboratory under the then Indian Central Cotton Committee (ICCC). In 1966, The ICAR took the administrative control of the Institute and later in 1991, it was renamed as the Central Institute for Research on Cotton Technology. Over the past nine decades the institute has made a substantial contribution to the stakeholders of the cotton and allied sectors.

The institute has its headquarter at Mumbai and is working under Agricultural Division of ICAR. The vision of the institute is “*Global Excellence in Cotton Technology*” and the institute is functioning with the following mandates:

1. Basic and Strategic Research on Processing Cotton and its Agro-Residues, Development of Value Added Products and Quality Assessment
2. Skill Development and Business Incubation Services and Function as Referral Laboratory for Cotton Fibres

There are four research divisions namely, Quality Evaluation and Improvement Division (QEID), Mechanical Processing Division (MPD), Chemical & Biochemical Processing Division (CBPD) and Technology Transfer Division (TTD) in the institute to facilitate and monitor the Research, Consultancy, Training, Testing, Technology Transfer, Incubation and supporting the start-ups. The institute has six regional units namely Ginning Training Centre at Nagpur and Regional Quality Evaluation Units situated at Coimbatore, Sirsa, Surat, Guntur and Dharwad.

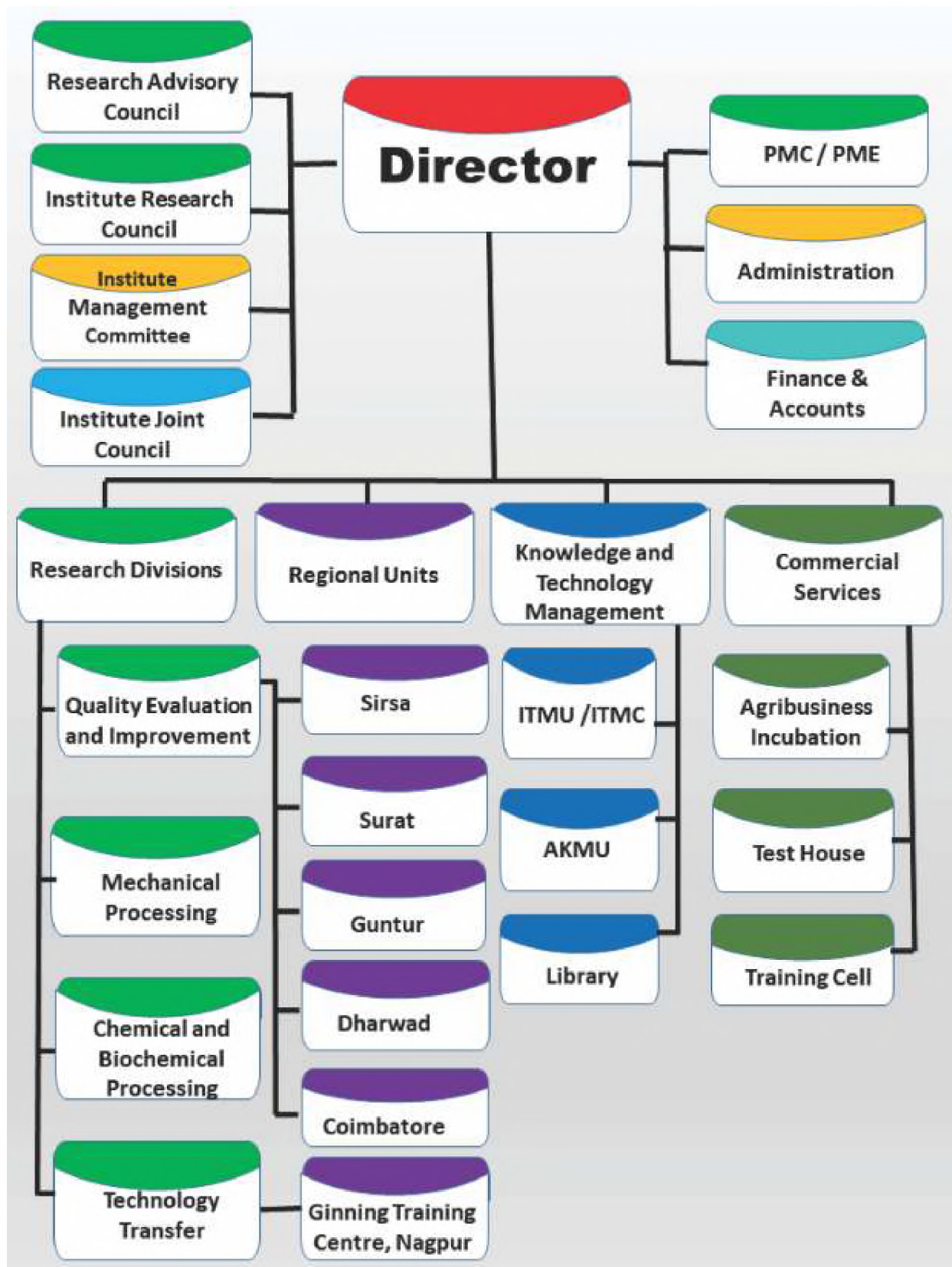
The Director is heading the Institute assisted by the heads of four research divisions,

administration and finance & accounts sections. The Priority-setting, Monitoring and Evaluation (PME) Cell assists the Director in assessing the performance of various research projects, handling communications with the council etc.

The Research Advisory Committee (RAC) guides the Director in streamlining the research programmes of the institute. The research programmes are carried out under the following five broad core areas:

- i. Pre-ginning and ginning
- ii. Mechanical processing: Technical textiles and Composites
- iii. Characterization: Cotton and other natural fibres, yarns and textiles
- iv. Chemical and biochemical processing and Biomass & by-product utilization
- v. Entrepreneurship and Human Resource Development

The contribution of the Institute to the progress of post-harvest processing of cotton and value addition to cotton by-product over the past nine and half decades of its existence is phenomenal. The institute is one of its kind in the World to carry out research solely on Cotton technology. The institute has also played a pivotal role under the Technology Mission on Cotton (TMC) in Modernization of the Ginning Industry in the country. The significant contributions in the area of ginning machinery research have helped the country to be self-reliant and also become net exporter of ginning machinery. The Ginning machinery is now being exported to the Afro-Asian countries earning precious foreign exchange for the country.



Organogram of ICAR-CIRCOT, Mumbai



The Institute has an important role as the Technology partner under the All India Coordinated Research Project (AICRP) on Cotton for developing and screening quality cotton genotypes. Lauding its efforts, the status of the Institute has been designated as Principal Investigator for Quality Research in the project. ICAR-CIRCOT calibration cotton, an indigenously developed Standard Reference Material, is an import substitute for the USDA reference material used for calibrating fibre testing instruments such as High Volume Instrument (HVI).

ICAR-CIRCOT is also supporting the private sector in its R&D efforts for development of machineries in the post-harvest processing of cotton and value addition to agro-biomass. The institute has successfully commercialised new machines and products developed in the institute, some of them worth mentioning are on-board pre-cleaner for cotton stripper, saw band pre-cleaner for mechanically picked cotton, stick removal machine for mechanically picked cotton, double roller gin with self-grooving rubber roller, miniature spinning system and village level sliver making machine, cotton lint opener, rubber composites for flexi check dam etc. Many process technologies for the value addition of cotton fibres and cotton biomass are also developed and demonstrated by the Institute. The Green Crematorium using cotton stalk briquettes and continuously feeding pellets stove developed by the institute are commercialised.

Recently, the Institute has been carrying out research in diverse areas and developed products and processes like cotton rich blended fabrics for sportswear, application of cotton in technical textiles especially medical textiles, mosquito repellent finishing for textile materials, solvent extraction process for gossypol removal in cottonseed meal for use as non-ruminant feed, salt free dyeing technology, value added products from Banana pseudo stem fibres and Naturally coloured cotton based products. The institute has

contributed towards making the chemical processing and finishing of cotton textiles eco-friendly. In this context lot of work has been carried out on extraction and application of natural dyes to cotton textiles and the institute is actively participating in formulation of BIS and ISO standards for identification of natural dyes. Scale up trials for salt free dyeing of cotton with reactive dyes developed by the institute were successfully undertaken in an industry and MoU has been signed for its industrial trials with Industry Association at Tirupur (T.N.).

The institute has done a pioneering work in the area of nanotechnology and its application in textiles & composites. The processes to impart various functional finishes to cotton textiles such as anti-microbial, UV protective, water repellent using nanomaterials have been developed by the Institute. A Nanocellulose Pilot Plant facility, first of its kind in the World to produce nanocellulose from cotton, was established in the year 2015, based on the indigenous chemo-mechanical process. Applications of nanocellulose in cement concrete, rubber composite, pulp and paper to enhance functional properties and in paint formulation as a rheology modifier have also been carried out. The development of security grade paper from a blend of cotton and natural fibre pulp and imparting security feature have also been demonstrated by the Institute. In this year, nano-ZnO production technology for fertilizer application was commercialized to M/s. Rashtriya Chemicals and Fertilizers, Mumbai.

ICAR-CIRCOT is the Lead institute and the Nodal Centre for implementing the Consortia Research Platform (CRP) on Natural Fibres. The project this year was implemented in collaboration with ICAR-NINFET, Kolkata, and ICAR-CSWRI, Avikanagar.

The Institute has been offering innovative tailor made skill development programmes at national and international level in a host of subjects that were not offered before. The institute also offers farmers training programme on post-harvest

processing and value addition to cotton by-produce, Increase in farm income through increase in production and processing at Village level.

The institute also caters to the capacity building needs of the cotton sector in the African countries. Under the Cotton Technical Assistance Programme (Cotton TAP) for Africa, the institute has contributed towards capacity building of the stakeholders in seven African countries viz., Benin, Burkina Faso, Chad, Mali, Malawi, Nigeria and Uganda. ICAR-CIRCOT was also instrumental in establishing a Regional Knowledge Cluster cum Training Centre for Post-harvest and Ginning Technologies at Bohicon, Benin. The institute also caters to skill building of the African Stakeholders as per Indo-African Forum Summit. Recently ICAR-CIRCOT has assisted the United Nations Conference on Trade and Development (UNCTAD) in implementing a UN Development account Project 1617K on “Promoting Cotton by-products in Eastern and Southern Africa” in Zambia, Zimbabwe, Tanzania and Uganda.

The Agri-Business Incubation (ABI) Centre of the institute is promoting and nurturing the new enterprise based on the technologies of post-harvest processing and value addition to cotton and other natural fibre biomass In line with the Government programme of Start-Up India.

CIRCOT RKVY RAFTAAR Agri Business Incubator (CIRCOT-R-ABI) was sanctioned by RKVY Division, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Govt. of India in January 2019. This incubator is providing funding support as grant-in-aid to agripreneurs in product development, commercialization and scaling up.

Coherent with the government initiative for doubling farmers' income, the Institute has taken up many innovative projects. Value addition to cotton biomass through preparation of compost

from cotton biomass, popularisation of mushroom cultivation using cotton biomass and preparation of briquettes and pellets from cotton stalks as a source of renewable energy are some of the activities taken up for creating economic value for the cotton stalks and enhancing the farm income.

The track record of ICAR-CIRCOT is very good in meeting the revenue generation target provided by the Council through its Internal Resource Generation. The institute generated revenue through Technology Commercialization, Technology Incubation Service, Consultancy and Commercial testing services besides sale of the products developed based on Institute technologies. ICAR-CIRCOT makes every effort to ensure 100 % utilization of the allocated Funds.

ICAR-CIRCOT is one of the most recognised laboratories for testing of cotton fibres, yarn and textiles made of cotton and cotton blends with other fibres. It provides commercial services for the stakeholders in the cotton value chain. Many testing facilities in the institute are accredited with ISO 17025:2005 by the National Accreditation Board for Testing and Calibration of Laboratories (NABL) since 1999. The Institute is also accredited with ISO 9001:2015 for Quality Management System by the Bureau of Indian Standards (BIS).

The staff position of the institute as on 31-12-2020 is given in Table 1.1. The institute is running with 56% of strength in Scientific and Technical category.

Table 1.1 Staff Position as on 31.12.2020

Category	Sanctioned	In-Position	Vacant
Scientific	48	28	20
Technical	112	62	50
Administrative	47	29	18
Supporting	57	33	24
Total	264	152	112

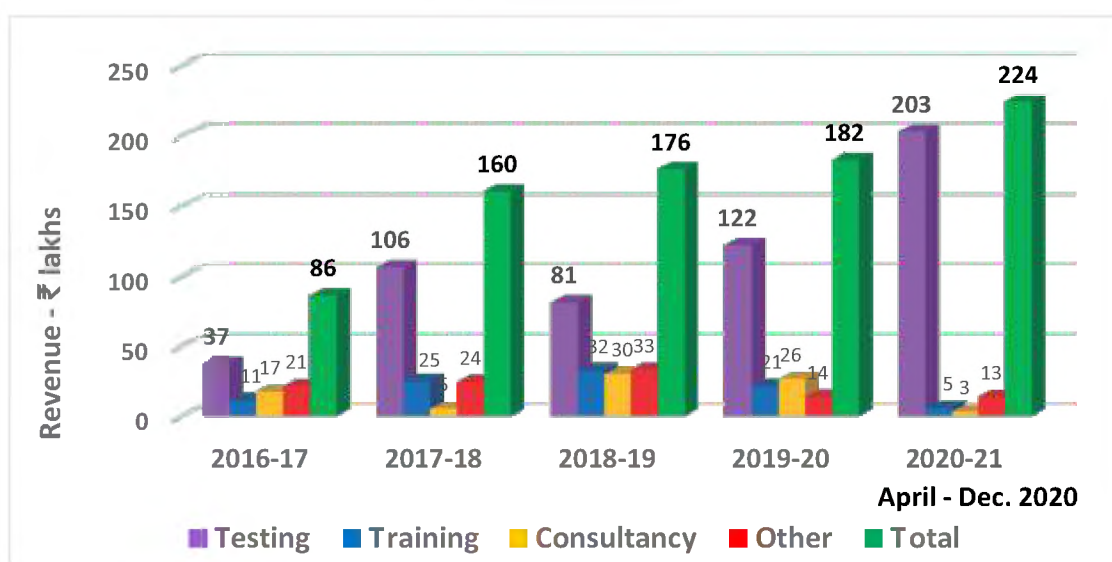
Table 1.2 Funds utilization during FY 2019-20

Head of Expenditure	ICAR-CIRCOT (including SCSP)			CRP on Natural Fibres		
	Allocation	Expenditure	% utilization	Allocation	Expenditure	% utilization
Grant-in-Aid-Capital	201.51	201.48	100 %	31.50	31.50	100 %
Grant-in-Aid-Salaries	1859.99	1859.99	100 %	--	--	--
Grant-in-Aid-General	Pension only	138.84	138.84	100 %	--	--
	Other than Pension	609.75	609.71	100 %	58.50	58.46
Total	2810.09	2810.02	100 %	90.00	89.96	99.96 %

Table 1.3 Funds Utilisation during the Year 2020

₹ Lakhs

Head of Expenditure	ICAR-CIRCOT (including SCSP)		CRP on Natural Fibres	
	Allocation (2020-21)	Expenditure (Apr – Dec 2020)	Allocation (2020-21)	Expenditure (Apr – Dec 2020)
Grant-in-Aid- Capital	235.00	10.19	45.00	1.20
Grant-in-Aid- Salaries	1960.62	1518.90	--	--
Grant-in-Aid-General	Pension only	600.00	208.98	--
	Other than Pension	570.00	322.38	82.00
Total	3365.62	2060.45 (87.57% of released funds)	127.00	27.40 (50.32% of released funds)
Funds released		2352.81		54.45

Revenue Generation


2. Salient Research Achievements

2.1 CORE AREA - I: PRE-GINNING AND GINNING

2.1.1 ICAR-CIRCOT Kawadi Cotton Opener

ICAR-CIRCOT Kawadi Cotton Opener is being designed and developed for processing of kawadi cotton, the immature and infested seed-cotton separated aside in the pre-cleaning systems in cotton ginneries. For its closely held short fibres, kawadi cotton is not ginnable on a double roller (DR) gin and is generally ignored by ginners considering it as a waste material. However, it can be processed and good quality lint can be recovered from it. About 5-10% of seed cotton is separated as kawadi cotton by Indian ginneries i.e. about 10-20 lakh tonnes of seed cotton every year. About 40% of this i.e. 4-8 lakh tonnes of seed cotton can be recovered for obtaining the usable lint, thus minimising losses incurred by ginneries on account of unprocessed kawadi cotton.

The Auto CAD drawings of the new design have been prepared for fabrication, testing and necessary refinement to develop an efficient system for processing of kawadi cotton in ginneries. The new machine is expected to have

the capacity for processing of 6-8 Q/h of raw kawadi cotton. The final Lint Recovery shall be around 22-25%.



2.1.2 Development of a Rotary Tubular Drum Dryer for Quarantine of Pink Bollworm infested Cottonseeds in Ginneries

A continuous processing type Rotary Tubular Drum Dryer (RTDD) of 1 tonne/h capacity was developed and commissioned at GTC, Nagpur for quarantine of Pink Bollworm (PBW) infested cottonseeds.

In this system, cottonseed is quarantined by indirectly heating it to about 65-70°C for 5-6 min using thermic fluid as heating medium. The inlet temperature of thermic fluid can be safely increased to 200 °C temperature by controlling

the boiler fuel feeding. The similar protocol is also followed for quarantine of cottonseeds by ginneries of US and Egypt. In the developed dryer, wet cottonseed is introduced into the upper end of the dryer shell and the fed cottonseed progresses through it by virtue of rotation of tubing system and dried cottonseed is withdrawn at the lower end of the dryer.

The major assemblies of the developed RTDD are described briefly as follows:

- 1. Bucket elevator:** It is developed for lifting of about 2 tonnes/h cottonseed vertically to about 2500 mm height and feeding the same to the dryer inlet using a 2 HP electric motor. There are specially designed metallic cups attached over a vertical belt conveyor for lifting and feeding of cottonseed. A variable frequency drive (VFD) is provided to control the feeding rate.
- 2. Rotary Joint:** It is one of the most critical component of indirect heating dryers. It is meant for supply of hot and cold thermic fluid to the dryer. In the developed system, a rotary joint having 75 mm and 90 mm diameter is selected for supply of hot and cold fluids, respectively into and out of the dryer.
- 3. Elliptical Shell:** It is used for housing of metal tubes, which are installed longitudinally in its interior. The outer portion of the shell is insulated using glass wool. The height, diameter and length of the shell are 1042, 600 and 2500 mm, respectively. Two heat resistant bearings are mounted at either side of the shell for mounting of the tubing system.
- 4. Tubing System:** A bunch of well-designed metal tubes are used for transportation of hot and cold thermic fluids into the dryer. It consists of a main annulus central tube of 127 mm internal diameter and 7.6 mm thickness. It is mounted inside and at the centre of the elliptical shell over bearings. The hot fluid flows through the outer portion while the cold fluid flows through the inner portion of the central annulus tube. The central tube distributes the hot fluid to a bunch of 20 pipes (5 tubes each are fitted longitudinally in 4 rows over the main pipe) having 50.8 mm internal diameter and 5 mm thickness through the 4 manifold pipes. The hot fluid circulated in these pipes supplies heat to cottonseeds and leaves the dryer through rotary joint via annulus space of the main central pipe. The whole tubing system is rotated using a VFD controlled 5 HP motor.
- 5. Flights and Lifters:** The wet cottonseed, which is fed into the dryer, is lifted and pushed inside the dryer drum through the flights and shovels, respectively. The pitch and shape of the flights and shovels influence the amount of material present in the rotary dryer. Flights and lifters are designed considering that the volume occupied by the load of solids in the rotary dryer shall be between 10 and 15% of the total dryer volume. The flights of the rotary drum dryer used in the present work are of the two-segment type.
- 6. Moisture Transportation System:** It is designed and developed for removal of moisture evaporated during heating from the dryer. It consists of a centrifugal fan and a 2D2D cyclone having 600 mm barrel diameter. An air damper has been provided at the fan inlet to control the air flow rate of the moisture transportation system.
- 7. Cottonseed Conveying and Bagging System:** A belt conveyor system has been designed and developed for transportation and bagging of the dried seed.

Performance Evaluation: The developed dryer was evaluated for its performance at GTC, Nagpur during the reported period. The incoming thermic fluid temperature, initial cotton seed moisture content and tube rotational speeds were varied to 180-200°C, 12-18%, 6-10 RPM, respectively. The recorded room temperature and relative humidity were in the range of 25-28°C and 35-40%.

Initially, it was observed that cottonseed transportation rate was very high even at 8-10 RPM leading to withdrawal of cottonseed from the dryer in less than a minute resulting into rising of cottonseed temperature and removal of cottonseed moisture content by merely 10-20°C and 0.5-1%. When the rotational speed was reduced to 2 RPM, it was found that cottonseed was moving in lumps and it was neither mixing and nor coming into contact of all peripheral tubes leading to insufficient heating of seeds resulting in poor moisture removal. It was learnt that a minimum rotational speed of tubes is required for proper mixing of seeds for increasing its temperature and reducing moisture content.

In order to address this issue, the cottonseed shovels and lifters were modified to reduce the cottonseed transportation rate; the pitch of the

lifters and flights was reduced to 100 mm from initial pitch of 500 mm resulting into proper mixing of cottonseeds at about 6-8 RPM. The fresh trials were conducted to assess the drying performance of the modified dryer. Initially, trials were conducted by varying the incoming thermic fluid temperature in the range of 180-200°C, but the final cottonseed temperature was less than 60°C for temperature below 200°C. Hence, the full-scale trials were conducted by keeping incoming thermic fluid temperature at 200°C. The gauge pressures of incoming and outgoing thermic fluid were measured as 1 bar and 0.5 bar, respectively, which shows that there was about 0.5 bar pressure drop in the dryer.

The developed dryer was able to reduce moisture content of the cottonseed by 6% moisture content and increase its temperature over and above 65-68°C (initial temp. 26°C), which were sufficient enough to properly quarantine cottonseed against PBW. However, the effectiveness of the dryer was not up to the mark for quarantine of cottonseed having 18% moisture content as the maximum final cottonseed temperature achieved was lesser than required for quarantine purpose.

2.1.3 Digital Ginning Percentage Indicator (DGPI) for Portable Cotton Gins

Ginning percentage (GP) is an important parameter in objective grading of seed cotton and has significant impact on profitability of both farmers and ginners. Traditionally seed cotton is traded irrespective of GP which is a major price deciding component. This traditional practice is depriving farmers from getting additional benefit

for sowing improved GP cotton cultivars. Presently the benefits for growing high GP cotton normally goes to the cotton processors.

Portable gins are being used by cotton breeders, traders and seed industries for determination of GP. However these machines are not used to their fullest extent as after ginning of seed cotton, the

lint and cottonseed are to be weighed separately on weighing balance and then calculate the ginning percentage manually which requires additional time, labour and accuracy also gets adversely affected. Absence of appropriate machine to instantly and accurately determine GP at market yards/ginneries resulted in continued adoption of visual grading of seed cotton. Hence need was felt to modify portable gin for quick and accurate determination of GP.

Therefore a Digital Ginning Percentage Indicator (DGPI) for portable cotton gin is designed and being developed on electrometrical principle for real time determination of ginning percentage of seed cotton. The major components of DGPI are weight recording system, GOC-PLC setup, software programme, electronic display unit and accessories for integration with the portable cotton gin.

- 1. Weight recording System:** DGPI consists of three load cells with weight transmitters for weighing seed cotton (minimum capacity 200 gm), cottonseed (minimum capacity 200 gm) and lint (minimum capacity 100 gm) with accuracy of 0.1 gm. Load cells are to be fixed with suitable fixtures at respective locations on portable gins.
- 2. GOC-PLC setup:** The Graphic Operation Controller (GOC) PLC setup is being developed with GOC-35-DI/DO, Ethernet module and RS 485 module. Inbuilt HMI is provided in GOC-35 PLC. All load cells are to be connected to a PCC-HMI panel.

- 3. Software program:** A software program is being developed to determine GP from recorded weights. Load cells transfer weight data to PLC through transmission unit. PLC records, stores, analyses and retrieves data. Provision for recording weight of seed cotton, cottonseeds and lint is made in the PLC along with sample number. The data can be stored in a Micro SD Card which can be removed from PLC to upload the records to a PC.
- 4. Electronic display:** Electronic display unit along with electrical control panel with equivalent accessories is developed for displaying the ginning percentage on real time basis digitally in percentage terms.
- 5. Integration of DGPI with portable cotton gin:** Developed DGPI will be integrated with portable cotton gin with fixtures, conducting and cabling.

The digital GP indicator on portable cotton gins is expected to aid in increased usage of portable gins as it will record GP on real time basis. It is further expected to accelerate in GP based trading of seed cotton in ginning industries and market yards. It would help farmers, traders and ginners to realize the better value for their product. Further the traditional practice of cotton trading without determining GP which is depriving farmers from getting additional benefit for sowing improved GP cotton cultivars will be eliminated. The developmental DGPI would empower farmers with premium rates for their cotton over and above 34% GP.

2.1.4 Optimization of groove profile and diameter of chrome leather roller for enhancing the performance of double roller gin

The harvested seed cotton contains both lint (fiber) and non-lint part of the cotton plant. Ginning is the first important operation on seed cotton under which the seeds are separated from lint and the machine used for it is called a gin. Mostly double roller gins (DR gins), are used for commercial ginning in India. The lint quality and ginning efficiency depend upon many factors such as variety, staple length and moisture content of the seed cotton, speed, diameter, length and material of the roller, speed of rotating knife, etc. The peculiar gripping action of cotton fibers to roller covering surface is a crucial factor in the successful ginning. Therefore, grooving profiles of chrome leather roller of DR gin is important factor to investigate which could adversely affect the overall plant capacity and

may affect lint quality. Three private ginning industries from the vicinity of Nagpur viz. Sultania Oil Industries and Pressing Unit Pvt. Ltd. (Plant-A), P. N. Gavande Ginning Pressing & Oil Mill Pvt. Ltd., (Plant-B) and Prakash White Gold Ginning & Pressing Pvt. Ltd, (Plant-C) have been visited to study the chrome leather roller grooving profiles adopted by these industries. The data was recorded in terms of roller length, diameter, groove spacing, width, and depth, number of grooves, plant capacity and ginning percentage (GP). Ten numbers of random ginning stands consist of twenty chrome leather rollers were selected from each plant for the study. The observations recorded during the investigation are summarized in the following table.

Investigated Parameters	Industry "A"	Industry "B"	Industry "C"
No of stands and gin type	48 Stands Golden Jubilee DR Gin	24 Stands Jumbo DR Gin	24 Stands Golden Jubilee DR Gin
Number of grooves	15-18	11-15	12-16
Groove spacing (mm)	14.90-53.33	21.05-57.72	16.27-39.36
Groove width (mm)	1.02-4.89	0.43-3.80	0.89-5.84
Groove depth (mm)	1.11-4.00	1.14-3.55	1.09-3.45
Capacity (bales/12 hrs)	180	120	120
Ginning percentage	35-37%	35%	32%

It was found that, all the plants perform roller grooving weekly or twice in a week depending on moisture content of seed cotton. These ginneries perform manual grooving using marble cutter. It takes around 4-7 minutes to form grooves on one roller using one operator. The spacing, width and depth of the groove and number of grooves of each of the roller should be constant and uniform in ideal conditions but a lot of variations were observed in the groove profiles as well as in

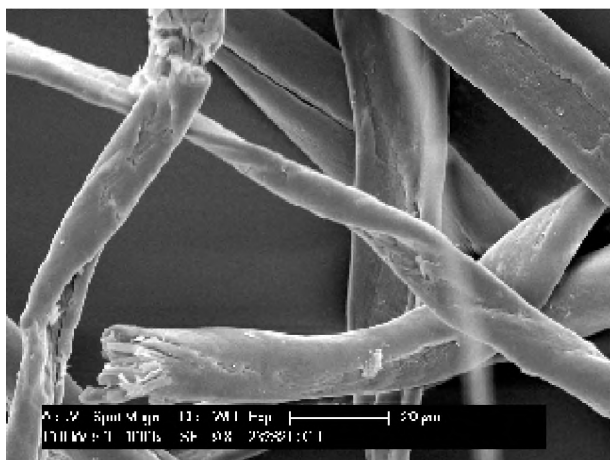
number of grooves of visited ginning industries. Damaged, incomplete and extended grooves were also observed during the study. The main reasons behind this variation could be manual operation of groove formation and replacement of operator on season basis. Lack of technical knowledge, negligence in operation by fitter and hurry in the job to be done at earliest could also be some of the reasons for non-uniform groove profile.

2.2 CORE AREA - II: MECHANICAL PROCESSING, TECHNICAL TEXTILES AND COMPOSITES

2.2.1 Evaluation of spinnability and formulation of guidelines for spinning of recycled fibre from fabric waste and develop value added products

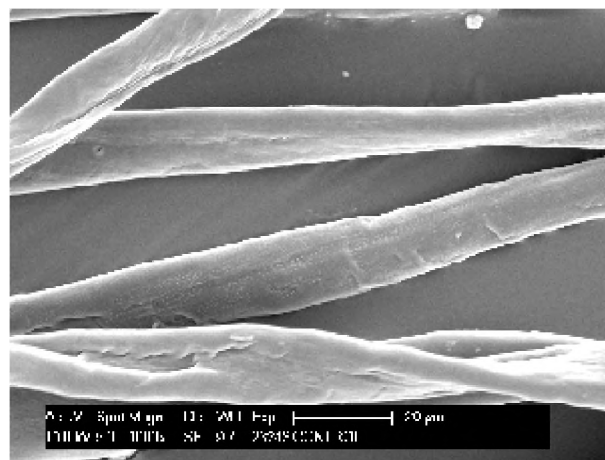
The recycled fibres collected from Industry were extracted from pre-consumer waste cotton knitted fabrics. These waste fabrics contain mixture of single colour dyed fabrics with different fabric structures such as single jersey, interlock, purl etc. The process of fibre extraction is mechanical action such as cutting, shredding of fabrics and opening fibre. The recycled fibre looks majority of short fibre and in opened manner. The trash analysis of recycled cotton fibre carried out by CIRCOT SP-4 method showed the percentage of lint, Trash and invisible loss to be 97.85%, 0.67% and 1.48% respectively. The physical properties of recycled cotton fibres was

analysed by High Volume Instrument (HVI) (ASTM D-5867:1995), the UHML and ML were 18.6mm and 12.8mm respectively. The identification of fibres as analysed by IS 3416: 1988, showed that the recycled fibres consist of 99.1% cellulose fibre. In order to observe the surface morphology of the virgin and recycled cotton fibre, scanning electron microscopic analysis was employed. From the Figure some of the recycled fibres were found to be broken, some were seen to be fibrillated by mechanical actions such as cutting, shredding and opening action of fabric waste. Figure below shows the morphological analysis of virgin cotton fibre.



Recycled Cotton Fibre

Since recycled cotton fibres were short fibres it was very difficult to spin 100% recycled fibre alone. It required minimum 10% of long fibres for transportation or holding the short fibres during its transfer between the rollers and yarn forming time. So, the recycled fibre based yarn



Virgin Cotton Fibre

was produced from recycled cotton fibre (RF) with blending of virgin cotton (VC) fibre in different blend proportions such as 50RF/50VC, 65RF/35VC, 80RF/20VC, 90RF/10VC and 100%VC through microspinning techniques.

**Recycled cotton fibre****Sliver****Recycled cotton fibre based yarn**

The sample weight of 100g was taken for all the blend ratios and the lap formation was done on the indigenously developed CIRCOT Lap preparation machine. The lap was fed to the carding machine and formed sliver. During the carding process the fibre loss was around 20 to 30 percent. The whole sliver weight was taken carefully and the sliver length was taken with the

help of the wrapping drum and then carding sliver hank was calculated. The whole sliver is cut into 6 equal parts with the help of a wrapping block and the 6 ends were fed to the miniature drawing machine to get the uniform parallel fibre sliver. Further, this sliver fed into miniature rotor spinning machine for yarn formation.

2.2.3 Development of cellulosic nanofibre based micronutrient delivery system for urban farming

Development of multi-feed High-pressure electrospinning nozzle

During this reporting period different gauge and length multi-feed high pressure nozzle was designed and fabricated (Fig.1a) which can help to feed the polymer and compressed air simultaneously. Nanoparticle mixed nanofibre generation is facing difficulties in solving needle blocking and uneven distribution of the particle into nanofibre. Hence high-pressure multi-feed electrospinning nozzle was designed with an objective to remove the clogged particle continuously by applying compressed air and polymer solution simultaneously in the single

nozzle output. It consists of two independent feeding arrangement and one delivery nozzle arrangement, therefore at the same time polymer and compressed air can feed simultaneously in the same delivery path. Thus the developed system will prevent the needle blocking and positively clean the nozzle frequently. Further, it can be used for higher production. Three different gauge (14, 18, 20) needles were fabricated as shown in Fig. 1b, further trial needs to be conducted to optimize the nanofibre production and fibre diameter by using different needle gauge with different applied pressure.



Fig: 1a Multi-feed electrospinning needle arrangements



Fig 1b. Different Gauge multi-feed needle arrangement

Development of Electrospun Nanofibre based micronutrient delivery system for agriculture crop

Nano zinc-oxide encapsulated biodegradable PVA electrospun mat was produced by using multi-phase electrospinning machine. A 10 % Polyvinyl alcohol (PVA) (Mol. Weight 70,000 - 100,000 g/mol) was used to produce nanofibers and 10% zinc oxide nanoparticles with an average size of 124 ± 10 nm were used for encapsulation. The process parameters were optimized to produce finer and even fibres; flow rate 1.0 ml/hr, voltage 30 kV distance 15 cm and traverse speed was 2 mm/sec. The produced zinc oxide particle encapsulated nanofibre particle distribution was

analysed through fluorescence microscopy as shown in Fig.2 the particle distribution was found good. Further characterization process is under progress. The fibre diameter was analysed through SEM analysis (Fig. 3). The average fibre diameter measurement considered in the range of 180-200 nm. Further bulk production trials need to be conducted for pot culture analysis.

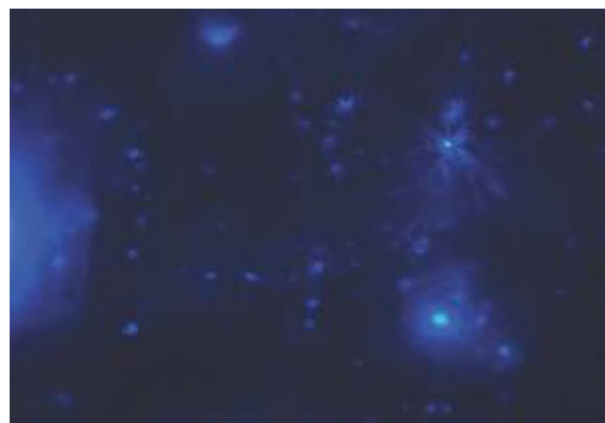


Fig 2. Zinc oxide nanoparticle distribution in the PVA electrospun mat

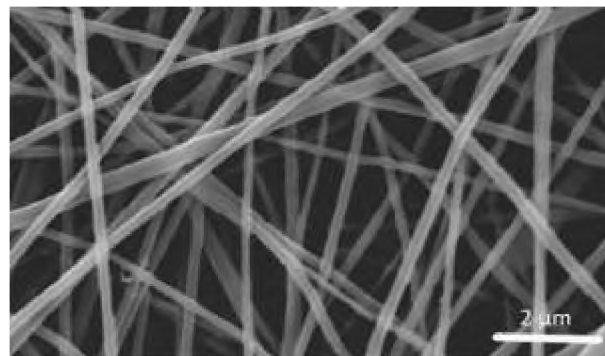


Fig: 3 SEM image of PVA electrospun mat produced through multi-phase electrospinning machine.

2.3 CORE AREA - III: CHARACTERISATION – COTTON AND OTHER NATURAL FIBRES, YARNS AND TEXTILES

2.3.1 All India Coordinated Research project on Cotton (Quality Research)

Quality parameter data was generated on the cotton samples received from the cotton breeders throughout the country from breeders

pertaining to the ICAR-AICRP on Cotton Zonal Trials (North Zone, Central Zone and South Zone) and National Trials. In all, the technological data

on 3764 samples have been reported of which 1457 samples belong to National trials while 1114 cotton samples correspond to Zonal Trials. Out of the zonal trials, 154 cotton samples belong to North zone, 535 cotton samples belong to Central zone and 425 belong to South zone. Under ICAR-Bt Trials 1147 samples were received and analysed for fibre quality parameters. Under Agronomy trial 46 samples were received for spinning performance along with fibre quality assessment. The quality parameters of all cotton fiber samples were measured by using the High

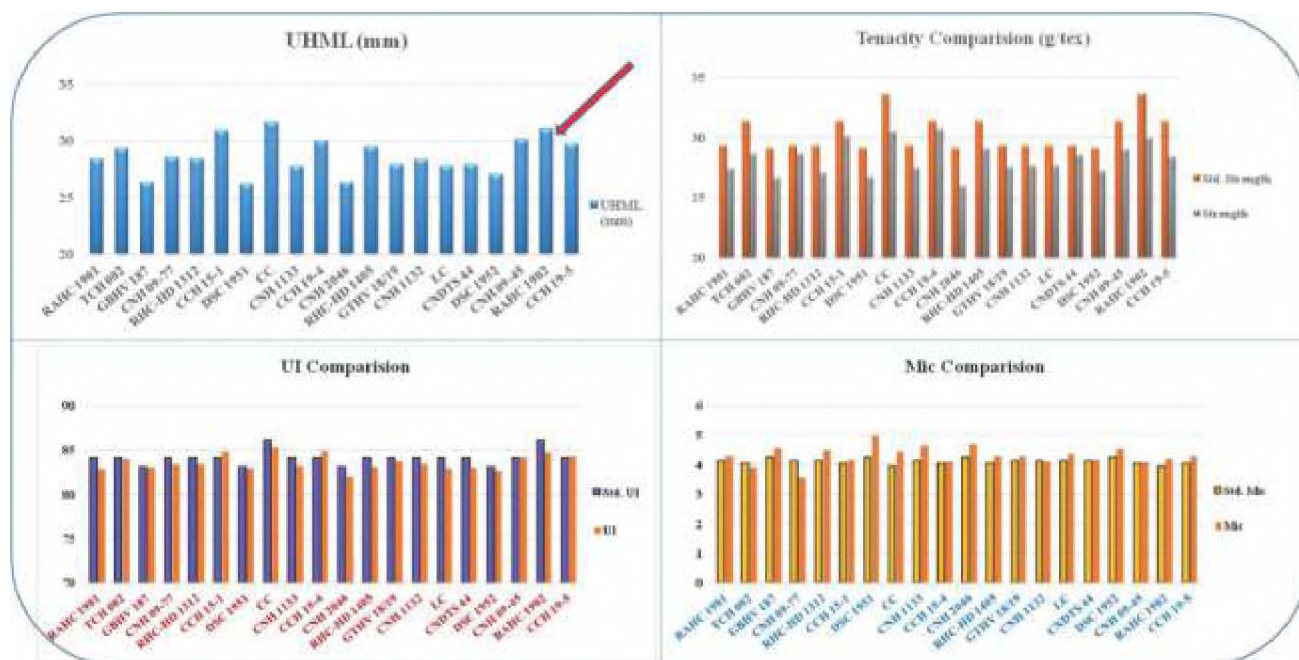
Volume Instrument operated in the HVI Mode. The data was analysed and reported.

Trial Name	No. of Samples
National Trials	1457
North Zone	154
Central Zone	535
South Zone	425
Agronomy Trials	46
ICAR-Bt Trial	1147
Total	3764

Br06b -compact genotypes under irrigated condition

Observations

- ❖ The samples were having UI equal to the minimum requirement

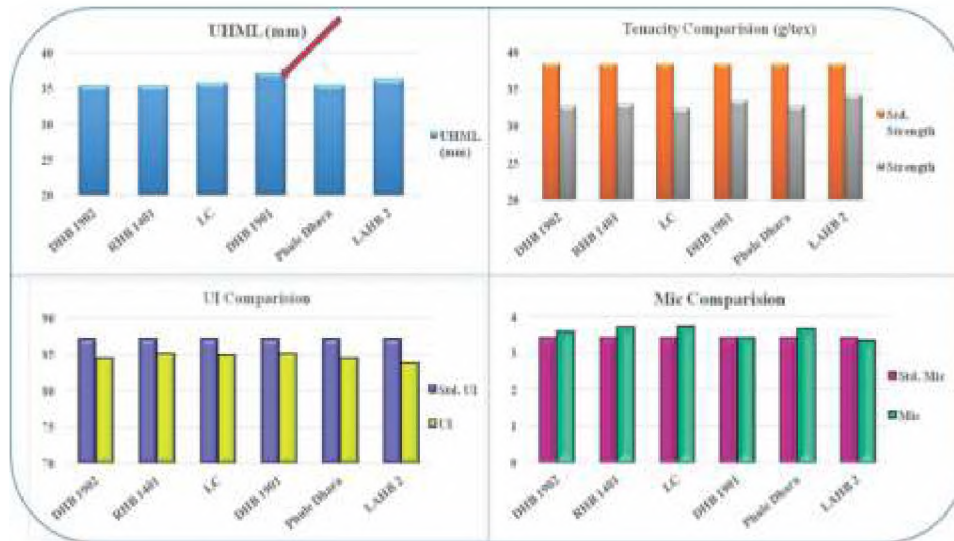


- ❖ The tenacity of the samples was either at par or marginally low compared to the minimum requirement.
- ❖ The micronaire values of all the samples were higher than the maximum required

micronaire as depicted above.

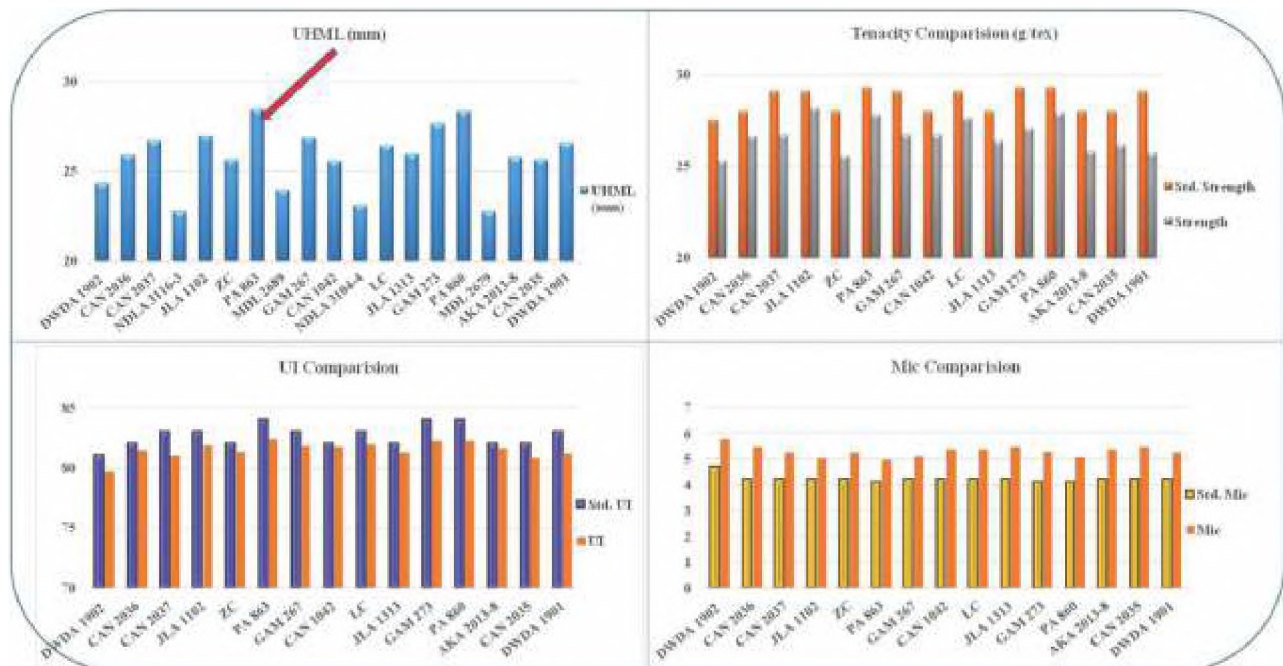
- ❖ **Entry RAHC 1902(31.0 mm UHML, Tenacity 30.0 g/tex, Mic 4.2, Uniformity Index 85), has performed well.**

Br15a - PHT Inter specific – Hybrid (hir x barb)



Entry DHB 1901 (37.1 mm UHML, Tenacity 33.8 g/tex, Mic 3.4, Uniformity Index 85) has performed well.

Br22a/b - G.Arboreum



Entry PA 863 (28.4 mm UHML, Tenacity 27.8 g/tex, Mic 5.0, Uniformity Index 82), has performed well.

Salient findings

- ❖ The CVIC meeting was held on during the month of May and June 2020 and

124 proposals were screened

- ❖ *G.barbadence* variety trial resulted fibre with good strength, micronaire and uniformity
- ❖ Strength up to 42 gpt was observed
- ❖ Compact genotypes trial under irrigated

- conditions performed well in terms of strength and micronaire
- ❖ In *G. hirsutum* trial under rainfed conditions the strength was marginally lower than the minimum requirement

- ❖ Long linted *G. arboreum* trial resulted with good fibre length and micronaire. Micronaire of all trials was observed in higher side than last year

2.3.2 Marker Fibres: A Tool for Traceability of Cotton Textiles

The chemical identified for producing marker fibres is highly spectral active. To determine the sensitivity of marker chemical on Raman analysis it was attempted to carry out the application of marker chemical by using printing experiments. Marker chemical was added with water based thickening system and applied on cotton fabric using table screen printing process.

It was found out that 1 % (OWP) of marker chemical gives detectable peak in Raman analysis.

The presence of marker chemical was also confirmed by FTIR analysis. It was attempted to in situ synthesize the tracer chemical on cotton fibre.

The bleached cotton fibre was treated with precursor chemical using precipitation reaction. Then the treated fibre was evaluated using Raman analysis. It was found out that peak for tracer chemical was appearing in the spectra with very less intensity.

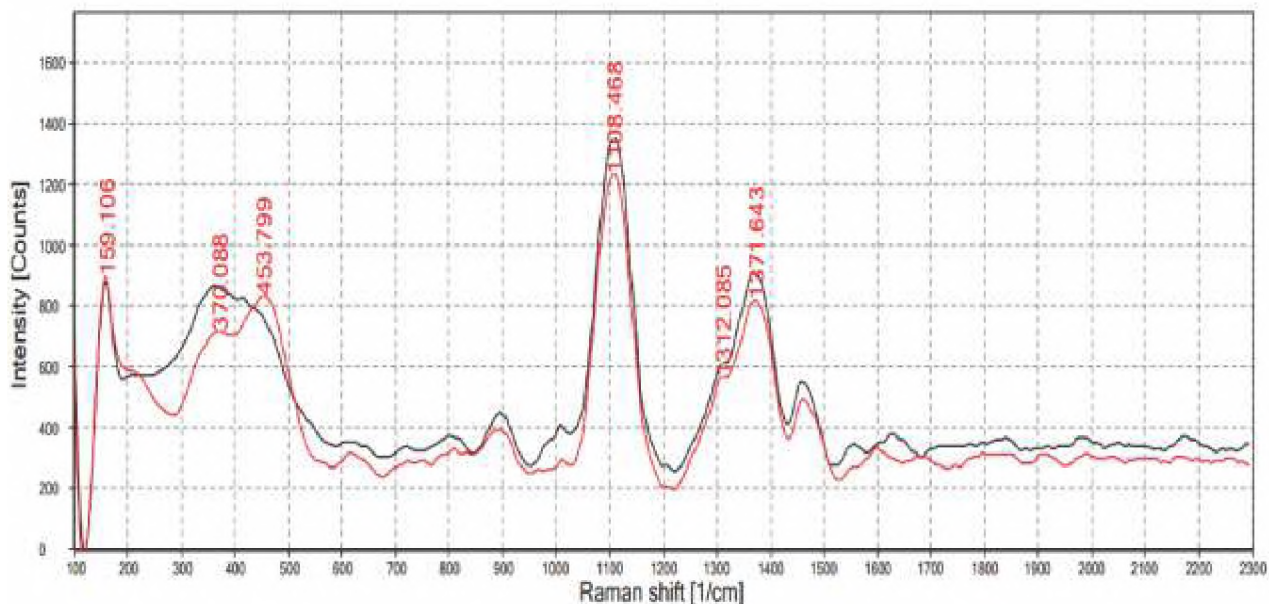


Figure 4. Raman analysis of *ex situ* treated tracer fibre and blended cotton fibre

2 % of this *ex situ* treated tracer fibre was blended with cotton fibre. This blend was analyzed in the Raman spectrometer. It was found out that the

tracer chemical can be identified by this technique in the fibre blend.

2.4 CORE AREA - IV: CHEMICAL & BIOCHEMICAL PROCESSING AND BIOMASS & BY-PRODUCTS UTILISATION

2.4.1 Toxicological and Environmental impact of ICAR-CIRCOT's nanomaterials (Nanocellulose, Nanosilver and Nano-ZnO)

Toxicological study of nanosilver treated cotton fabric and nanocellulose

As a preliminary study of cytotoxicity of nanosilver treated fabric and nanocellulose, pure cultures of microbial flora (4 microorganisms) isolated from various habitats were used. Nanosilver treated and untreated fabric swatches were placed on nutrient agar plates surface inoculated with 24 h cultures. Since nanocellulose does not dissolve in water, it was tested by the agar ditch method against the four cultures, as given below.

- 1) *Pantoea agglomerans*- isolated from cotton bolls, beneficial in removing stickiness
- 2) *Pseudomonas putida*- a soil inhabitant useful in bioremediation

3) *Bacillus subtilis*- a soil inhabitant useful in seed protection as a fungicide

4) *Pseudomonas aeruginosa*- an omnipresent organism beneficial in biodegradation and bioremediation

The images of the experimental setup after the incubation period is given in figure 5. From these images, it can be seen that nanosilver treated cotton fabric exhibited antibacterial activity against all the four cultures tested, as there was no growth below the fabric swatches as well as there was a marginal to about 1 mm size zone of inhibition. On the other hand, nanocellulose did not exhibit any antagonism towards all the four bacterial cultures.

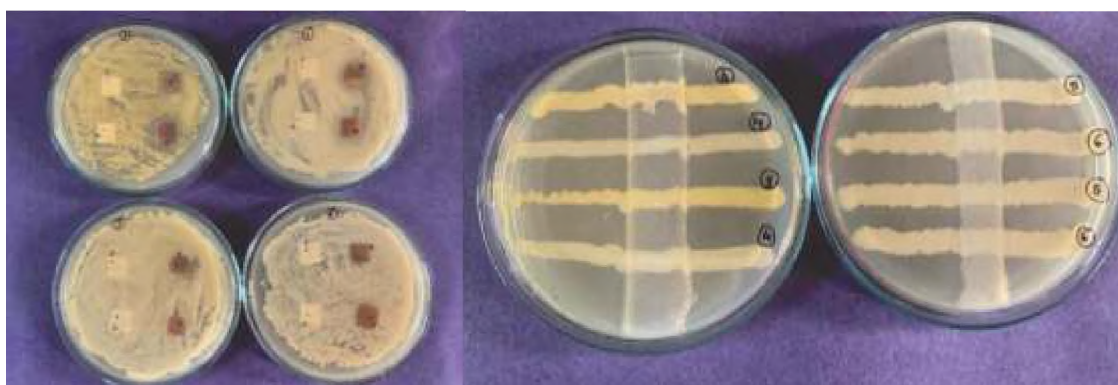


Figure 5: Antibacterial effect of silver nitrate treated fabric (left) and of nanocellulose (right)

Life cycle assessment (LCA):

Nanocellulose from cotton is being produced at ICAR-CIRCOT in the pilot plant with the capacity of 10 kg per shift of 8 h. The material inventory required for the production of nanocellulose using the novel chemo-mechanical process from

cotton is collected for use in life cycle assessment as per the ISO standard. The openLCA software is being used for this analysis. The system boundary developed for the NCC assessment is given in the figure 6.

2. The approach followed will be Cradle-to-Gate.

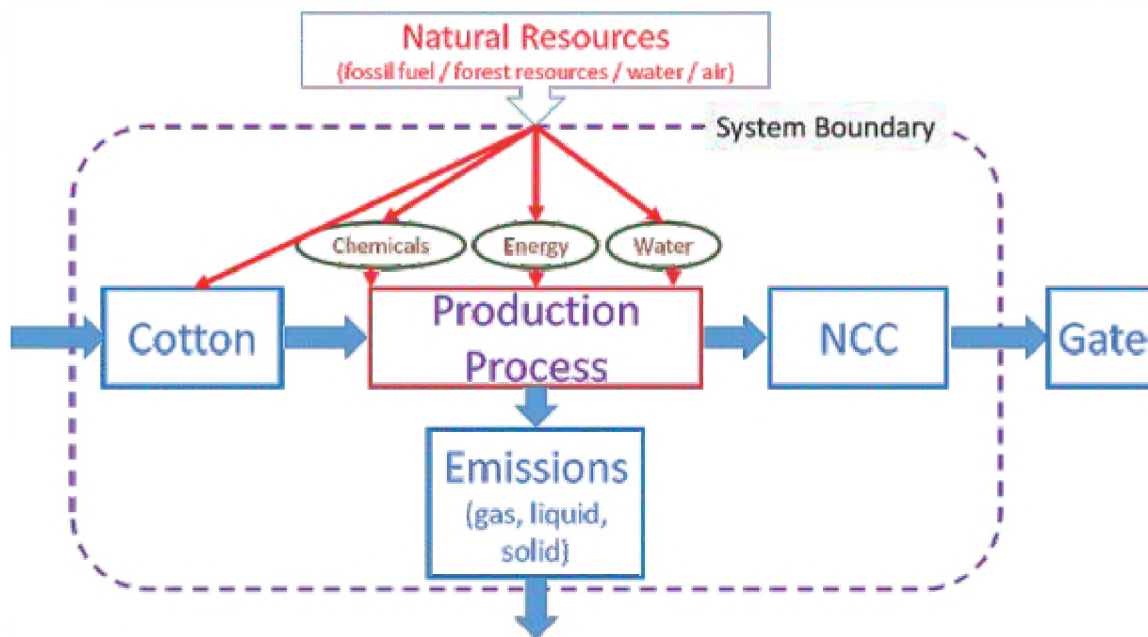


Figure 6. Cradle-to-Gate Approach for LCA of NCC

Process for detoxification of nanosilver

Since the nanosilver is demonstrated to be toxic against the tested organisms as per the preliminary report, experiments have been conducted to convert the nanoparticles of silver (Ag⁰) into ionic silver particles (Ag⁺). For this purpose, silver nanoparticles synthesized by chemical reduction method using PVP, Tannic acid and Citrate as stabilizers were taken as substrate. The size of the nanoparticles were in the range of 5-20 nm. The nanoparticles were stable under environmental condition and were used for giving functional finishes to textile materials like antimicrobial, antifungal etc. The nanoparticles

after completion of the process were treated with different concentrations of 50% hydrogen peroxide solution to find out the stability. From the experiment, it is found that addition of 0.5-1% of hydrogen peroxide completely converts the nanosilver to ionic silver that is evident from the disappearance of yellow colour of silver nanoparticles. This was confirmed by DLS particle size analyser, wherein no scattering intensity was observed from nanosilver after treatment with the hydrogen peroxide. This method can be used to nullify the toxicity associated from the effluent of nanosilver based treatment processes.

2.5 CORE AREA - V: ENTREPRENEURSHIP AND HUMAN RESOURCE DEVELOPMENT

2.5.1 Development of nanocellulose based edible coating for fruits and vegetables

In order to evaluate the role of vegetable oil in coating, formulations were prepared with and without vegetable oil. Various formulation were composed of sodium alginate, nanocellulose and vegetable oil. Guava fruits were coated with the

prepared formulations and stored under ambient condition. The fruits remained intact for upto 3 days when uncoated, 6 days upon coating without vegetable oil and more than 12 days in formula containing both vegetable oil & nanocellulose.

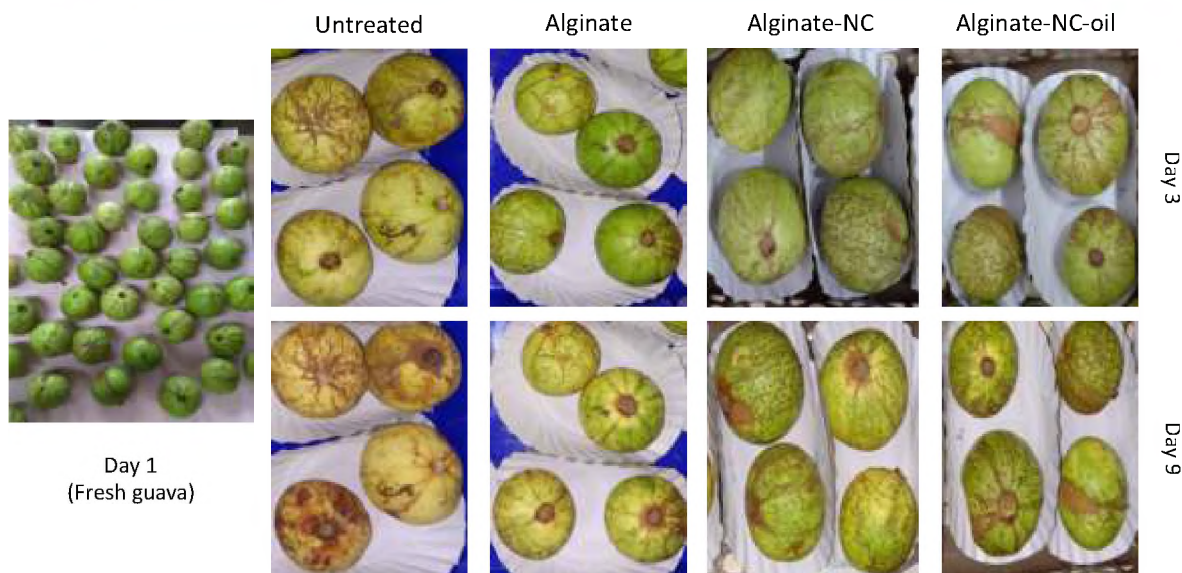


Figure 7. Guavas coated with various coating formulations stored under ambient condition

2.5.2 Refinement and popularisation of nutrient-enriched compost production from cotton micro-dust

Composting is one of the sustainable approaches for conversion of cotton micro-dust waste into nutrient enriched compost and thereby its management. Microorganisms with cellulolytic activities have important role in composting but they may not tolerate thermophilic phase. Microorganisms with cellulolytic potency and operating at thermophilic temperatures could accelerate the composting process which in turn could increase the thermophilic phase and thereby reduce the duration of composting.

In the present project, attempts were made to identify cellulolytic microorganisms which can tolerate high temperatures for their exploitation in composting of cotton micro-dust. A trial experiment for composting of cotton micro-dust was carried out at Kalmeshwar, Nagpur (Fig.1). The chemical properties of final compost were analysed and it had the following properties: organic carbon – 12%, total nitrogen – 1.5%, with C:N ratio of 8:1 (Table 1). The compost samples were enriched with carboxymethylcellulose (CMC) as sole carbon source and incubated at 55

°C for 5 days. After incubation, it was serially diluted and aliquots of 100 µl were spread on Nutrient Agar (NA) and incubated. The distinct morphotypes were picked and purified on NA by repeated streaking. A total of twenty microbial isolates were obtained and they were screened for production of cellulase enzyme on Reese's mineral medium supplemented with 1% (w/v) CMC at 55 °C. The colonies which showed orange halo zone around their growth indicated positive for cellulase enzyme production. Among 20 isolates, 5 isolates were found to produce cellulase enzyme at thermophilic temperature (55 °C).



Fig.8 composting of Cotton Micro-dust

Table 1. Chemical properties of Cotton micro-dust and compost

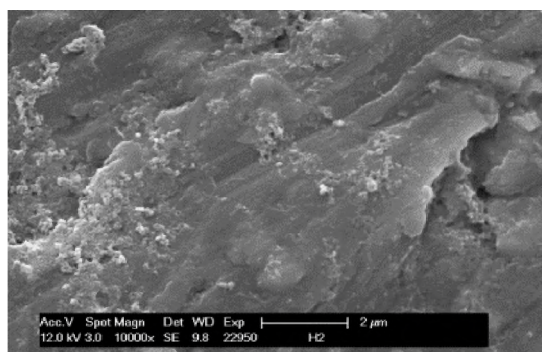
Sample	Organic Carbon (%)	Total Nitrogen (%)	C: N ratio (%)
Cotton Micro-dust	35	1.0	35:1
Compost	12	1.5	8:1

2.5.3 Development of process protocol for synthesis of nano-sulphur and its application in agriculture

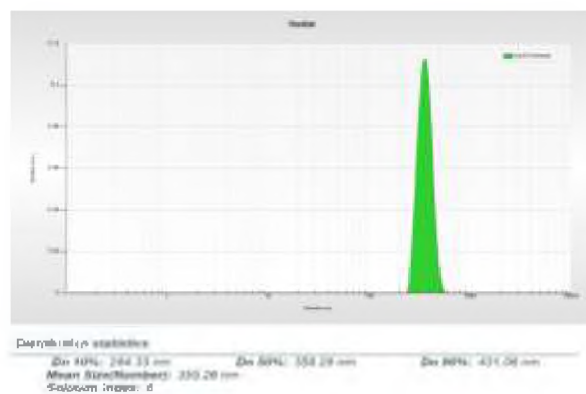
Elemental sulphur is a cheap and abundant source of sulphur in nature and in order to make the overall process economical, elemental sulphur was utilized for the synthesis of nanosulphur by adopting bottom up and top down approaches. In bottom up approach, sodium thiosulphate ($\text{Na}_2\text{S}_2\text{O}_3$) was used as precursor and acids viz. oxalic acid, hydrochloric acid (HCl) and acetic acid were utilized for obtaining nanosulphur. During the process, different protocols with variable concentrations of precursor as well as acids was tried out. The nanosulphur emulsions were stabilized using surfactants (CTAB, Tween 80, Nonyl-phenol ethoxylate, SPAN 85). Since the issues related to yield and scaling up ability at commercial level nanosulphur yield from bottom up approach is less and the process is not economical, therefore,

chemo-mechanical approaches are adopted in this study.

Mass colloidal, high pressure homogenizer and ultra-high pressure homogenizer were utilized by standardizing the process protocol involving the concentration of elemental sulphur, surfactant, stirring time, operating pressure, number of passes etc. Nanosulphur was synthesized and its characterization (particle size, zeta potential, scanning electron microscopy, surface area) was performed. The particle settlement study with reference to time of the different nanosulphur formulations was also evaluated. The average particle size of the mass colloidal sample was in the range of 284-430 nm as evaluated using the particle size analyzer.



SEM image of nano-sulphur



Particle size distribution of nano-sulphur

2.5.4 Impact Assessment of CIRCOT technologies

The objective of the project is to develop suitable methodological framework for evaluation of the impact of the technologies developed by the institute. Initially five technologies have been identified to carry out the impact evaluation study. During the initial phase of the project

I. The variables have been identified and the questionnaire has been developed to collect

the requisite information for impact assessment

- ii. Secondary data on the list of customers/ stakeholders on the identified institute technologies have been collected
- iii. Economic surplus approach has been identified to quantify the economic impact of the CIRCOT-Bajaj Pre-cleaner technology

2.6 CONSORTIA RESEARCH PROJECT (CRP) ON NATURAL FIBRES

2.6.1 Development of cotton incorporated Personal Protective Equipment (PPE) body suit with smart respirator for healthcare workers with enhanced comfort

(i) Cotton incorporated PPE

The PPEs available in the market were procured and analyzed for its properties. The properties are presented in the Table 2, which shows the PPEs

are available with different GSM and thickness. Air permeability was also found to vary due to variable pore sizes as confirmed by the SEM analysis.

Table 2. Physical Properties of the PPEs

Property	A	B	C	D
GSM	88.6	24.6	52.1	48.4
Thickness (mm)	0.47	0.29	0.42	0.42
Air resistivity (kPa.S/m)	Not permeable	0.016	0.064	0.029

Table 3. MMT properties of PPE materials

No.	Properties	A	B	C	D
I	Wetting Time Top (sec)	1.563	1.485	1.485	1.406
ii	Wetting Time bottom (sec)	119.953	119.953	119.953	119.953
iii	Top Absorption Rate (% /sec)	35.355	23.434	25.569	20.865
Iv	Bottom Absorption Rate (%/sec)	0	0	0	0
V	Top Max Wetted Radius (mm)	5	5	5	5
Vi	Bottom Max Wetted Radius (mm)	0	0	0	0
Vii	Top Spreading Speed (mm/sec)	2.909	3.199	3.199	3.201
Viii	Bottom Spreading Speed mm/sec	0	0	0	0
ix	Accumulative One way Transfer Index (%)	-954.048	-882.914	-930.309	-818.834

Moisture management properties of the PPEs fabric were determined using MMT analyser. It was found out that the PPEs were having very poor MMT properties (Table 3). To improve the comfort of PPE material it was attempted to use

cellulosic based hydrophilic material. It was hypothesised that cotton based web will improve the MMT properties of PPE if it is kept inside the PPE. Cotton non-woven fabric was prepared by the following method.

Table 4. MMT properties of the modified PPE materials

No.	Properties	A	B	C	D	Cotton Non-woven
I	Wetting Time Top (sec)	1.406	1.406	1.485	1.563	1.523
li	Wetting Time bottom (sec)	119.953	119.953	119.954	119.953	4.7575
lii	Top Absorption Rate (%/sec)	24.212	17.635	18.318	11.231	19.5677
Iv	Bottom Absorption Rate (%/sec)	0	0	0	0	37.046
V	Top Max Wetted Radius (mm)	5	5	5	5	20
Vi	Bottom Max Wetted Radius (mm)	0	0	0	0	20
Vii	Top Spreading Speed (mm/sec)	3.199	3.199	3.199	3.047	5.006
Viii	Bottom Spreading Speed mm/sec	0	0	0	0	3.8426
ix	Accumulative One way Transfer Index (%)	-455.552	-438.091	-440.556	-475.801	-149.612

From Table 4, it can be seen that sandwiching cotton non-woven fabric (40 GSM) has improved the MMT properties of PPE materials. Improved comfort of the modified material was further confirmed by determination of Q-Max value which gives the instant cooling property of the material

Table 5: Q-Max value of the PPE material

Nature of material	Q-Max
PPE	0.071
Cotton Sandwiched material	0.145

(ii) Development of cooling belt and vest using Peltier module

In initial part of research work, a cooling belt has been made using Peltier module. This will provide cooling air circulation through a mini circulating fan. Complete setup will function using a 10Ah DC battery with 2A, 5V power supply. The power consumption and rate of cooling at different voltages were studied (Table 6).

Table 6. Power consumption and rate of Cooling in Peltier module

S. No.	Voltage Applied (volt)	Time (minutes)	Temperature of the Peltier module (°C)
1.	2	2	25
		3	22
		5	20
2.	3	2	22
		3	19
		5	18
3.	5	2	20
		3	18
		5	15

Experiment was carried out at ambient conditions (30°C) as initial temperature and measured for cooling at various time intervals. A control switch was also connected in the circuit with 3 modes of options to control the input voltage. To neutralize the heat generated by the peltier

module, heat sinks were attached at both the sides with circulating fan as give in the figure 9. Figure 10 shows the cotton and synthetic fabric based cooling belts developed in the project. It was found out that by using cotton fabric the weight of the belts can be substantially reduced.

Peltier Module with heat sink and fan

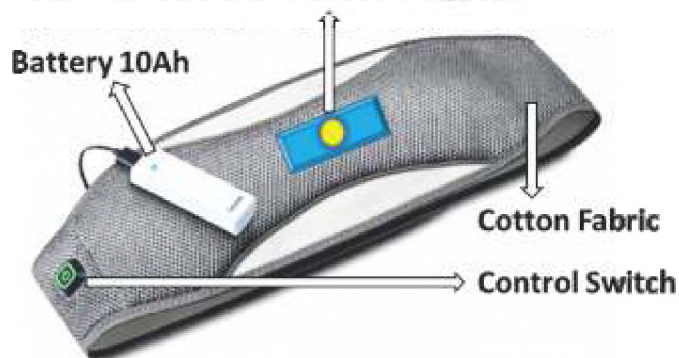


Figure 9. Cooling belt Model using Peltier



Figure 10: Developed cooling belts (A) Cotton fabric (B) Synthetic fabric

2.6.2 Development of Cotton Based face mask with improved particle filtration efficiency and breathability using electro spun nano materials and antiviral coatings

1. Pore size analysis of different fabric used for mask production

Initial study has been carried out to study the pore size properties of different materials like melt blown nonwoven fabric, plain nonwoven fabric etc used for face mask

production using SEM. From the results, it is inferred that all the cotton based materials have the fibre diameter in the range of 12-16µ. The fibre diameter is four times higher than the polypropylene melt blown fibres. The pore size of the plain woven fabric is in

the range of 29-61 μ . From the study, it is inferred that the pore sizes of cotton based woven/knitted fabrics are very large compared to the polypropylene based nonwoven materials. These cotton based fabrics have to be layered to get the required filtration properties.

2. Production of Electro spinning based nanofibre Mat:

The electrospun mat was produced using

Needleless electrospun production m/c (make ELMARCO, Czech Republic) at BTRA, Mumbai. The nylon nano fibres produced on the machine was deposited on the polypropylene nonwoven fabric of 40 gsm. The SEM of electrospun layers of nylon polymer on polypropylene nonwoven fabric are given as Figure 11.

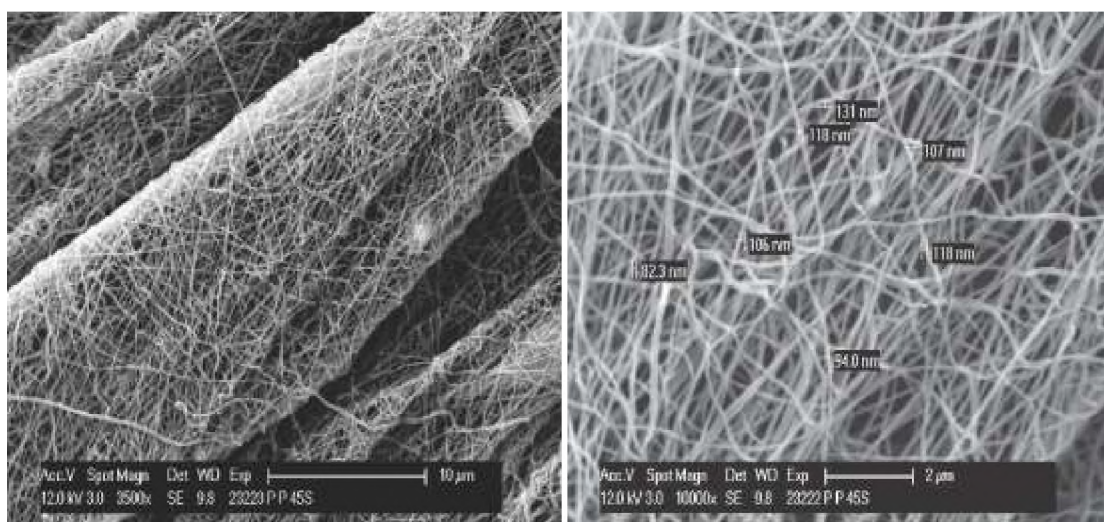


Fig. 11. The SEM Electrospun nanofibres at 3500x and 10000x magnifications

S. No	Type of fabric/nonwoven	Fibre diameter of substrate (μ)	Fibre diameter of nanofibrils (nm)	Approx pore size (μ)/ (nm)
1.	Electospun layer of commercial mask	26 in substrate/	300	0.2-0.5/ 200-500
2.	Polypropylene fabric	30	-	10-25
3.	Electospun coated PP	30 in substrate	100-130	0.05-0.1/ 50-100
4.	Melt blown fabric (30 gsm)	2-3	-	4-8

From the above table, it is inferred that the electro spun mat produced using nylon polymer contains nano fibrils of size of 50-100nm. When the pore size is compared with melt blown fabric which has fibre diameter of 2-3 μ , and pore size of

4-8 μ , the electrospun mat has much lower diameter fibres and the pore size is less than 100 nm. The thermal analysis of electrospun mat was carried out using Netsch Thermo Gravimetric Analyser and carbon content

analysis was done using Shimadzu TOC solid module analyser. From the results it is inferred that the developed nano mat has thermal stability up to 300°C and the carbon content was 81-82%

Development of Masks using Electrospun Nanofibre Mat

The electrospun mat based mask was produced using three layered structure viz. Top Layer - Polyester- provide water repellent & quick drying; Middle Layer– Electrospun Mat is sandwiched between the Polypropylene non-woven fabrics; Inner Layer -- Cotton fabric (Open structure). The developed mask was tested for air permeability and particle filtration efficiency which showed the valued 48.26 ft³ /min/ft² & 54.3% respectively.



Fig. 12 Development of Reusable Cotton mask

In this study, a three layered fabric based mask was developed with the construction of Top Layer - Polyester- provide water repellent property & quick drying, Middle Layer (Optional)– Cotton fabric & Inner Layer -- Cotton fabric, 110 gsm. The air permeability and particle filtration efficiency properties of the developed mask were 41 ft³ /min/ft² & 51% respectively.

Development of 100 % Cotton Engineered fabric structure for face mask application

100% cotton double fabric structure was introduced to suit the requirement of high air permeability with higher particle filtration efficiency for face mask applications. Two different yarn counts (40s & 60s) were used for fabric constructions and three different structure combination fabrics were developed.

Construction of Double Fabric structure

The produced double fabric structure construction is opposite to each other as shown in figure 13. In single repeat, two different structures were introduced in a diagonal direction and the same structure was reversed in face fabric (opposite layer). Out of two structures, one is highly floated structure and hence the air permeability was good and the other structure was a compact structure with high air resistance. Due to simultaneous compact and open structure, the air movement was diverted from the compact structure and transferred through the open structure; hence the air permeability was maintained. But the particles which are travelled along with the air can be filtered through compact fabric structure which is present in the opposite direction

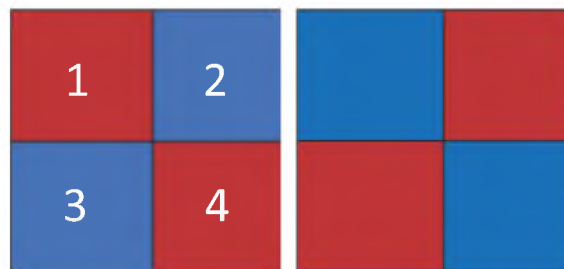


Fig:13 schematic diagram of Double fabric construction; First Layer (1, 4 Compact structure) (2, 3 open high float structure); Second Layer (2, 3 Compact structure) (1,4 open high float structure)

Double fabric Air permeability Comparison with different Yarn Count:

The air permeability is directly proportional to yarn count. It was increased with the finer count in same fabric structure due to reduced yarn diameter and cover factor. The trend was similar in all three structures. But based on fabric structure, the air permeability ratio was different concerning yarn count. Higher air permeability was noticed in plain/matty structure combination compared to the other two

structure combinations.

Double fabric Air permeability comparison based on structure combinations:

Based on the fabric structure the double fabric air permeability was varied, plain and matty structure combination fabric air permeability was comparatively higher around 45% compared to plain/oxford and plain/twill structure respectively. A similar trend was observed for 60s Ne fabric structure.

Table 7 : The Particle Filtration Efficiency of Engineered Fabric structures

S. No.	Weave structure	Yarn count	Double cloth Double fabric air permeability (Ft ³ /min/Ft ²)	Particle Filtration Efficiency (%)
1	Plain / matty	40 X40	151.34	-
2	Plain / matty	60X60	377.20	0.8
3	Plain / oxford	40 X40	158.18	31.3
3a	Plain/ oxford double	40 X40	--	33.9
4	Plain / oxford	60X60	570.18	39.2
5	Plain / 3/1 twill	40 X40	151.34	19.8
5a	Plain / 3/1 twill double	40 X40	--	27.8
6	Plain / 3/1 twill	60X60	415.55	15.2

Development of antibacterial and hydrophobic coating to reusable cotton based mask for general public

Face mask is worn close to mouth and nose, a safest and non-leaching type antimicrobial is required. In this study, it is attempted to develop

Non-leaching Silver coated Cotton fabric for Mask by Exhaust & Pad-dry-cure methods and also by using cationic polymers. The antimicrobial testing results of the above treated materials are given below.

S. No.	Type of fabric	Type of Organism	Zone of inhibition in mm
1	Non leaching insitu silver nano treated fabric by exhaust method	<i>Staphylococcus aureus</i>	Nil. But no growth beneath the fabric
		<i>Klebsiella pneumoniae</i>	5.0
2	Non leaching insitu silver nano treated fabric by Pad-dry-cure process	<i>Staphylococcus aureus</i>	Nil. But no growth beneath the fabric
		<i>Klebsiella pneumoniae</i>	7.0

S. No.	Type of fabric	Type of Organism	Zone of inhibition in mm
3	Cationic Polymer(CAT -R) treated Fabric	<i>Staphylococcus aureus</i>	Nil. But no growth beneath the fabric
		<i>Klebsiella pneumoniae</i>	Nil. But no growth beneath the fabric
4	Control Fabric	<i>Staphylococcus aureus</i>	Nil
		<i>Klebsiella pneumoniae</i>	Nil

Development of Test Jig for testing the efficacy of filter fabric for indoor decontamination

Indoor air pollution is a complex issue involving a wide diversity and variability of pollutants that have affected the human health. Known example for air pollutants which are produced by human activity includes nitrogen oxides, sulfur dioxide, carbon monoxide and volatile organic compounds. The exposure to these pollutants is associated with numerous effects on human health, including increased respiratory symptoms, hospitalization for heart or lung diseases, and even premature death. Therefore, an equipment has been conceptualized and designed for testing the efficacy of materials (non-woven, knitted or any other porous material, filters etc.) to filter out the hazardous substances like particulate matter, volatile organic compounds, carbon dioxide and formaldehyde and measure the air quality along with other environmental conditions. The proposed equipment will consist of two major components i.e. the test jig, measurement and display electronics.

Test Jig:

- The Test Jig consists of two chambers namely control chamber and result chamber.

- The sample gases with controlled and known concentration will be passed into the control chamber.
- After a predetermined settling time, the contents of the result chamber will be analyzed to determine the filtering capability of the fabric under test.
- Sensors will measure the concentration of gases in the control chamber and the result chamber.
- The Measurement and Display Electronics (MDE) will interface with the sensors in the Control Chamber and the Result Chamber and collect the real-time data.
- This data will be processed and stored in the MDE.
- The data will be retrievable from the MDE using a USB Flash Drive.
- The data collected by the MDE will be displayed real-time on a 7" touchscreen display using graphs.

2.7 EXTERNALLY AIDED PROJECTS

2.7.1 ICAR-CIRCOT-Agri-Business Incubation (ABI) Centre

ICAR-CIRCOT Agri-Business Incubation (ABI) Centre promotes incubation and business development in cotton and its by-products, conducts techno-entrepreneurial activities in cotton value chain for building prospective clientele and facilitates skill development in selected stakeholders related to cotton sector. During the current year two new entrepreneurs were admitted at ICAR-CIRCOT-ABI Centre for incubation on different technologies as Development of Particle Boards with innovative adhesive and Eco-friendly Dyeing & Finishing of Khadi and Handloom Fabric. Two incubatees graduated from the incubation centre namely M/s. Kotak Commodities, Mumbai for innovation titled "Preparation of Value Added Products using Naturally Coloured Cotton" and M/s. Shree Agro Invent Tech Pvt. Ltd., Mumbai for innovation titled "Conceptualization, Design and development of technically Advanced Textile Materials and

conversion to related Products". One new product developed by ICAR-CIRCOT-ABI Centre incubatee M/s. Shree Agro Invent Tech Pvt. Ltd., Mumbai was developed and commercialized. The incubatee developed Cotton rich high comfort T-shirt with smart drying knitted fabric and supplied product worth Rs. 110 lakhs to stakeholders. Four specialized training programmes, two workshops, online mentoring sessions, Telephonic call/talks, were undertaken for guiding and mentoring the incubatees and other trainees amidst covid pandemic during the year 2020 by ICAR-CIRCOT-ABI Centre.

Covid 19 advisory for the stakeholders were prepared in four Indian languages (English, Hindi, Marathi & Tamil). In this connection 2500 emails were sent to different stakeholders/ incubatees/ startups and 500 numbers of Whatsapp messages were sent.



Sustainable 6 pack Beer Packaging made by M/s. Fumalabs Pvt. Ltd.



Particle Boards with innovative adhesive made by M/s. Fumalabs Pvt. Ltd.



Cotton rich high comfort T-shirt with smart drying knitted fabric developed by incubatee M/s. Shree Agro Invent Tech Pvt. Ltd., Mumbai

2.7.2 Valorization of Cottonseed Meal: Extraction of Quality Protein for improving the Livelihood of Cotton Farmers (DST)

Optimization of protein extraction from cottonseed meal

For optimizing the recovery of the protein from cottonseed meal (CSM) obtained from Clean Cotton Impex, Pitchampalayam Pudur, Tiruppur, Tamil Nadu, India. pH more than 10 was found to play important role in extraction and solubilization of protein in extracting media. Hence, alkali-based extraction was used and single factor experiments were conducted by

using five factors i.e., sample to solvent ratio, Time, KOH, NaCl and Na₂SO₃ concentration to determine the optimum conditions for extraction of protein from CSM. Results showed alkali extraction followed by ethanol precipitation (pH=7) and citric acid precipitation (at isoelectric point of CSM protein) resulted in maximum protein recovery than other methods. Figure 14 displays overall methodology used for extraction and analysis of cottonseed protein.

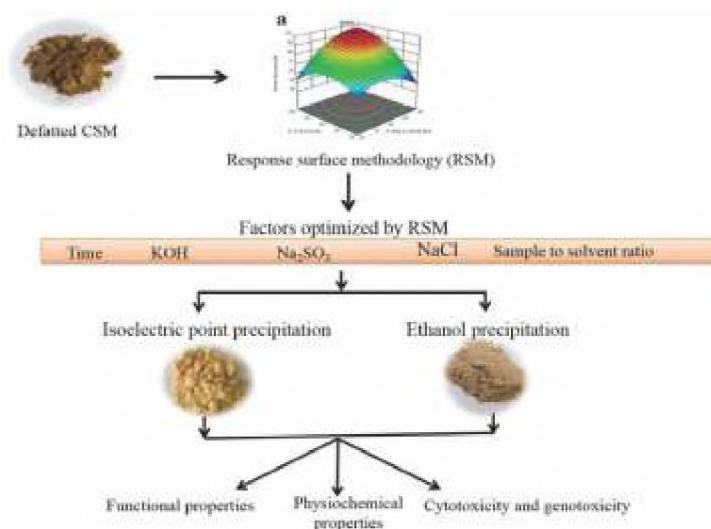


Fig. 14. Flow diagram of the experiments and activities performed under the project.

Alkali-based extraction was chosen with different input factors and yielded more than 80 and 70% protein when precipitated with ethanol and citric acid (at isoelectric point) respectively. At the same time, free gossypol was found minimal in case of ethanol and isoelectric point precipitation respectively. Both the precipitation techniques give high recovery of protein with high total protein content and low gossypol content (0.03% of free gossypol).

Optimization of protein hydrolysate from cottonseed meal and protein:

Enzymatic hydrolysis was carried out using two enzymes, pancreatine and pepsin. The optimized

cottonseed hydrolysate present high degree of hydrolysis and shown good potential to be utilized in functional foods.

Characterizing the isolated protein for food and feed application

Isolated protein was characterized by doing proximate analysis and evaluating gossypol concentration and functional food properties. Negligible gossypol concentration of free gossypol 0.03% and higher protein content with excellent functional food properties suggested use of cottonseed protein in bakery and other edible product toxicological evaluation is underway

2.7.3 An Inclusive Agribusiness Model for Sustainable Cotton Marketing in the State of Maharashtra (NASF)

The project aims to empirically prove that marketing of the cotton based on objective quality assessment compared to the existing subjective quality assessment will be more inclusive making the farmers a part of the cotton value chain enabling them to get remunerative price. During the reporting period the primary survey was carried out in the districts of Yavatmal (Tehsil: Ralegaon, Pusad, Ghatanji and Babhulgaon) districts of Maharashtra covering over 100 cotton farmers comprising small, medium and large farmers besides ginners and traders. Earlier, primary data from about 300 farmers from the districts of Aurangabad, Amaravati and Jalgaon were collected and analysed.

Profitability and Choice of Marketing Channel:

- Cotton is more profitable crop among other alternate crops with an average net income Rs. 15302 /ha (profit of Rs.920/quintal).
- Farmers are aligning with the Better Cotton Initiative (BCI) to streamline their cultivation practices and have seen 12% reduction in their cost of cultivation as compared to non-BCI farmers.
- The preferred marketing channel is traders (46%), village merchants/agents (28%) followed by ginners (23%) despite the fact that high price realization accrue to the farmers by selling it to ginners.
- It is also found that the profitability of the farmers is also dependent on the choice of the marketing channel. Price realized by the farmers by selling to ginners amount to Rs.5100/- per quintal whereas it is Rs 4880/-

and Rs.4600/- per quintal for traders and village agents respectively. There is a margin of around Rs.500/- per quintal in sale at farm gate and at ginning factory

Price Quality Linkage

- Another reason for the lower price realization to the farmers is lack of quality consciousness during harvest and post-harvest operations. The harvested cotton is neither stored nor sold according to its quality by many farmers.
- The price quality linkage of the existing marketing practices show that staple length and colour grade has positive relation and significant influence on price, whereas other parameters do not exert any influence on the price. In case of the public procurement operation moisture content plays a significant role and is inversely related to the price.

Biomass Utilization

- There is ample potential to increase the farm income by commercial exploitation of the cotton stalks. 70 per cent of the surveyed farmers have burnt the stalks in the field and 10 per cent use it for household purpose and rest of them plough the stalks in the field. The farmers incur additional cost of Rs.800-1000/- per hectare for management of stalks.
- Role of Farmer Producers Organisation in cotton marketing is identified as promising alternative that will serve to improve the benefits to the farmers.



Procurement of Cotton at Ginning Factory site under MSP operation in Yavatmal.



Visit to farmers growing desi cotton in Yavatmal.

2.7.4 Technology Incubation – RAFTAAR Agri-Business Incubation (DAC&FW)

RKVY Division of Ministry of Agriculture has sanctioned CIRCOT to work as Agri Business Incubator under RAFTAAR (Remunerative Approaches for Agri and Allied Sectors Rejuvenation) scheme from 31st January 2019. Since then, CIRCOT has got a new wing with which it can expand its reach to Agriculture and Allied Sectors.

CIRCOT-RKVY-RAFTAAR –ABI provides a platform to raw talent not only to materialize their innovative ideas in agriculture and allied sectors but also to commercialize them. Through this platform individuals/ startups with innovative

ideas can have access to CIRCOT's experienced expertise and standard testing laboratories to bring their ideas in reality. All necessary nurturing, mentoring and financial grant in aid will be made available through this platform. This wing of CIRCOT will focus on strengthening the Agriculture sector which is the back bone of Indian Economy by building a new line of Agri innovators and agri-entrepreneurs. This line will provide new remunerative approaches of Indian Agriculture which will attract Indian Youth towards Agriculture.

CIRCOT-R-ABI will facilitate incorporation of entities for all viable business ideas by the interns. Selected interns will be eligible to apply for Idea/Pre-Seed Stage Funding, of grant in aid up to Rs. 5 lakhs per startup for converting his/her innovative idea into prototype/product. And Seed Stage Funding scheme provides Grant in aid to Startups. Under this scheme financial assistance of maximum up to Rs. 25 lakhs will be granted to potential startups that have a Minimum Viable Product (MVP) based on innovative solutions/processes/products/services/business model in agriculture and allied sectors.

This Scheme covers below focus areas like- Pulp, Paper & Packaging, Precision Farming, Food

processing, Agri Extension Education, Post-Harvest processing, Agriculture Biotechnology, Waste to Wealth, Farm Retailing Supply Chain Management, Internet of Things (IOT), Farm Mechanisation, Animal Husbandry, Green Composite, Briquetting & pelleting, Natural Resource Management, Agri clinic & Farm Health Services, Cotton and other Natural Fibres, Sustainable Agri/Organic Farming, Nanotechnology Application Agriculture, Agri Input Tools & Technology etc.

As per the Guidelines of RKVY-RAFTAAR, the CIRCOT-R-ABI centre runs under continuous guidance & supervision of RAFTAAR incubation committee (RIC),

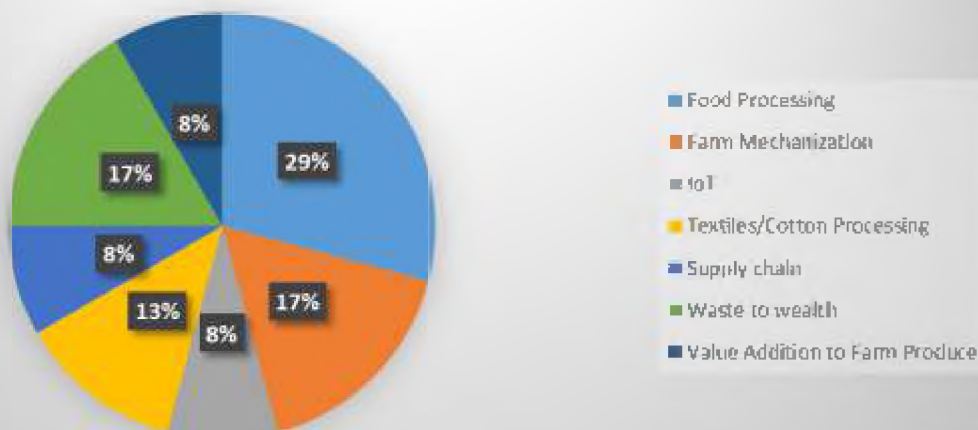
CIRCOT-RAFTAAR Incubation committee (RIC)

Sr. No.	Name	Designation	Role In RIC
1	Dr. P. G. Patil	Director, ICAR-CIRCOT, Mumbai	Chairman (Head of the Institution)
2	Dr. G. R. Anap	Former International Cotton Consultant, World Bank Project (Africa)	Member (Domain Expert from Industry)
3	Prof. (Dr.) A. S. Vastrad	Professor and Dy. Director Student Welfare, University of Agricultural Science (UAS), Dharwad	Member, (RKVY Knowledge Partner nominee)
4	Dr. N. J. Thakor	Former Dean, College of Agricultural Engineering and Technology, Dr. BSKV, Dapoli	Domain Expert (Invitee) CIRCOT-R-ABI)
5	Prof. (Dr.) V. D. Gotmare	Associate Professor, Department of Textile Manufactures, VJTI, Mumbai	Member (Domain Expert from Academia)
6	Mr. Ramesh. R Kadam	RTD, General Manager, Bank of India	Member (Representative of Bank)
7	Shri. D. B. Bote	Joint Director (Soil Conservation), Commissionerate of Agriculture, Pune	Member (State representative from the state Department of Agriculture)
8	Dr. Ashok Kumar Bharimalla	Senior Scientist & Head I/c., TTD, ICAR-CIRCOT, Mumbai	Member Secretary (PI) - Chief Executive Officer (PI-CEO), CIRCOT-R-ABI)

For wide publicity of the scheme and to reach a greater number of agri-innovators CIRCOT-R-ABI team developed website, designed information brochures which were inaugurated by Mr. Sushilkumar (IAS), Additional Secretary, DARE on 1st May 2019.

Fourteen (14) agri-start-ups were incubated at CIRCOT-R-ABI during first cohort of the scheme. RKVY Division of DoAC&FW, MoA&FW, New Delhi has sanctioned them grant-in-aid of Rs.144.5 Lakhs viz letter No. 12-27I2020-RKVY Dated 3rd August 2020.

Sectorwise Agri-start-up Incubated under 2nd COHORT



Application for Pre-seed Stage funding (up to Rs. 5 lakhs) 2nd Cohort CIC recommended to RKVY-RAFTAAR Selection and Monitoring Committee for funding

Sr. No.	Agri-startup	Innovation
1	M/s. ELECTRO SPARK SOLUTIONS (Mr. Harish R Bhagat)	Development of cost-effective smart irrigation system
2	M/s. SETU AGRO-BIOTECH AND TEXTILE INDUSTRY PVT LTD (Mr. Vyomkesh R Vhanbatte)	Cost effective hydroponic system
3	M/s/ SIDHDHAGANGA BIO PRODUCTS (Mr. Vijay Hirejagner)	Development of utensils by using arecanut leaves.
4	M/s. 21CFARM TECHNOVATIONS LLP. (Mr. Sourav A Kedar)	Development of Artificial Intelligence based Fruit Crop Disease and Pest, warning & Prediction system

Applicants for Seed-Stage Funding (up to Rs 25 Lakhs)

Sr. No.	Agri-startup	Innovation
1	M/s K B DESHMUKH DAIRY FARM (Mr. Kiran Bapusaheb Deshmukh)	Development of sustainable supply chain of Organic milk and milk products
2	M/s. ENERGY CHAKRA (Mr. Sudarshan Ramrao Ghorpade)	Development of Hybrid solar dryer
3	M/s. PAWAAK FOODS (Mr. Kaushal Dongre)	Production of Chemical free Jaggery in innovative cube shape with enhanced shelf life
4	M/s. VAISHVIK SOCIAL FABRICS LLP (Mrs. Purna Prashant Sude)	A Social innovation to employ differently abled persons for textile product manufacturing through ergonomically designed machines suitable to be operated by differently abled persons.

5	M/s. INDRADHANU MUSHROOM (Mr. Rohan Gangadhar Thakare)	Use of Ice ball technology for cost effective production of button mushroom
6	M/s. VIDARBHA SALES (Mrs. Minal Hatwar)	Cost effective and ecofriendly Green-Crematorium
7	M/s SANJIVANI AGRO MACHINERY (Mr. Pranay Choudhary)	Continues Feeding Stove (CFS) using pallets made out of Agro biomass
8	M/s. AARDE-PATIL PHARMA PVT LTD (Dr. Sushant Sarjerao Patil)	Extraction of medicinal plant extracts and its use innovative ayurvedic drug formulations.
9	M/s. MANDESHI GOAT FARM (Mrs Sharmila Jagdish Gaikwad)	Development of Goat Farming Cluster to strengthen the supply Chain management of Meat and diversified Goat Milk Products and provide employment to rural women
10	M/s. VARAD ENGINEERING LLP (Mr. Harshad Tanaji Magar)	Development of Fully Automatic Spraying Machine for agricultural application
11	M/s. VASUNDHARA SHASHWAT SHETI MAL UTPADAK& PRAKRIYA SANSTHA (Mr. Shriniwas Bagal)	Development of diversified jaggery based products like jaggery syrup, jaggery powder, granules, chunks etc using organically grown sugar cane
12	M/s. MEDICON (Ms. Apoorva Uttam Bajaj)	Innovative process protocol for production of absorbent cotton reducing the use of natural resources and effluents.
13	M/s. SR FOODS BREWERYS (Mr. Rahul Vijay Joshi)	Development of food products based on cashew apple e.g., nectar, cookies made using cashew apple pomace powder.
14	M/s. ENVIR ERA (Mr. Sushant Shivaji Pawar)	Eco-Friendly Brake Pads using agro-residues for Automotive Industry
15	M/s. PRAFULLA WINERY AND HOSPITALITY PVT LTD (Mrs Manjula Mahesh Deshmukh)	Development of innovative process protocol for production of beet root wine.
16	M/s. RAMKRISHNA FRESH (Mr. Avadhut Dongare)	Inclusive Business Model for Supply of Fruits and Vegetables
17	M/s. SAMRTHA MAKACHUNI CENTRE (Mr. Abhijeet Prakash Deshmukh)	Chelated animal feed of maize with added flavor, minerals, calcium etc.
18	M/s/ SHRI KRISHNA PLASTIC (Mr. Badal Sejpal)	Development of Innovative Partially Biodegradable Mulching Sheets for Agriculture
19	M/s. SAI DADA AGRO INDUSTRIES (Mr Uday Nagane)	Development of innovative process protocol to increase the yield of neem seed oil and integration of manufacturing facilities for neem seed oil based cosmetic products.
20	M/s/. RAMIZ AGRO FOOD INDUSTRIES (Mr. Omkar Ramchandra Patil)	Fortification of vermicelli with natural fruit pulp for making a healthy food.



3. TECHNOLOGY MANAGEMENT

ICAR-CIRCOT carries out basic & strategic research in processing of cotton and its agro residues, development of value added products and quality assessment. The research work results in development of machinery, products and process protocols. The Institute is also engaged in the refinement of the already developed technologies in the areas of post-harvest processing of cotton, eco-friendly finishing of textiles and value addition of cotton stalks. Technologies developed are protected through management of intellectual property rights. Assessment, popularization and commercial adoption of viable technologies are carried out regularly through demonstrations, industrial trials, awareness meets, exhibitions and seminars. Impact assessment of already commercialized technologies is also taken up for further improvement.

3.1 Intellectual Property Management

Institute Technology Management Unit (ITMU) takes care of the protection of intellectual property rights of the technologies developed in the Institute and evaluation of commercial values of different consultancy projects and also the licensing of technology.

During this period eleven consultancy projects have been evaluated and processed through

Institute Technology Management Unit (ITMU) meetings and Institute Technology Management Committee (ITMC) meeting.

During this period, Four ITMU meetings and one Institute Technology Management Committee (ITMC) Meeting were conducted. The ITMC was held on 27th November 2020. The agenda of the meeting was discussion regarding creation of incubation facilities for Assessment of Indian Cotton Quality for Quality based trading of Cotton for better remuneration to Farmers. Different stakeholders are enquiring about facilities at CIRCOT for assessment of cotton quality for quality based trading of cotton for better remuneration to farmers. CIRCOT is working on cotton quality and trash level assessment and said facilities are NABL Accredited. The committee suggested that a National Laboratory for Assessment of Trash and Contamination in Cotton (NLATCC) may be established at CIRCOT for reducing trash and contamination level in Indian cotton

A sponsored contract research proposal titled “Development of Standard Protocol for ensuring Transparency in Evaluation of Quality and Lot Wise Analysis of Cotton Fully Pressed (FP) Bales” to be sponsored by M/s. The Cotton Corporation of India Limited, Navi Mumbai was evaluated by the ITMU committee.

Consultancy Project No	Title of Project	Name of Organisation to which Consultancy offered
CP2/2019-20	Cleaning & bleaching of Linters	M/s Atul Limited, Valsad, Gujarat
CP10/2019-20	Fabrication of Kenaf fibre reinforced polyester composite	M/s. VJTI, Mumbai

Consultancy Project No	Title of Project	Name of Organisation to which Consultancy offered
CP11/2019-20	Treatment of Silk fabrics	M/s. Assam Agricultural University, Jorhat
CP12/2019-20	Treatment with ZnO on Cotton Fabrics	M/s. Nirmala Niketan, Mumbai
CP13/2019-20	Design and Manufacturing of Precleaner, Double roller gin, Bailing presses & Feeding system	M/s. Bajaj Steel Industries Ltd., Nagpur
CP01/2020-21	Processing of bleached cotton linters for filter making applications	M/s. Molbio Diagnostics Pvt. Ltd., Bengaluru
CP02/2020-21	Soft Silk Fabrics for Kawabata Analysis	M/s. Central Silk Technological Research Institute, Bengaluru
CP04/2020-21	Micro-Spinning of Cotton/Kapok Fibre blended yarns ratio of 82/20, 65/35 & 100% cotton	M/s. CSUA&T, Kanpur, UP
CP05/2020-21	Study spinning performance by blending of Kheemp fibre with cotton (ratio 80/20) on micro spinning	Dr Amit Vyas
CP03/2020-21	Silk Fabrics for Kawabata Analysis	M/s. Central Silk Technological research Institute, Bengaluru
CP06/2020-21	Friction spinning of multifilament dyneema fiber	M/s. MMP filtration Pvt. Ltd, Ahmedabad




3.2 Technology Incubation:

Agri-Business Incubation (ABI) Centre

ICAR-CIRCOT has established an Agri-Business Incubation (ABI) Centre under 12th Plan Scheme of National Agriculture Innovation Fund (NAIF) (Component II) –Incubation Fund for the benefit of prospective entrepreneurs who wish to start their business using Institute technologies on post-harvest processing of cotton and value addition to its by-products. This centre promotes incubation and business development in cotton and its by-products, conducts techno-entrepreneurial activities in cotton value chain for building prospective

clientele and facilitates skill development in selected stakeholders related to cotton sector. The Agri-Business Incubation (ABI) Centre was launched at ICAR-CIRCOT, Mumbai on 5th February 2016. Since inception, sixteen incubatees joined this incubation centre for developing business enterprises among them seven incubatees successfully graduated from the incubator and started commercial ventures.

- Two new entrepreneurs were admitted at ICAR-CIRCOT-ABI Centre for incubation on different technologies during the year 2020

Sl. No.	Incubatee	Technology	Technology Brief	Photograph
1	M/s. Fumalabs Private Limited, Gwalior	Development of Particle Boards with innovative adhesive	Incubatee has started product development (beer holder) using bagasse and mustard Lol with the furniture company Featherlite for testing of boards Lol with a farmer's organization in Karnataka for supply of year-round bagasse and rice MoU with the University of Maine, US for R&D collaboration Product Development & testing trial in progress at ICAR-CIRCOT for three layer particle boards	 Logo 
2	M/s. Navkruti Industries, Sangli	Eco-friendly Dyeing & Finishing of Khadi and Handloom Fabric	Innovative textile finishing technology for cotton fabrics Use of natural dyes as marigold, burnt coconut shell extract, Can be carried out at room temperature, Prevents high energy consumption, Imparts anti-microbial and UV protective properties, Absence of hazardous effluents.	Logo 

➤ Two incubatees graduated from the incubation centre.

Name of Incubatee	Technology
M/s. Kotak Commodities, Mumbai	Preparation of Value Added Products using Naturally Coloured Cotton
M/s. Shree Agro Invent Tech Pvt. Ltd., Mumbai	Conceptualization, Design and development of technically Advanced Textile Materials and conversion to related Products

➤ One new product developed by ICAR-CIRCOT-ABI Centre incubatee M/s. Shree Agro Invent Tech Pvt. Ltd., Mumbai was commercialized. The incubatee developed Cotton rich high comfort T-shirt with smart drying knitted fabric developed using ICAR-CIRCOT Technical Textile Technology and supplied product worth Rs. 110 lakhs to stakeholders.

➤ Four specialized training programmes were

conducted during the year 2020 by ICAR-CIRCOT-ABI Centre.

➤ On the occasion of 92nd Foundation Day of ICAR on 16th July 2020, two technologies developed by ICAR-CIRCOT ABI Centre incubatees namely, 'Innovative Lysimeter for on-farm water management' and 'Cotton interlined sleeping bags for better comfort' were released by Hon'ble Agriculture & Farmers Welfare Minister.

INCUBATEE :	GREEN PROSPERITY INNOVATIONS	SHREE AGRO INVENT-TECH PRIVATE LTD
Focus Area:	Precision Farming	Value addition to natural fibre
Name of Innovation:	Lysimeter Based Water Management System	Cotton based Nanofinished Sleeping bags
Technology:	<p>Accurate Lysimeter based water management system for helping farmers to make decisions on irrigation time schedules. This device will be useful for determining highly accurate, ideally representative observations of evapotranspiration and amount of water leaching as well. It will also help in deciding quantity and timing of fertilizers and other irrigation-based inputs also. This system includes mobile phone based easy to use soft tools for farmers helping to make decisions</p>	<p>Sleeping Bags with mosquito repulsive, antimicrobial finishing and high abrasive resistant outer layer of light weight Cotton/Polyester Blended fabric which uses recycled textile reinforcing material for cost effectiveness.</p> <p>Unique Selling Proposition:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Inner layer of 100% cotton for better comfort and to avoid static charge generation. <input type="checkbox"/> High abrasive resistant, light weight outer layer of Polyester fabric <input type="checkbox"/> Anti-bacterial inner cotton layer to avoid odour generation due to sweating. <input type="checkbox"/> Sleeping Bag has pocket to place mosquito repellent pouch as well <input type="checkbox"/> 100% Made in India Product
Photographs	 	 

- Annual Review Workshop conducted for Agri Business Incubator and ITMUs under NAIF ZTMC Agri Engg. Institutes in Nov 2020 under chairmanship of Dr. K. Alagusundaram, DDG (Agril. Engg.) on 24th Nov. 2020.

RKVY RAFTAAR Agri Business Incubator (CIRCOT-R-ABI)

CIRCOT RKVY RAFTAAR Agri Business Incubator

(CIRCOT-R-ABI) was sanctioned by RKVY Division, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Govt. of India in 31st January 2019. This incubator is providing funding support as grant-in-aid by two programmes viz. Pre-seed stage funding upto Rs. 5 lakhs and Seed Stage Funding upto Rs. 25 lakhs. Under this programme, fourteen startups of the first cohort have received

grant-in-aid of Rs. 144.5 lakhs for converting their Minimum Viable Product into commercial scale products.

1. The 1st Cohort of fourteen agripreneurs have developed innovative minimum viable products (MVP) and have received from RKVY-RAFTAAR Division of Rs. 144.5 lakhs in August 2020 for developing commercial scale products.

➤ Uday: 4 agripreneurs

➤ Ankur: 10 agripreneurs

2. Fourteen MoUs signed with start-ups for disbursement of funds received from RKVY RAFTAAR Division, DAC&FW, Ministry of Agriculture and Farmers Welfare, Govt. of India.

3. The 2nd cohort of twenty four agripreneurs completed their Agripreneurship Orientation Programme (AOP) during 9th October to 8th December 2020.



➤ Uday: 4 agripreneurs

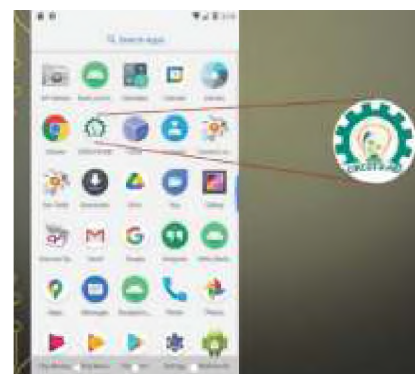
➤ Ankur: 20 agripreneurs

4. Three Online Mentoring Sessions were organized to guide agripreneurs in product development, commercialization and scaling up: (05/11/2020, 06/11/2020; 11/11/2020)

5. Interaction with individual agri startups to monitor their progress: three times during AOP for each agri startups

6. Launch of CIRCOT-R-ABI Mobile App:

CIRCOT-R-ABI App was launched by Dr. K. Alagusundaram, DDG (Agril. Engg.),



3.3 Awareness Meets and Demonstrations

Awareness programme under Mera Gaon Mera Gaurav (MGMG) was organized at Shegaon kund, Hinganghat Dist- Wardha on 25th January 2020 in which 59 farmers participated.



39 farmers participated in Awareness programme under Mera Gaon Mera Gaurav (MGMG) at Waigaon, Dist- Wardha on 18th February 2020



Ginning Training Centre (GTC), ICAR-CIRCOT, Nagpur organised a Krishi Samvad at Dr. S. P. Roychoudhary Auditorium, ICAR-NBSS & LUP, Nagpur to commemorate the first World Cotton Day anniversary on Oct 07, 2020. About 75 farmers from districts of Nagpur, Wardha and Yavatmal and a number of Scientific and Technical Officers of all 4 local ICAR institutes participated in the programme.



A webinar was organised by Ginning Training Centre, ICAR-CIRCOT, Nagpur on Oct 15, 2020 in association with The Confederation of Indian Textile Industry-Cotton Development & Research Association (CITI-CDRA), Nagpur and Cotton Guru, Mumbai to assist the cotton farmers in realising MSP for sale of their produce. Prominent cotton professionals guided farmers through online lectures for maintaining quality parameters, proper harvesting and storage of cotton and avoiding adulteration of cotton with contaminants. The programme was also live streamed on YouTube. Over 300 farmers benefitted through this programme.

Awareness programme on “Clean Cotton Picking and Benefits of Maintaining Cleanliness in Surroundings” at Mera Gaon Mera Gaurav (MGMG) adopted village Ghorad, Taluka- Seloo, district Wardha was conducted on 18th Dec 2020 wherein 25 farmers participated



Kisan Diwas was celebrated on 23rd December 2020 by conducting an awareness programme on “Maintaining Hygiene and Benefits of Clean Cotton Pickings” at village Akoli, Wardha. Participants: 75



3.4 Exhibitions and Agri-Fair

KRUSHIK 2020, a live demonstration & Agri Expo was organized by Agricultural Development Trust, Baramati and supported by ICAR and NABARD during 16th to 19th January 2020.

ICAR-CIRCOT, Mumbai participated in this exhibition and displayed technologies developed by the Institute. This mega event took place in Krishi Vigyan Kendra, Baramati. Around 450 exhibitors demonstrated their technologies in the area spread over 110 acres. As per organizers around 3 lakh visitors visited the expo in the span of 4 days. Visitors from other cities and states, farmers, students and many women self-help groups visited the ICAR-CIRCOT stall. Visitors were briefed about schemes under Agri Business Incubation (ABI) and RAFTAAR – ABI and entrepreneurs were urged to come up with innovative ideas to avail the facilities provided by the Government of India.



3.5 Television Talks

Phone in Live interview of Dr. P. G. Patil, Director, ICAR-CIRCOT on “कापूस वेचणी नंतर चे तंत्रज्ञान” (Post-Harvest Technologies of Cotton) was telecast on 24th September 2020 on Sahyadri channel in Krishidarshan programme where in he answered direct questions from the farmers and other stakeholders.



3.6 Inauguration of National Laboratory for Advanced Material Characterization (NLAMC):

- The National Laboratory for Advanced Material Characterization (NLAMC) was inaugurated by the august hands of Dr. K. Alagusundaram, DDG (Agril. Engg.) on 3rd December 2020
- This lab has been established with the financial support from ICAR-National Agricultural Innovation Fund (NAIF), ICAR-Scheduled Caste Sub Plan (SCSP) and Rashtriya Krishi Vikas Yojana – Renumerative Approaches for Agriculture and Allied Sectors Rejuvenation (RKVY-RAFTAAR) Scheme, Ministry of Agriculture and Farmers Welfare (MoA&FW) New Delhi and Extramural Fund of ICAR





4. SKILL DEVELOPMENT AND CAPACITY BUILDING

Skill development and capacity building are very important for every organisation to maintain the quality of the work with the dedicated involvement of the employees. The skill of the work force needs to be upgraded in their respective fields with latest developments so as to enable them to provide maximum output for the organization.

Skill development in the area of post-harvest processing of cotton and value addition to its biomass is one of the mandate of the Institute. Training programmes are organised by the institute for the stakeholders including farmers, ginners, personnel from cotton trade and industry throughout the year. These trainings covers diverse areas of cotton processing.

Ginning Training Centre (GTC) of the Institute at Nagpur regularly conducts training for the farmers covering production and post-harvest processing of cotton and utilisation of cotton biomass for value added products. Training courses for Gin fitters and other workers in the ginning industry on technologies for production of clean quality cotton, maintenance of various ginning and allied machines are also organized regularly by GTC.

The institute also organises specialised training programmes on spinning, quality evaluation, Knitting, material characterisation, nanotechnology, microscopy, electrospinning, absorbent cotton technology, composite materials, value addition to cottonseeds etc. for the personnel from the academia, industry and entrepreneurs.

4.1 Capacity building of Staff

Institute staff are trained as per the training needs assessment plan for the year 2019-2020, to keep pace with the latest technological advancements in the relevant fields. The employees were trained in premier institutions to learn the cutting-edge technologies, and project management methodologies. Impact assessment of the training programme are also carried out after a period of one year to analyse the outcome. The percent realization of trainings planned during the financial year 2019-20 was 81.48%. Scientists underwent training in diversified fields like advances in scientific communication, food processing, management development programme and NABL training. Technical staff underwent training in the area of skill & personality development, motivation, positive thinking, E-Office, development of institutional repositories, and Instrumental analysis. Administrative staff were trained in Personality development, behavioural skills, administration and finance. Supporting staff underwent training on skill development. For the current year (2019-20), all the staff are enthusiastically participating in the various training programmes as per the designed annual training plan.

Orientation training of newly joined ARS probationers Dr. Kanika Sharma and Shri Himanshushekhar Chourasia was organised during 8th June - 7th July which was co-ordinated by Dr. Sujata Saxena, Principal Scientist & Head I/c, CBPD.

Table 4.1 Skill development of Institute Staff

Programme Title	Duration	Venue	Name(s)
Scientific Staff			
Training programme on “SciCom for Smart Scientists”	January 16-22, 2020	ICAR-Central Institute of Fisheries Education, Mumbai	Dr. C. Sundaramoorthy Dr. T. Senthilkumar Dr. G. Krishna Prasad
Training on Fundamentals of TOC & Operational Software	February 13-14, 2020	M/s Shimadzu Analytical (I), Pvt. Ltd.	Dr. A. S. M. Raja
Online training programme on "SciCom for Smart Scientists"	May 12-25, 2020	Organized by ICAR-CIFE, Mumbai	Dr. N. Vigneshwaran, Dr. Kanika Sharma
One-week online training course “Smart Handling and Processing Systems of Horticultural Produce”	May 09-14, 2020	Organized by MPKV Rahuri (Maharashtra).	Dr. M. K. Mahawar Dr. Kirti Jalgaonkar
One-week online training course on "Role of technologies and automation in food processing and preservation"	May 14-19, 2020	Organized by Vasantao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, Maharashtra	Dr. Sharmila Patil Dr. M. K. Mahawar Dr. Kirti Jalgaonkar
ISAE Webinar training series-2 : Automation in Agriculture" Second webinar series	May 20-26, 2020	ISAE, New Delhi	Shri GTV Prabu
Advances in smart Food Processing Technologies	June 04-15, 2020	Organized by MPKV Rahuri, Maharashtra	Dr. Manoj Kumar Mahawar
Management Development Program (MDP) on Priority Setting, Monitoring and Evaluation (PME) of Agricultural Research Projects	October 12-17, 2020	Organized by ICAR-NAARM, Hyderabad online mode	Dr. A S M Raja
Training on science administration and research management	November 04-17, 2020	Organized by ASCI, Hyderabad	Dr. P.S. Deshmuk
Online nanotechnology Training 2020	November 23-27, 2020	ICAR-CIRCOT, Mumbai	Dr. Kanika Sharma
Training programme on Laboratory Management System and Internal audit as per ISO17025:2017	November 24-27, 2020	Organized by IRMRA, Mumbai	Dr. A S M Raja
Specialized training programme on improving Work efficiency, Stress Management and Personality Development	December 07, 2020	ICAR-CIRCOT, Mumbai	Dr. S. K. Shukla Dr. P. K. Mandhyan
Technical Staff			
E-office Training	January 09-10, 2020	ICAR-CIRCOT, Mumbai	Shri. K. Narayanan
Training on “Dspace Software for Design and Development of Institutional Repositories-Advance”	January 20-24, 2020	CSIR-NISCAIR, New Delhi	Mrs. P. S. Nirhali Mrs. P. R. Mhatre

Programme Title	Duration	Venue	Name(s)
Repair & Maintenance of office residential building including guest house	January 21-23, 2020	ICAR-CIAE, Bhopal	Shri.T.Venugopal
Training on Fundamentals of TOC & Operational Software	February 13-14, 2020	M/s Shimadzu Analytical (I), Pvt. Ltd.	Dr Sujata R. Kawlekar, Shri R.S. Narkar
One day specialized training programme on improving Work efficiency, Stress Management and Personality Development	December 07, 2020	ICAR-CIRCOT, Mumbai	Shri D. U. Patil Dr. Sheela Raj Shri. K. Thiagarajan Shri U. D. Devikar Shri. S. L. Bhanuse Shri S. N. Hedau Shri K. Narayanan Shri R. G. Dhakate Shri D. U. Kamble Dr. Jal Singh Shri M. B. Patel Smt. Binu Sunil Shri D. M. Correia Shri M. M. Kadam Shri Umrao Meena

Administrative Staff

Training on Establishing matters of LDC & UDC	January 04-09, 2020	ICAR-CIFE, Mumbai	Mrs. Vijaya Nitin Walzade
E-office Training	January 09-10, 2020	ICAR-CIRCOT, Mumbai	Shri. Sunil Kumar Shri.S.V.Kasabe Shri.Y.R.Pathare Shri.K.Parleshwar Smt.Pooja Tiwari Miss. Himani Singh Shri.Avinash Aman
Training Programme on “Enhancing Efficiency and behavioural skills of Stenographer grade III, PA, PS and PPS of ICAR Institutes /HQS	February 24-29, 2020	ICAR-NAARM, Hyderabad	Smt.R.R.Tawade Shri.R.D.Shambharkar
Training session through a webinar with Knowledge partners and R-ABI from 29 institutions for discussions on various issues related to operation of PFMS/ EAT module of PFMS	October 15, 2020	--	Shri.S.V.Kasabe Miss.Himani Singh Shri.T.D.Dhamange Shri.Hemant Ladgacutar
One day specialized training programme on improving Work efficiency, Stress Management and Personality Development	December 07, 2020	ICAR-CIRCOT, Mumbai	Shri K. Parleshwar Shri. R. G. Matel Smt. V. R. Naik
Online Training Programme for Administrative & Finance Officer	November 23-27, 2020	ICAR-NAARM, Hyderabad	Shri.M.Radhakrishnan Shri.S.A.Telpande Shri.S.D.Ambolkar

Skilled Support staff

Programme Title	Duration	Venue	Name(s)
One day specialized training programme on improving Work efficiency, Stress Management and Personality Development	December 07, 2020	ICAR-CIRCOT, Mumbai	Shri R. B. Kautkar Shri D. G. Gole Shri A. F. Gudadur Shri V. Subbaiah Shri R. S. Umare Shri M. M. Bhandakkar

4.2 HRD Achievements

Table 4.2.1 HRD Targets & Achievements for April 2019 to March 2020

Category	Total No. of Employees	No. of trainings planned for each category during 2019-20 as per ATP	No. of employees undergone training during April 2019 to March 2020	% realization of trainings planned during 2019-20
Scientist	26	8	7	87.5
Technical	64	7	5	71.43
Administrative & Finance	32	6	11	183.33
SSS	36	6	0	0.00
Total	158	27	22	81.48

Table 4.2.2 HRD Targets & Achievements for April 2020 to December 2020

Category	Total No. of Employees	No. of trainings planned for each category during 2020-21 as per ATP	No. of employees undergone training during April-Dec 2020	% realization of trainings during 2020-21
Scientist	28	10	13	130.00
Technical	62	19	20	105.26
Administrative & Finance	29	13	16	123.07
SSS	33	12	6	50.00
Total	152	54	55	101.85

4.3 Trainings organised to stakeholders

The Institute has been conducting regular training programmes for students, farmers, entrepreneurs and personnel employed in cotton and ginning sectors. Training programmes related to advances in cotton technology in the field of composite materials, Nano-technology, spinning,

quality evaluation and use of advanced instrumentation are conducted at Mumbai headquarters. At Ginning Training Centre, Nagpur, training programmes on cotton grading and procurement, double roller ginning technology are organised.

Table 4.3 Training Programmes organised during 2020
National

Programme Title	Duration	No. of Participants	Participants' Profile
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ICAR-CIRCOT, Mumbai

Composite Technology	February 12-14, 2020	05	Students, Academic, Industry, ICAR
Quality Evaluation of Cotton for Cotton Graders	June 01-05, 2020	05	Agricultural Officers
Nanotechnology Training (online)	November 23-27, 2020	24	Students, Academics, ICAR
One day specialized training programme on improving Work efficiency, Stress Management and Personality Development	December 07, 2020	26	ICAR-CIRCOT Employees

GTC of ICAR-CIRCOT, Nagpur

Double Roller Ginning Technology and Basics of Cotton Grading	January 13-18, 2020	03	Ginners
Cotton Production and Post-harvest Processing	February 03-06, 2020	20	Farmers
Double Roller Ginning Technology and Basics of Cotton Grading	February 10-15, 2020	01	Ginners
Cotton Grading and Procurement	May 11-14, 2020	29	Agricultural Officers
Cotton Grading and Procurement	May 15-18, 2020	32	Agricultural Officers
Cotton Grading and Procurement	May 20-23, 2020	33	Agricultural Officers
Cotton Grading and Procurement	June 01-05, 2020	06	Agricultural Officers
Double Roller Ginning Technology and Basics of Cotton Grading	October 26-30, 2020	08	Ginners

Total number of training programmes	Number of beneficiaries	Revenue generated (Rs. Lakhs)
11	166	16.94

Besides, an Agripreneurship orientation Programme (AOP) was organised during 9th

October - 8th December 2020 for 24 Agripreneurs by CIRCOT R-ABI.

4.4 Education

The University of Mumbai has accorded permanent recognition to ICAR-CIRCOT for guiding students leading to **M.Sc.** (by research) in

subjects: Physics, Bio-physics, Microbiology and Organic Chemistry and **Ph.D.** in Physics and Microbiology.

Ph.D. Students on roll

Name of Students (Research Guide)	Year of Admission	Research Topic	Status
Mrs. Sangeeta M. Chavan (Dr. N. Vigneshwaran)	2012	Effect of silver, zinc oxide and titania nanoparticles on nitrogen fixing, phosphate solubilizing and biofilm forming bacteria found in soil ecosystems.	Synopsis submitted.
Ms. Komal Saraf (Dr. N. Vigneshwaran)	2012	Preparation of nanofibre mats of alginate and pullulan by electro spinning and its application as nanosensor for detection of food spoilage	On-going
Ms. Priyanka Bagde (Dr. N. Vigneshwaran)	2014	Immobilization of antimicrobial peptides on nanocellulose for potential use in active food packaging	Degree awarded on 16 th March 2020.

ICAR-CIRCOT has signed MoUs with educational institutions to promote research and teaching in the sphere of cotton science and technology. The MoU helps in carrying out joint research work & creates an opportunity for perusing post graduate & Doctoral degree programmes. ICAR-CIRCOT has signed MoU with following educational institutions.

1. VJTI, Mumbai.
2. Dr. BSKKV, Dapoli.
3. UAS, Dharwad
4. SNTD, Mumbai
5. ICT, Mumbai

In addition, to promote the quality post graduate research and training in cutting edge areas, ICAR-CIRCOT facilitate students from NARS and other organizations to access specialized guidance and facilities as per the ICAR's **Guidelines for the students to conduct research for their degree programmes as trainees at ICAR institutions.**

Institute scientists also deliver guest lectures to students of various textile related institutes on topics related to Cotton technology. Dr. Sujata Saxena, Principal Scientist and Head I/c, CBPD conducted a virtual expert session for students of National Institute of Fashion Technology, Mumbai on Natural dyes on 23rd October, 2020.



5. Linkages and Collaboration

ICAR-CIRCOT has a very important policy of maintaining linkages with various organizations at national and international level in the domain of research, education, skill development and extension. These linkages with stakeholders helps to foster research, enhance technology assessment and refinement, capacity building and eases the transfer of technology from lab to the land.

ICAR-CIRCOT continues to be a technology partner for the AICRP on Cotton and Principal investigator of Quality Research. The institute is linked to ICAR institutions and State Agricultural University involved in the cotton breeding programmes. The institute is also a part of the Central Variety Release Committee and the cotton varieties release should fulfil the CIRCOT quality norms.

The Institute's initiative to include industrial stakeholders at the project initiation stage has led to development of linkage with industrial stakeholders through signing of Memorandum of Understanding (MoU) for carrying out collaborative research and machinery development in public private partnership mode. The association with the institutional stakeholders like Cotton Corporation of India (CCI) has also been strengthened to work in participatory mode for technology development.

The Institute is the nodal centre for implementation of the Consortia Research Platform (CRP) on Natural Fibres. Under this project the linkage has been established with institutes working in the field of natural fibres such as ICAR-NINFET, Kolkata, Assam Agricultural University, Jorhat, TNAU, Coimbatore and ICAR-CSWRI, Avikanagar.

The Regional Quality Evaluation (QE) units of the institute are located within the premises of other

ICAR institutes and agricultural universities in the country. The main functioning of these units is as extension wings of the Institute. In addition to this, these units also facilitate linkages and collaboration with the host institutes.

Agri-Business Incubation (ABI) Centre and R-ABI of the Institute work towards promotion of entrepreneurship based on institute technologies as well as agriculture and allied sector innovations. These incubation centres have mentored budding agripreneurs for innovative product development, guided them in product refinement as per market needs, facilitated funding for product upscaling and establish successful ventures for commercial scale production. They have created linkages with budding entrepreneurs, industries and other institutions working towards transformation of innovative ideas into new enterprises.

International collaboration with the stakeholders of the cotton sector in the African Countries was also created by the Institute. A partnership has been established with the United National Conference on Trade and Development (UNCTAD), Geneva for promoting cotton by-products in Eastern and Southern Africa especially in Zambia, Zimbabwe, Tanzania and Uganda. In the process the linkage was also established with International Trade Centre (ITC) and COMESA.

Memoranda of understanding (MoUs) were signed for development / commercialization of Institute technologies for cotton processing and value addition to by-products with different institutions, industries and individuals.

Institute also participates regularly in the Round Robin tests for evaluation of cotton fibre quality conducted by Bremen Institute and USDA. Since past 4 years it is also participating in the inter-lab

Round test for stickiness measuring methods conducted by International Cotton Committee on Testing Methods of the International Textile Manufacturers federation (ICCTM-ITMF).

5.1 MoU Signed

Research Collaboration

1. ICAR-CIRCOT signed a MoU with Bhabha Atomic Research Centre (BARC), Mumbai on 29th October 2020 to boost the collaborative research in Quality Improvement of Cotton Cellulosic Biopolymer by Gamma Irradiation for their use in Medical and Food Industries.

Technology Incubation

2. MoU with Incubatee M/s. Fumalabs Private Limited, Gwalior for Development of Particle Boards with innovative adhesive.
3. Fourteen Memorandum of Agreements (MoAs) were signed by CIROT-R-ABI with startups and agri-preneurs for Pre-Seed and Seed Stage Funding as Grant-in-aid under RKVY RAFTAAR Scheme of DAC&FW, MOA&FW, New Delhi, Govt. of India. These fourteen startups have received total funding support of Rs. 144.5 lakh under this scheme.

Technology Commercialization

4. MoU signed with M/s. Bajaj Steel Industries Ltd, Nagpur on 31st July 2020 for the licensing of technology titled 'Gin Trash Handling System to Destroy Pink bollworm from Cotton Ginneries" for commercial scale production and marketing.

5.2 Commercial Testing Services

CIRCOT is an acclaimed NABL accredited cotton testing laboratory in India. The Institute has facilities for conducting more than 190 tests on different textile materials and cotton by-products. These facilities are extended to various stakeholders. Besides regular tests, special tests were also carried out as per demand on samples received from various government/ private organisations and universities.

During the year 2020, a total number of 42722 samples were tested at headquarters at Mumbai, GTC Nagpur and quality evaluation units at Coimbatore, Dharwad, Guntur, Sirsa and Surat. Total revenue generated through commercial testing during the year 2020 was ₹ **27580703/-**.

The Institute maintains liaison with different institutions including private organizations and entrepreneurs and strives to meet their technological needs by offering various other need based services and generates additional revenue through the activity.

Table 5.1 Number of Paid Samples Tested and Revenue Generated

Test Centre	No. of Samples Tested	Revenue Generated (Rs)
Mumbai	4656	3333231
Nagpur	31136	21568426
Coimbatore	5521	1484388
Dharwad	--	14396
Guntur	268	26904
Sirsa	872	1128649
Surat	269	24709
Total	42722	27580703

Table 5.2 Tests Conducted and Clientele

Test	clients
AAS	ICAR-Central Sheep and Wool Research Institute, Avikanagar
AFM	Central Pulp & Paper Research Institute, Saharanpur U.P. ICAR-National Institute of Natural Fibre Engg.&Tech, Kolkata
Anti-bacterial Activity	Director, MGIRI, Wardha
BET	Institute of Chemical Technology, Mumbai V.J.T.I., Mumbai Ultrafine Products Pvt. Ltd., Dombivali Naari Pharma Pvt. Ltd., Pantnagar V. G. Vaze College, Mumbai
Bandage Testing	Medii Heal Solutions, Nagpur
FTIR	Central Pulp & Paper Research Institute, Saharanpur U.P.
Free Gossypol	Noveltech Feeds Pvt. Ltd., Worli, Mumbai
Instron	European Textile Chemical Corporation, Hosur, T.N. Dept of Clothing & Textiles, College of Home Science, Pantnagar
Kawabata	ICAR-Central Sheep and Wool Research Institute, Avikanagar Grasim Industries Limited, Navi Mumbai
Paper testing	Shivaji University, Kolhapur Mumbai University Press, Mumbai
Particle size Analysis	Central Pulp & Paper Research Institute, Saharanpur U.P. Watson Pharma Pvt Limited, Mumbai
SEM	Bharati Vidyapeeth College, CBD Belapur TUV SUD South Asia Pvt. Ltd. Watson Pharma Pvt Limited V.J.T.I., Mumbai NMIMS SPPSPTM, Vile Parle Rubicon Research Pvt. Ltd., Ambernath ICAR-National Institute of Natural Fibre Engg.&Tech, Kolkata Institute of Chemical Technology, Mumbai Indoco Remedies Limited, Navi Mumbai Gangwal Chemicals Pvt. Ltd., Thane Central Pulp & Paper Research Institute, Saharanpur U.P.
Shear Strength	Institute of Chemical Technology, Mumbai
Total Gossypol	Noveltech Feeds Pvt. Ltd., Worli, Mumbai Chhattisgarh State Co-Op. Marketing Federation Ltd., Durg
TOC	Institute of Chemical Technology, Mumbai
UPF	J. D. Birla College, Kalyan ICAR-National Institute of Natural Fibre Engg.&Tech, Kolkata

5.3 Linkage with BIS

Director and scientists of the institute have been contributing to the development and review of the test methods & standards in the field of textiles as members/chairman in various committees of the Bureau of Indian Standards

(BIS). During the year 2020, membership of the institute scientists to various BIS committees is listed below. Dr. Sujata Saxena, Principal Scientist, has been nominated by BIS to be a member of the TC 38 (Textiles) Committee of the ISO.

BIS Committee Name	Name of Member & Designation	Role
Physical Methods of Test (TXD 01)	Dr P G Patil, Director	Chairman
	Dr Pradeep Mandhyan, Principal Scientist	Principal
	Dr T Senthilkumar, Scientist	Alternate
Chemical Methods of Test (TXD 05)	Dr Sujata Saxena, Principal Scientist	Principal
	Dr A S M Raja, Principal Scientist	Alternate
Textiles Speciality Chemicals & Dyestuffs (TXD 07)	Dr (Smt.) Sujata Saxena , Principal Scientist	Principal
	Dr A S M Raja, Principal Scientist	Alternate
Textile Machinery and Accessories (TXD 14)	Dr V G Arude, Senior Scientist	Principal
	Dr T Senthil Kumar, Scientist	Alternate
Man-made Fibres, Cotton and their Products (TXD 31)	Dr P K Mandhyan, Principal Scientist	Principal
	Dr A Arputharaj, Scientist	Alternate
Technical Textiles for Agrotech Applications (TXD 35)	Dr N Vigneshwaran, Principal Scientist	Principal
	Dr P K Mandhyan, Principal Scientist	Alternate
Technical Textiles for Sportech Applications (TXD 37)	Dr A Arputharaj, Scientist	Principal
	Dr P K Mandhyan, Principal Scientist	Alternate
Technical Textiles for Mobiltech Applications (TXD 38)	Dr G Krishna Prasad, Scientist	Principal
	Dr A Arputharaj, Scientist	Alternate
Technical Textiles for Clothtech Applications including Narrow Fabrics and Braids (TXD 39)	Dr P Jagajanantha, Scientist	Principal
	Dr T Senthilkumar, Scientist	Alternate
Composites and Speciality Fibres (TXD 40)	Dr. Ashok Kumar Bharimalla, Sr. Scientist	Principal
	Dr P Jagajanantha, Scientist	Alternate

BIS Committee Name	Name of Member & Designation	Role
Textiles Division Council (TXDC)	Dr P G Patil, Director	Principal
	Dr P K Mandhyan, Principal Scientist	Alternate

Four new BIS standards IS 17430, IS 17431, IS 17432 and IS 17433 on identification of natural dyes Canna flowers, Balsam flowers, Tectona

leaves and Arjun bark respectively were published in 2020 through TXD 07 committee wherein institute provided valuable inputs.

5.4 Linkages with Institutions through consultancy projects

- VITI, Mumbai, Maharashtra
- Assam Agricultural University, Jorhat, Assam
- M/s Atul Limited, Valsad, Gujrat
- Nirmala Niketan, New Marine Lines, Mumbai
- Bajaj Steel Industries Ltd., Nagpur, Maharashtra
- M/s. Molbio Diagnostics Pvt. Ltd., Bengaluru, Karnataka
- Central Silk Board, Bengaluru, Karnataka
- CSUA&T, Kanpur, UP
- M/s. MMP filtration Pvt. Ltd, Ahmedabad, Gujarat
- M/s. Amarnaath Engineering, Coimbatore, Tamil Nadu
- Tamil Nadu Agricultural University, Coimbatore
- M/s. Bajaj Steel Industries Limited, Nagpur
- Bhabha Atomic Research Centre, Mumbai
- M/s. Fumalabs Private Limited, Gwalior, MP



5.5 Innovation Excellence Indicator

Institute participated in the exercise to determine Innovation Excellence Indicators for public funded R&D organisations initiated by the Office of the Principal Scientific Advisor to

GOI under 'Applied reserach' and 'Services and research' categories. Dr. Sujata Saxena, Principal Scientist and Head I/c, CBPD was nodal officer for this exercise.

6. AWARDS AND RECOGNITION

Sardar Patel Outstanding ICAR institution Award 2019

During the occasion of 92nd Foundation Day and Award Ceremony of the Indian Council of Agricultural Research (ICAR) held on 16th July, 2020 through Video Conferencing, the prestigious Sardar Patel Outstanding ICAR Institution Award for the year 2019 was conferred upon ICAR-CIRCOT, Mumbai. The award carries a cash prize of Rs. 10 Lakhs, award citation and certificate. The award is for significant contribution of ICAR-CIRCOT towards the research and development of various technologies in the field of Post-Harvest Processing and Value Addition to Cotton and Utilization of its By-Products. The institute has commercialized various developed technologies through incubation, promotion of start-ups, skill

development and entrepreneurship development programmes and offered prompt commercial testing services to stakeholders.

Dr. P.G. Patil, Director of the institute received the award virtually from Shri Narendra Singh Tomar, Hon'ble Union Minister for Agriculture & Farmers Welfare, Government of India. Dr. P. G. Patil congratulated all the staff members of CIRCOT for their untiring work which led to bagging the award.

During the occasion two technologies developed by the institute through incubation centre namely innovative Lysimeter for on-farm water management and Cotton interlined sleeping bags for better comfort were also released.



ISAE Team Award-2019 for remarkable research work

A team of ICAR - CIRCOT Scientists comprising of Dr. P. G. Patil, Director of the institute and Dr. S. K. Shukla, Dr. V. G. Arude, Dr. V. Mageshwaran, Dr. C. Sundaramoorthy, Dr. P. S. Deshmukh and Dr. A. K. Bharimalla has been bestowed with ISAE Team Award-2019 for their remarkable research work for the project 'Utilization of Ligno-Cellulosic

Fibre Based Biomass as Renewable Energy for Rural and Industrial Applications' carried out under Consortia Research Platform (CRP) Project on Natural Fibres. The award was conferred upon the scientist during 54th ISAE Convention and International Symposium held at Pune on 7th January, 2020



Jawaharlal Nehru Award

Dr. Ashok Kumar Bharimalla, Senior Scientist of the Institute has been awarded Jawaharlal Nehru Award for P.G. Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2019 in the category of Agricultural Engineering for his thesis on "Preparation of Nanocellulose by Chemo-Mechanical Process and its Application to Improve Mechanical Properties of Kraft Paper".

Young Scientist Award

Dr. Manoj Mahawar, Scientist received Young Scientist Award from VDGGOOD Professional Association, Tamil Nadu.

Best Start up Award 2020

ICAR-CIRCOT-RKVY-RAFTAAR incubate Shri K. K. Anand (Rubber Engineers Enterprise) received the Best Start-up award 2020 by KRISHIK, An incubator of UAS, Dharwad on 25th February 2020.



Natural Fibre Reinforced Rubber Pots



Best Paper Award

- Article entitled, 'Nanotechnological approaches for synthesis of Sulphur nanoparticles' authored by Bharimalla, A. K, Patil, P. G, Palkar, J and Mahawar M. K was awarded with Best Article Award by the Agriculture & Food: E-Newsletter magazine (ISSN: 2581 8317).
- Dr. P. Jagajanantha, scientist received the Best Paper award for the paper entitled "Heat Generating Smart Garment using Conductive Yarn" presented in International Virtual Conference on Applied Science, Technology Management And Language Studies (ASTMLS) organised by Sona College of Technology, Salem on 11th & 12th December, 2020.
- Manoj Kumar and Charanjit Kaur "Optimizing the extraction process of natural antioxidants from punica granatum peel using microwave-assisted extraction: a value addition approach" presented by Dr. Manoj Kumar in the National seminar on Smart Horticulture at Jhalawar, Rajasthan on 30th January 2020. Received first place in oral presentation.

Lead / Invited Presentations

Topic	Event / Organizer / Venue	Delivered by
Invited Paper "Business Perspective and Entrepreneurship Opportunities in Cotton Stalk By-product Based Industry in India"	"Cotton Production Technologies in next decade: Problems & Perspectives" held at OUAT, Bhubaneswar during 22-24 January, 2020	Dr. V. G. Arude
invited paper titled 'Cotton based Medical Textiles'	Seminar on Business Opportunities in Medical Textiles organized by South Gujarat Productivity Council, Surat, Gujarat on 17 th February, 2020	T. Senthilkumar
Invited Lecture	National Conference on Omics for Food, Health and Environment (OFHE-2020) held at DDU Gorakhpur University, Gorakhpur during 14-15 February 2020	Dr. K. Pandiyan
Invited Lecture "Role of Agri-Business Centre in Entrepreneurship Development: A Case of ICAR-CIRCOT"	21 days National Innovative Training Programme (NITP-2020) on "Recent Technologies for Agribusiness Management and AGri-Entrepreneurship" organised by NADCL, J&K and Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, MP on 27 th October 2020	Dr. C. Sudaramoorthy

7. PUBLICATIONS

7.1 Research papers

1. Kumar, Manoj, Dahuja, Anil (2019) Cellulase enhances anthocyanin and phenolic content in black carrot juice, *Indian Journal of Horticulture*, 76 (4), pp. 749-751 (NAAS rating 6.11)
2. Chavan, S, Sarangdhar, V, Vigneshwaran, N (2020) Toxicological effects of TiO₂ nanoparticles on plant growth promoting soil bacteria, *Emerging Contaminants*, 6, pp. 87-92
3. Arude, V. G, Deshmukh, S. P, Shukla, S. K, Patil, P. G (2020) Assessment of strength of attachment of cotton fibre to seed, *Journal of Cotton Research and Development*, 34 (1), pp. 1-9 (NAAS rating 4.69)
4. Sardar, Ashtashila, Satankar, Varsha, Jagajanantha, P. and Mageshwaran, V. (2020) Effect of substrates (cotton stalks and cotton seed hulls) on growth, yield and nutritional composition of two oyster mushrooms (*Pleurotus ostreatus* and *Pleurotus florida*), *Journal of Cotton Research and Development*, 34 (1) 135-145. (NAAS rating 4.69)
5. Jalgaonkar, K, Mahawar, M. K, Bibwe, B, Kannaujia, P (2020) Postharvest Profile, Processing and Waste Utilization of Dragon Fruit (*Hylocereus Spp.*): A Review, *Food Reviews International*. DOI: 10.1080/87559129.2020.1742152 (NAAS rating 9.93).
6. Prabu, G. T. V, Dhurai, Bharathi (2020) A Novel Profiled Multi-Pin Electrospinning System for Nanofiber Production and Encapsulation of Nanoparticles into Nanofibers, *Scientific Reports*, 10:4302 (NAAS rating 10.01)
7. Prabu, G. T. V, Dhurai, Bharathi, Saxena, Ayush (2020) Influence of high voltage polarity in multi-pin upward electrospinning system on the Fibremorphology of poly (vinyl alcohol), *Journal of Polymer Research*, 3/2020.
8. Mahawar, M. K, Jalgaonkar, K, Bibwe, B (2020) Development of composite mechanical peeler cum juice extractor for kinnow and sweet orange, *Journal of Food Science and Technology*, 57, pp. 4355-4363 (NAAS rating 7.85)
9. Arude, V. G, Deshmukh, S. P, Patil, P. G, Shukla, S. K (2020) Single Locking Cotton Feeder for Enhancing Ginning Efficiency of Double Roller Gin, *Agricultural Mechanization in Asia, Africa and Latin America (AMA)*, 51 (1), pp. 24-28 (NAAS rating 6.15)
10. Arude, V. G, Deshmukh, S. P, Patil, P. G, Shukla, S. K (2020) Influence of single locking of cotton bolls on ginning performance of double roller gin for short staple cotton, *Journal of Cotton Research and Development*, 34 (2), pp. 278-290 (NAAS rating 4.69)
11. Krishna Prasad, G, Senthilkumar, T, Raja, A. S. M, Patil, P. G, Ashtaputre, Nandita M, Vigneshwaran, N (2020) Cotton Based Bioactive Wound Dressing Material with High Absorbency and Antibacterial Activity, *Indian Journal of Fiber & Textile Research*. (NAAS rating 6.51)
12. Kumar, V, Patil, P. G, Sundaramoorthy, C (2018) Cotton and Man-made Textile sector in India — A Curtain Raiser and Relevant Environment Issues, *Cotton Research Journal*, 9(1), pp. 1-7 (NAAS rating 3.45)

13. Patil, P. G, Mandhyan, P. K, Sundaramoorthy, C, Arputharaj, A (2018) Challenges in Asian Cotton Fibre Quality and Future Requirement, Cotton Research Journal, 9(1), pp. 8-13 (NAAS rating 3.45)
14. Shaikh, A. J, Patil, P. G, Shukla, S. K, Mageshwaran, V, Ambare, M. G (2018) Supply Chain and Value Addition of Cotton Byproducts in Asia, Cotton Research Journal, 9(1), pp. 14-19 (NAAS rating 3.45)
15. Ghadge, S. V, Shukla, S. K, Satankar, Varsha, Patil, D. U, Shirsath, B. V (2018) Performance Evaluation of Bajaj Boll Opener for Cleaning and Opening of kawdi Cotton in Ginneries, Cotton Research Journal, 9(1), pp. 20-23 (NAAS rating 3.45)
16. Krishna Prasad, G, Mageshwaran, V, Guruprasad, R, Arputharaj, A, Senthilkumar, T, Patil, P. G, Jadhav, R. K (2018) Mechanical and Chemical Processability of Cotton / Kapok Blends, Cotton Research Journal, 9(1), pp. 24-26 (NAAS rating 3.45)
17. Jagajanantha, P, Mandhyan, P. K, Krishna Prasad, G, Patil, Sharmila, Senthilkumar, T, Arputharaj, A, Patil, P. G, , (2018) Core Spun Yarns for Warm Clothing, Cotton Research Journal, 9(1), pp. 27-29 (NAAS rating 3.45)
18. Kambli, N. D, Deshmukh, R. R, Basak, S, Patil, P. G, Mandhyan, P. K, Raja, A. S. M, Arputharaj, A, , (2018) Comparative Study of Physico-chemical Characteristics of Cornhusk Fibre with Cotton, Cotton Research Journal, 9(1), pp. 30-34 (NAAS rating 3.45)
19. Senthikumar, T, Bharimalla, A. K, Sundaramoorthy, C, Patil, P. G, Vigneshwaran, N (2018) Mechanical Properties of Cotton Stalk Micro Particles and Fibrillated Coir Fibre Reinforced Epoxy Composites, Cotton Research Journal, 9(1), pp. 35-39 (NAAS rating 3.45)
20. Deshmukh, P. S, Bharimalla, A. K, Patil, P. G, Arude, V. G, Sundaramoorthy, C, Kamble, D. U, Jadhav, A. R, Chandrika Ram, (2018) ICAR-CIRCOT's Training on Quality Evaluation of Cotton: An Analysis for 2014-17, Cotton Research Journal, 9(1), pp. 40-43 (NAAS rating 3.45)
21. Krishna Prasad, G, Raja, A. S. M, Senthilkumar, T, Vigneshwaran, N, Patil, P. G. (2018) Characteristic Analysis of Commercial Wound Dressings, Cotton Research Journal, 9(1), pp. 44-46 (NAAS rating 3.45)
22. Basak, S, Saxena, Sujata, Raja, A. S. M, Patil, P. G (2018) Sustainable Fire Retardancy of Cellulosic Materials by Application of Plant Bio-macromolecules, Cotton Research Journal, 9(1), pp. 47-50 (NAAS rating 3.45)
23. Kumar, Manoj, Potkule, Jayashree, Saxena, Sujata, Patil, P. G (2018) Value-addition of Cottonseed: Protein Extraction, Functional Characterization and its Application, Cotton Research Journal, 9(1), pp. 51-57 (NAAS rating 3.45)
24. Kadam, D. M, Kaur, Amanpreet (2018) Review on Natural Fibers Based Nanocomposite Materials: Part – I, Cotton Research Journal, 9(1), pp. 79-91 (NAAS rating 3.45)
25. Kannaujia, P. K, Asrey, R, Singh, A. K, Mahawar, M. K, Bhatia, K (2020) Evaluation of postharvest quality attributes of gum arabic and fruwash coated summer squash, Indian Journal of Horticulture, 77(2), pp. 394-397 (NAAS rating 6.11)
26. Raja, A. S. M, Arputharaj, A, Senthilkumar, T, Saxena, Sujata, Patil, P. G (2020) Dyeing of cotton with reactive dyes using pre-treated sea water, Indian Journal of Fibre & Textile Research, 45(3), pp. 319-325 (NAAS rating 6.51)

27. Raja, A. S. M, Arputharaj, A, Krishna Prasad, G, Saxena, Sujata, Patil, P. G (2020) Challenges in dyeing of cellulose with reactive dyes and practical sustainable feasibility, *Chemical Management in Textiles and Fashion*, 79.
28. Senthilkumar, T, Bharimalla, A. K, Sundaramoorthy, C, Patil, P. G, Vigneshwaran, N (2020) Fibrillation of Coconut Fibers by Mechanical Refining to Enhance Its Reinforcing Potential in Epoxy Composites, *Fibers and Polymers*, 21, pp. 2111-2117 (NAAS rating 7.44)
29. Dongarwar, Nupur, Parate, Himani, Satankar, Varsha, Palaniappan, Jagajanantha, Kuppasamy, Pandiyan and Vellaichamy, Mageshwaran, "Simultaneous bioethanol production and lignin and cellulose fractionation from cotton stalks: A bio-refinery approach", *Research Journal of Biotechnology*, Vol. 15 (11), November (2020) (NAAS rating 5.00)
30. Sundaramurthy, V. T. and Saxena, Sujata (2020) The Environment and Textile Industry-Friendly Hirsute Cotton Variety, *Indica. International Journal of bio-resource and Stress Management*, p 451 – 455, Published online: 20 Nov 2020 (NAAS rating 4.65) DOI: <https://doi.org/10.23910/1.2020.2151d>
31. Chavan, S., Vigneshwaran, N (2020) Shifts in metabolic patterns of soil bacterial communities on exposure to metal engineered nanomaterials, *Ecotoxicology and Environmental Safety* 189, 110012, 1 (NAAS rating 10.53)
32. Sahu, P. K., Singh, S., Gupta, A., Singh, U. B., Paul, S., Paul, D., Pandiyan, K., Singh, H. V., Saxena, A.K. (2020). A simplified protocol for reversing phenotypic conversion of *Ralstonia solanacearum* during experimentation. *International Journal of Environmental Research and Public Health*, vol. 17(12): 4274. (NAAS rating 8.47)
33. Pandiyan, K., Kushwaha, P., Bagul, S. Y., Chakdar, H., Madhaiyan, M., Krishnamurthi, S., Kumar, P., Karthikeyan, N., Singh, A., Kumar, M., Singh, U. B., Saxena, A. K. (2020). *Halomonas icarae* sp. nov., a moderately halophilic bacterium isolated from soils of Pentha beach, India. *International Journal of Systematic and Evolutionary Microbiology* (NAAS rating 8.17) <https://doi.org/10.1099/ijsem.0.004611>
34. Meena VS, Jalgaonkar K, Mahawar MK, Bhushan B, Bibwe B and Kashyap P. (2020). Optimization of process variables for preparation of pomegranate juice-fortified aonla candy. *Current Science*, 118 (1) : 114-118. (NAAS rating 6.76)
35. Kamat V, Sisodiya JH, Mahawar MK, Jalgaonkar K (2020). Determination of some physical properties of Plum (cv. Kala Amritsari) fruits. *International Journal of Chemical Studies*, 8(3):225-228. (NAAS rating 5.31)
36. Satankar, M., Patil, A. K., Kautkar, S. and Kumar, U. 2020. Pearl Millet: A Fundamental Review on Underutilized Source of Nutrition. *Multilogic in Science*. X(XXXIV): 01-04 (NAAS rating 5.20)
37. Patil, A. K., Satankar, M., Kautkar, S. and Raj, R. 2020. Cloud Point Extraction: A Novel Approach for Extraction of Bioactive Compounds from Fruit and Vegetable Waste. *Chemical Science Review and Letters* 9(34): 324-328 (NAAS rating 5.21)
38. Chaurasia, Himanshushekhar, Shah, Nawajul Islam, Sonica Priyadarshini, Rajeev Kumar and Md. Asif Khan (2020) Development of

Android based Crop Advisory Application for Seed Spices, *Int. J. Curr. Microbiol. App. Sci.*, 9(3): 904-913, (NAAS rating 5.38) <https://doi.org/10.20546/ijcmas.2020.903.106>

39. Sharmaa, Kanika, Guleriaa, Sanjay, Razdanb, Vijay K., Vikash Babu (2020) Synergistic antioxidant and antimicrobial activities of essential oils of some selected medicinal plants in combination and with synthetic compounds, *Industrial Crops & Products*, 154, 112569 <https://doi.org/10.1016/j.indcrop.2020.112.569> (NAAS Rating 10.19)

7.2 Book Chapters

1. N. Vigneshwaran and A. Arputharaj, Functional Finishing of Cotton Textiles Using Nanomaterials, In: *Advances in Functional Finishing of Textiles*, 43-56, 2020.
2. Akshay Dheeraj, Sapna Nigam, Shbana Begam, Sanchita Naha, Salam Jayachitra Devi, Himanshu Shekhar Chaurasia, Dilip Kumar, Ritika, S.K. Soam, N. Srinivasa Rao, Alka Arora, P.D. Sreekanth and V.V. Sumanth Kumar, Role of Artificial Intelligence (AI) and Internet of Things (IoT) in Mitigating Climate Change, In: *Climate Change and Indian Agriculture: Challenges and Adaptation Strategies* published by ICAR-NAARM, Rajendranagar, Hyderabad-500 030, Telangana, India

7.3 Paper Presentations

1. Dr. V. G. Arude, presented an INVITED PAPER entitled 'Business Perspective and Entrepreneurship Opportunities in Cotton Stalk By-product Based Industry in India' in "Cotton Production Technologies in next

decade: Problems & Perspectives" held at OUAT, Bhubaneswar during 22-24 January, 2020

The following three papers were presented in the 54th Annual Convention of Indian Society of Agricultural Engineers (ISAE) and International Symposium on "Artificial Intelligence Based Future Technologies in Agriculture" at Hyatt Regency Pune from 07 - 09 Jan 2020.

2. Arude V.G., Shukla S. K Patil and P. G., 2020. Development and evaluation of cotton gin trash handling system for control of pink bollworm in ginneries presented by Dr. V. G. Arude.
3. Dattatreya M Kadam, Jagajanantha and Tushar Mahajan "Processing of Fibers for Development of Composite Materials for Sanitary Pads" presented by Dr. D. M. Kadam.
4. Manoj Kumar, Jayasree Potkule, P. G. Patil and Sujata Saxena "Functional characterization of cottonseed protein" presented by Dr. Manoj Kumar.

The following two papers were presented by Dr. Manoj Kumar in the National seminar on Smart Horticulture at Jhalawar, Rajasthan on 30th January 2020

5. Manoj Kumar, N. Vigneshwaran, T.Senthilkumar, A. K. Bharimalla, D.U.Kamble and P.G. Patil, "Valorization of lignocellulosic biomass for developing seedling trays"
6. Manoj Kumar and Charanjit Kaur "Optimizing the extraction process of natural antioxidants from punica granatum peel using microwave-assisted extraction: a value addition approach".
7. Dr. P. Jagajanantha Presented a paper "The Concept as defined by Apparel and Textile Scholars – Social Responsibility", in National Conference on 'Business Intelligence for



- Sustainable Development – NCBI 2020, held on 12th Feb. 2020 organised by S.A. Engineering College, Chennai
8. Dr. P. Jagajanantha Presented a paper “Conductive Yarn for Heat Generating Textiles”, in 1st International Conference on 'Indian Context, Nature, Science, Information Media, General Management, Humanities and Technology (INSIGHT 2020), held on 29th Feb. 2020 organised by S.A. College of Arts & Science, Chennai
 9. Dr. Sujata Saxena, Principal Scientist & Head i/c CBPD presented a paper “Potential of Cotton Textiles for pesticide protective clothing” at International conference on Functional Textiles and Clothing 2020 held at IIT, Delhi during 7-9 February, 2020.
 10. A poster on “Synthesis of Nano-Sulfur : A Potential Agricultural Input” by Dr. Manoj Mahawar was presented, in 11th Bengaluru INDIA Nano conference held at Bengaluru and during 2-4 March 2020
- Two research papers were presented in National Conference on “Role of Agricultural Engineering Innovations in Doubling the Farmers' Income” organized by the College of Agricultural Engineering, Raichur (Karnataka) during 12-14 March, 2020.
11. “Development and Evaluation of Sanitary Pad Properties” by Dattatreya M Kadam, Jagajanantha and Tushar Mahajan (Poster)
 12. “Development and Characterization of WPI Based Biopolymers Incorporated With Silver Nano-Particle” by Dattatreya M Kadam, Pranita Jaiswal, Amanpreet Kuar, Supriya Rattan (Oral Presentation)
 13. Dr. V. G. Arude, presented an invited paper titled “Business Perspective and Entrepreneurship Opportunities in Cotton Stalk By-product based Industry in India” in a webinar on 'Scope of Agricultural Entrepreneurship Development' organised by Navsari Agricultural University (NAU), Bharuch, Gujarat on 19th August 2020.
14. G. Krishna Prasad, S Periyasamy, T Senthilkumar, A. S. M. Raja, P. G. Patil & V. G. Arude presented a paper in 5th International Conference on Industrial Textiles – Products, Applications and Prospects (InduTech 2020) – Webinar titled “Chemical Surface Roughening of Nylon 6,6 and its Effect on Bonding Strength in Rubber Composites” during 21st – 23rd August 2020.
 15. T. Senthilkumar, G. Krishna Prasad, P. G. Patil, V. G. Arude, M. Murugesan and N. Vigneshwaran, Presented Paper “Production and Characterization of Organic Filler Reinforced Unsaturated Polyester Composite” in 5th International Conference on Industrial Textiles – Products, Applications and Prospects (InduTech 2020) – Webinar during 21st – 23rd August 2020.
 16. A. S. M. Raja, A Arputhraj, G Krishnaprasad, S. Saxena, and P.G Patil presented Paper in 5th International Conference on Industrial Textiles – Products, Applications and Prospects (InduTech 2020) – Webinar 21st – 23rd August 2020 on “Mosquito Repellent Finishing on Cotton Home Textiles through LBL coating with Cationic chemicals & microencapsulated citronella oil”.
 17. Dr. P. Jagajanantha Presented a paper on “Heat Generating Textile Products using Conductive Yarn” in an International Conference on Advances in Technical Textiles (ICATT-2020), Organised by Department of Textile Technology, Bannari Amman Institute of Technology, Sathyamangalam, during 24th-25th October, 2020.

7.4 Popular Articles

1. Manoj Kumar (2019), Paruthi Paal, a nutrient-rich healthy drink from cottonseed: an Indian delicacy. *Journal of Ethnic Food* 6: 32
2. Bharimalla A. K., Patil P. G., Palkar, J., Mahawar, M. K. (2020). Nanotechnological approaches for synthesis of Sulphur nanoparticles. *Agriculture & Food: E-Newsletter* 2(11):182-184.
3. Jalgaonkar K., Jagajanantha P., Arputharaj, A., Mandhyan P. K. (2020)- Recent developments in the indoor air purification technology and application methods, *Food and Scientific Reports*, November 2020, 1(1): 23-26.
4. Bharimalla AK, Mahawar MK, Patil PG (2020). Inclusive approach for strengthening of agri-business start-ups ecosystem. *Indian Farming*. 70(1):15-17
5. An article on "COVID -19 ON Indian Cotton" by C. D. Mayee, Bhagirath Choudhary, DeSouza Blaise, Prashant G. Patil was published in *The ICAC Recorder*, June 2020, Volume XXXIX, No.2, ISSN 1022-6303
6. Kannaujia, P., K., Kale, S., Indore, N., Mahawar, M., K., Bhan, C., (2020) – सब्जियों के उत्पादन में जैविक पलवार का महत्व, *फल फूल*, 41(5): 35-37
7. खेती पत्रिका, दिसम्बर 2020, कृषि में नैनोटेक्नोलॉजी के अभिनव प्रयोग: मनोज कुमार महावर, ए. के. भारिमल्ला, पी. जी. पाटील, प्राची म्हात्रे
8. A Mahapatra, J Dhakane- Lad, S Patil, M Kumar, AK Bharimalla, PG Patil (2020). The advent of nanotechnology in edible coating. *Beverage & Food World*, 47 (3), 24-27
9. Kunal Gaikwad, Senthilkumar T and Santosh HB, 'The Journey of Cotton from Seed to Fabric', *Food and Scientific Reports*, Volume: 1, Issue: 8, 2020, Page 59-62
10. Mahawar M K, Jalgaonkar K, Bhushan (2020). Processing, packaging and development of space foods. *Food and Beverage Newsletter*.
11. Bibwe B, Jalgaonkar K, Kannaujia P (2020). Canning of litchi. *Agriculture and Food E-Newsletter*, 2(6):558-559
12. Kautkar, S. and Raj R. 2020. Novel Non-thermal Food Processing Technologies for Quality Food Production" in *Readers Shelf*. 16(05): 20-23.
13. Kautkar, S., Raj, R., Patil, A. K. and Satankar, M. 2020. Ultrasound and its Applications in Food Processing. *Readers Shelf*. 16(07): 24-26.
14. Patil, A. K., Satankar, M., Kautkar, S. and Raj R. 2020. Modern Engineering Technologies: A Boon to Transform Indian Agriculture. *Readers Shelf*. 16(05). 55-57.
15. Satankar, M., Patil, A. K., Kautkar, S. and Raj, R. A Novel Extraction Techniques for polyphenols from Fruit and Their Waste Products. *Readers Shelf*. 16(12): 13-15.
16. Rajeev Kumar, Sonica Priyadarshini, Md. Asif Khan, Animesh Kumar, Pramod Kumar Moury and Himanshu shekhar Chaurasia, PRODUCTION TECHNOLOGY OF AZOLLA AS A FODDER CROP, *Marumegh: Volume 5(1): 2020*

7.5 Newspaper Articles/ Report

1. A report on "Lint based cotton marketing begins in APMC, Hinganghat, Wardha" was published in *Agrowon* dated 2nd January 2020 and *The Times of India* dated 3rd January 2020.

7.6 Other Publications

1. Annual Report 2019 (English)
2. Annual Report 2019 (Hindi)
3. Mandhyan PK, Arputharaj A, Jagajanantha P, Jalgaonkar K, Fibre quality Report- AICRP on Cotton, May 2020.
4. P. G .Patil, PK Mandhyan, A. Arputharaj “Study on weight change of cotton bales during storage” report prepared for consultancy project for Cotton Corporation of India, July 2020.
5. Schedule of Fees for Tests
7. Success Story ICAR-CIRCOT Portable Laboratory Model Gin
8. ICAR-CIRCOT Bajaj Cotton Pre-cleaner For Improved Ginning Performance & Lint Quality
9. ICAR-CIRCOT Green Crematorium (Flyer)
10. CIRCOT_LLC Baton Cotton Fabric Reinforced Rubber Baton : A Boon to Security -Police force (Flyer)
11. Dining ware & packaging material from plant waste banana - An Innovative Product of CIRCOT-R-ABI Startup

Brochures

1. Nono Zinc Oxide Production Technology
2. ICAR-CIRCOT NANOCELLULOSE PILOT PLANT (Using Eco-Friendly & Energy-Efficient Production Technology)
3. Valorizing Banana Pseudostem From Waste to Wealth
4. Naturally colour Cotton An opportunity for innovative Textile Startups
5. Empowering Women with Health & Hygiene Textiles
6. SUCCESS STORY ICAR-CIRCOT Calibration Cotton
12. Agro-Residue reinforced Natural Rubber Garden Pots A Product of ICAR-CIRCOT-ABI Centre, Mumbai
13. Nano-finished High performance Sleeping Bags A Product of ICAR-CIRCOT-ABI Centre, Mumbai
14. Training Leaflets:
 - i. Spectroscopic & Chromatographic Techniques for Material characterization
 - ii. Characterization of Material using X-Ray Diffractometer (XRD)
 - iii. Composite Material
 - iv. Instrumental Evaluation of Clothing Comfort

8. IMC, RAC and IRC Meetings

8.1 Institute Management Committee (IMC)

The Seventy Nine meeting of the Institute Management Committee (IMC) was held on 17th Dec., 2020 at 2.30a.m. on Virtual mode in the Institute. Dr. P.G. Patil, Director was in the Chair and following members were present.

- Dr. S. N. Jha, Asstt. Director General (PE), ICAR, New Delhi
- Dr. Abhijit Kar, Principal Scientist, IARI, New Delhi
- Dr. G. Balasubramani, Principal Scientist, (BIO Tech), CICR, Nagpur
- Dr. Vilas Kharche, DR, PDKV, Akola, M.S.
- Dr. L. K. Nayak, Principal Scientist (AS&PE), ICAR-NINFET, Kolkata
- Shri Dhrupatrao Sawle Patil
- Dr. (Smt) Sujata Saxena, Principal Scientist (Biochem) ICAR-CIRCOT, Mumbai
- Shri Sunil Kumar, Senior AO, ICAR-CIRCOT, Mumbai, Member Secretary

Due to Corona pandemic in the country and as per guidelines of ICAR this year IMC meeting was

conducted on virtual mode.

Some of the members could not attend the meeting due to some preoccupation and were granted leave of absence by the IMC. A detailed account of research achievements of the institute was presented and a documentary on **National Laboratory on Advance Material Characterization** was shown to the Committee.

The minutes of the 78th IMC meeting held at CIRCOT, Mumbai on 9th July, 2019 were approved by the committee. The committee expressed its satisfaction over the progress made in the settlement of audit paras of the Institute. New items purchased during 2018-19 and 2019-20 and the progress of the works under the Institute budget head were reviewed.



8.2 XXVI Research Advisory Committee (RAC)

The 26th meeting of the Research Advisory Committee (RAC) of ICAR-CIRCOT, Mumbai was held on virtual platform on 8th June 2020. Dr. N. C. Patel, Former Vice Chancellor, Junagarh Agricultural University and Anand Agricultural University and Chairman, RAC presided over the meeting. The RAC members namely Dr. M. K. Sharma, Prof. (Dr.) U. J. Patil, Prof. (Dr.) S. R. Shukla, Dr. N.N. Mahapatra, Dr. Narendra G. Shah, Shri D. B. Sawale, Dr. S. N. Jha participated in online meeting. Besides this all Heads of Division and scientist participated in the online meeting.

Dr. P. G. Patil, Director, ICAR-CIRCOT, made a presentation of major research achievements and other activities undertaken by the institute in last three years. Dr. V. G. Arude, Member Secretary, RAC, presented the Action Taken Report (ATR) on the proceedings of 25th RAC

Dr. N. C. Patel, Chairman RAC, appreciated Scientists and Director for excellent work done during last three years and wished that CIRCOT will make much more progress in next three years. He urged scientists to take this work to the national and international level and improve visibility of the institute at international level.

RAC suggested scientist to work on the research areas such as removal of contamination from seed cotton, machinery for logistic supply of cotton stalk, Cationization of cotton fibres, blending of cotton with other sustainable natural fibres, guidelines for recycling of fibres, automation in cotton post-harvest processing machinery through application of AI, IoT, sensor technology and robotics, studies to ascertain toxicological and environmental safety aspects of nano materials, standardization of an eco-friendly, efficient and economical techniques for removal of gossypol, production of edible starch from cotton stalks etc.

8.3 Institute Research Council (IRC)

120th Annual IRC Meeting

The 120th Institute Research Council (IRC) Meeting of ICAR-CIRCOT, Mumbai was held on 10th & 15th July, 2020 under the chairmanship of Dr. P.G. Patil, Director through Video Conferencing.

On the opening day, Dr. N. Vigneshwaran, PME Nodal Officer welcomed the Chairman, Scientists and Technical officers for the 120th IRC in the virtual platform. In his opening remarks, Dr. Patil stressed the role to be played by ICAR-CIRCOT to the farming community & the society at large during the COVID-19 pandemic. Also, he mentioned that there would not be any EFC/SFC approval for the year 2020-21. He emphasized that all the scientists should make proper plan to utilize the budget that is being allotted monthly otherwise the budget will be automatically lapsed as per the new direction from the Council. This was followed by presentations from Scientists on final reports of completed projects, progress of on-going research projects and new proposals for consideration of the IRC.

Further RAC suggested to document impact of five prominent institute technologies adopted by stakeholders and also organize award/prize winning competition among scientists of institute or among students and budding entrepreneurs on the occasion of upcoming centenary year celebrations of the institute in 2024. RAC suggested for mass scale advertising to popularize institute activities and technologies developed by institute through media and digital platform



Half-yearly IRC Meeting

The half-yearly Institute Research Council (IRC) Meeting of ICAR-CIRCOT, Mumbai was held on 21st & 24th December, 2020 under the chairmanship of Dr. P.G. Patil, Director in the conference hall. Outstation staff joined the meeting through virtual platform.

The progress of ongoing projects were presented by the scientists and comments and suggestions were given by the chairman and other scientists.



9. Participation in Seminars/Conferences / Meetings / Workshops

Scientists and technical staff of the institute attend the seminars / symposia / workshops / conferences at national as well as international level to present their research work and keep them abreast of the latest developments in their specific areas. Their participation in such events

and publication of proceedings / abstracts results in wider dissemination of the institute activities. The staff members also present their work and share experience and knowledge gained during the visit with fellow colleagues through formal presentations.

Table 9.1 Participation in conferences during 2020

Name of the Conference	Organizer / Venue	Date	Participants
Cotton Production Technologies in next decade: Problems & Perspectives	OUAT, Bhubaneswar	22-24 January, 2020	Dr. V. G. Arude
National conference on "Recent trends for development of functional food"	MAFSU, Nagpur	06-07 February, 2020	Dr. S. S. Kautkar
International conference on Functional Textiles and Clothing 2020	IIT, Delhi	7-9 February, 2020	Dr. Sujata Saxena
National conference on Omics for Food, Health and Environment (OFHE2020)	Department of Biotechnology, DDU Gorakhpur University	14-15 February, 2020	Dr. K. Pandiyan
International conference on Banana 2020	ICAR-NRC-Banana at Tiruchirapalli, Tamilnadu	22-25 February, 2020	Dr. A. Arputharaj
11 th Bengaluru INDIA Nano conference	Bengaluru	2-4 March, 2020	Dr. Manoj Kumar Mahawar
National Conference on "Role of Agricultural Engineering Innovations in Doubling the Farmers' Income"	College of Agricultural Engineering, Raichur (Karnataka)	12-14 March, 2020	Dr. Dattatreya M Kadam
5th International Conference on Industrial Textiles – Products, Applications and Prospects (InduTech 2020)	PSG College of Technology, Coimbatore Online	21 – 23 August 2020	Dr. P. Jagajanantha
Online International Conference on "Advances in Technical Textiles (ICATT-2020)"	Department of Textile Technology, Bannari Amman Institute of Technology, Sathyamangalam, Tamil Nadu Online	24-25 October, 2020	Dr. Kirti Jalgaonkar Dr. Sharmila Patil Dr. A. Arputharaj Dr. P. Jagajanantha

Name of the Conference	Organizer / Venue	Date	Participants
National digital conference on “Technical Textiles for Atmanirbhar Bharat”	CII and Ministry of Textiles Online	04 November, 2020	All ICAR-CIRCOT Scientists

Table 9.2 Participation in Seminars / symposia

Title	Organizer / Venue	Date	Participants
54 th Annual Convention of Indian Society of Agricultural Engineers (ISAE) and International Symposium on “Artificial Intelligence Based Future Technologies in Agriculture	Hyatt Regency Pune	07 - 09 January, 2020	Dr. P. G. patil Dr. D. M. Kadam Dr. Manoj Kumar Dr. A. K. bharimalla Dr. Jyoti Dhakane Dr. V. G. Arude Dr. P. S. Deshmukh Dr. S. V. Ghadge
National seminar on Smart Horticulture	Jhalawar, Rajasthan	30 th January 2020	Dr. Manoj Kumar Mr. D. U. Kamble
Seminar on ‘Business Opportunities in Medical Textiles’	South Gujarat Productivity Council at Nanpura, Surat, Gujrat	17 February 2020	Dr. T. Senthilkumar Dr. G. Krishna Prasad
Seminar on Opportunities for Textile Industries in Challenging Scenario	Textile Association (India), Mumbai (unit) at Hotel Fortune Park Galaxy, Vapi, Gujarat	29 February 2020	Dr. T. Senthilkumar
Webinar on "Time Series Analysis and Forecasting using Eviews"	Online	02 April, 2020	Dr. C. Sundaramoorthy
webinar on “Role of Nanotechnology in Food and Agriculture	Centre for Nanotechnology, College of Agricultural Engineering, UAS, Raichur, Karnataka, India	21 August 2020	Dr. Dattatreya M Kadam
Webinar for the nodal officers for Evaluation of Science indicators of public funded R&D organization	Office of Principal Scientific Advisor to Govt. of India Online	20 October, 2020	Dr. Sujata Saxena
“Role of Natural Fibres for Atma Nirbhara Bharat” two days technical webinar	Indian Natural Fibre Society (TINFS) in Collaboration with ICAR-NINFET, Kolkata	27-28 November 2020	Shri. G. T. V. Prabu
"ICAR-NAHEP-IDP National Webinar on Agro-Textiles for Smart Farming and Entrepreneurship Development"	University of Agricultural Sciences, Dharwad.	10 December 2020	Dr. P. G. Patil Dr. N. Vigneshwaran

one-week webinar series on "Role of technologies and automation in food processing and preservation"	Centre for Advanced Science and Technology-Centre of Excellence for Digital Farming Solutions for Enhancing Productivity by Robots, Drones and AGV'S (CAAST-DESRDA), Vasantnao Naik Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra)	14-19 May 2020	Dr. Kirti Jalgaonkar Dr. Manoj Kumar Mahawar
ISAE Webinar series-2- on Automation in Agriculture" Second webinar series	ISAE	20 May to 26 June 2020	Shri. G. T. V. Prabu
Webinar on "Understanding Spectrometric Measurements"	HANNA INSTRUMENTS	28 May 2020	Shri. G. T. V. Prabu
One week webinar on 'Innovative Food Processing Technology for Entrepreneurship Development	Anand Agricultural University, Gujarat	30 May, 2020 to 04 June, 2020	Dr. Manoj Kumar Mahawar
Webinar on –"Impact of Pandemics and Innovations in Fashion and Footwear Industry"	school of fashion design and Footwear Design of FDDI Ankleshwar, Gujarat	15 June 2020	Shri. G. T. V. Prabu
Online international students and faculty development programme on "Innovative Food Processing Technologies: Value Addition, Food Safety and Security"	Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior under IDP-NAHEP on "Reinforcement of the Brand Value on University for Designing Market ready Graduates for Entrepreneurship and Employment Generation"	29 June, 2020 to 01 July, 2020	Dr. S. S. Kautkar
10 days webinar on "Role of Nanotechnology in Food and Agriculture"	Centre for Nanotechnology, College of Agricultural Engineering, UAS, Raichur, Karnataka	20-29 August, 2020	Dr. Kirti Jalgaonkar Dr. Manoj Kumar Mahawar
Webinar on "Response Surface Methodology"	ICAR-CIAE Regional Centre, Coimbatore	28 August, 2020	Dr. S. S. Kautkar
International Webinar on "Resilience of Cotton Sector Amidst Global Pandemic"	Indian Society for Cotton Improvement (ISCI) and ICAR-CIRCOT, Mumbai	07 October, 2020	Dr. P. G. Patil Dr. C. Sundaramoorthy Dr. S. V. Ghadge Dr. Sujata Saxena Dr. Kirti Jalgaonkar

			Dr. Sharmila Patil Dr. Manoj Kumar Mahawar Dr. T. Senthilkumar
International Webinar on Nanotechnology in Agriculture and Biotechnology	Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar) in collaboration with National Higher Education Project (NAHEP)	19-21 October, 2020	Dr. S. S. Kautkar

Table 9.3 Workshops / Meetings attended

Title	Organizer / Venue	Date	Participants
National Consultative workshop on Agri startups to strengthen Agri logistics in e-NAM	Ministry of Agriculture and Farmers Welfare A P Shinde Hall, NASC, PUSA, New Delhi	21 st January 2020	Mr. Hemant Ladgoankar
Annual Review Meeting of CRP on Natural Fibres	TNAU, Coimbatore	29 th January 2020	Dr. P. G. Patil Dr. A. S. M. Raja Dr. N. Vigneshwaran Dr. A. Arputharaj
Annual meeting of AICRP on Cotton	Online	18th-19th May, 2020	Dr. P. G. Patil Dr. P. K. Mandhyan Dr. A. Arputharaj
Annual Review Meeting of CRP on Natural Fibres	Online	16 th December, 2020	Dr. P. G. Patil Dr. A. S. M. Raja PIs & Co-PIs of CRP projects
One day workshop on Technological Innovation Under CRP on Natural Fibres	ICAR-NINFET, Kolkata	21 st February, 2020	Dr A.S.M. Raja
One day online workshop on "Training Management Information System (TMIS) for HRD Nodal Officers of ICAR"	ICAR	8 th May, 2020	Dr. T. Senthilkumar
Meeting of Dyestuff and Specialty Chemicals, TXD 07 subcommittee of BIS	Manak Bhavan, New Delhi	10 th February 2020	Dr. Sujata Saxena
SFC Review Meeting	Agricultural Engineering SMD, ICAR, NASC Complex, New Delhi	24 th February 2020	Dr. P.G. Patil Dr. A.S.M. Raja, Dr. N. Vigneshwaran
BIS mobiletech textile committee TXD 38 meeting	BIS office, New Delhi	27 th February 2020	Dr. A. Arputharaj
Meeting of Composites and Specialty Fibres Sectional Committee, TXD 40 in joint session with Textile Materials	BIS office, New Delhi	29 th February 2020	Dr. A. Arputharaj

Title	Organizer / Venue	Date	Participants
for Sportech Applications Sectional Committee, TXD 37			
Meeting of "Technical Textiles for Agro-tech, TXD 35" BTS sectional committee	Bureau of Indian standards online	18 th May 2020	Dr. G Krishna Prasad
Fifteenth meeting of Agriculture and Food Processing Equipment Sectional Committee, FAD 20 of BIS	Bureau of Indian standards	22 nd May 2020	Dr. P. G. Patil Dr. V. G. Arude
15 th Meeting of Textile Machinery and Accessories Sectional Committee, TXD14	Bureau of India Standards, Mumbai	25 th June 2020	Dr. T. Senthilkumar
Meeting of Board of Studies on Textile Science and Apparel Design of SNDT University	Online	17 th June, 2020	Dr. Sujata Saxena
Meeting on "Role of Agrotextiles in National Technical Textiles Mission (NTTM)"	Organized online by Ministry of Textiles, Govt. of India	8 th September 2020	Dr. P. G. Patil Dr. Sujata Saxena Dr. A.S. M. Raja Dr. Vigneshwaran Dr. P. K. Mandhyan Dr. A. K. Bharimalla
National Oilseed Brainstorming meet	Online mode organized by the Indian Institute for Soybean Research, Indore	23-25 September 2020	Dr. Sujata Saxena
26 th Meeting of Chemical Methods of Tests, Sectional Committee, TXD 05 of BIS	BIS, organized virtually	20 th October, 2020	Dr. Sujata Saxena
Meeting regarding NABL Accreditation of ICAR-NINFET Lab under ISO 17025:201	Organized by ICAR-NINFET, Kolkatta	October, 2020	Dr A S M Raja Dr. Manoj kumar Puniya

Director's participation in Major meetings / events

- Dr. P. G. Patil, Director participated in the meeting with DDG (Engg.) and Directors of Agricultural Engineering SMD through videoconferencing on 18-03-2020.
- Dr. P. G. Patil, Director participated in the ICAR Directors conference chaired by the DG, ICAR through videoconferencing on 19-03-2020.
- Dr. P. G. Patil, Director participated in the ICAR Directors conference chaired by the DG, ICAR through videoconferencing on 10-04-2020.
- Dr. P. G. Patil, Director attended the meeting of Directors and SMD officials under the chairmanship of DDG (AE) on 30 April, 2020 through videoconferencing. The scientists and technical officers associated with PME cell were also present during the meeting.
- Dr. P. G. Patil, Director attended Annual AICRP on Cotton workshop conducted through

videoconferencing during 18-19 May 2020 along with Dr. P. K. Mandhyan, Head in-charge, QEID, and Scientists and Technical Officers of QEID.

- Dr. P. G. Patil, Director, ICAR-CIRCOT conducted a web seminar on “ICAR-CIRCOT's Nanotech Research Initiatives and contributions in Value Creation and Entrepreneurship Development in Cotton Sector” for students of Food Chemistry and Technology Laboratory, Agricultural and Food Engineering Department, IIT, Kharagpur on 3rd October 2020
- Dr. P. G. Patil, Director attended ICAR Regional committee II Meeting on 8th October 2020 through virtual platform.

Visits to Regional units and other Institutions

- Dr. P. G. Patil, Director visited regional unit at Dharwad on 20th January 2020 to review the activities. Dr. Patil also had a meeting with the Vice Chancellor of University of Agricultural Sciences, Dharwad to discuss about the facilities required for the CIRCOT unit
- Dr. P. G. Patil, Director attended the 34th Convocation ceremony of Dr. P.D.K.V., Akola held on 5th February 2020 as Executive Council Member of Dr. P.D.K.V., Akola, nominated by Hon'ble Director General, ICAR, New Delhi
- Dr. P. G. Patil, Director visited Ginning Training Centre of ICAR-CIRCOT at Nagpur on 6th February 2020 and delivered a lecture on the topic “Post-Harvest Processing of Cotton & Value Addition to by-product” to the farmer trainees attending training during the period 3-6 February 2020
- Dr. P. G. Patil, Director visited regional unit at Coimbatore on 30th January 2020 to review the activities
- Dr. P. G. Patil, Director, ICAR-CIRCOT delivered the Inaugural Address in "ICAR-NAHEP-IDP National Webinar on Agro-Textiles for Smart Farming and Entrepreneurship Development" on 10th December 2020, organized by University of Agricultural Sciences, Dharwad.
- Dr. P. G. Patil, Director, CIRCOT attended Maharashtra Agricultural Universities 48th Joint AGRESKO Meet 2020 online on 27th October 2020

10. Events Organized

Seminars / Workshops / Conference / Meetings / Lectures

Annual Review Meeting of CRP on Natural Fibres

Consortia Research Project (CRP) on Natural Fibres is being implemented by the institute as Lead centre. Annual Review Meeting of CRP on Natural Fibres at TNAU, Coimbatore during 28th- 29th January, 2020 under chairmanship of DDG (Engg.)

Internal review workshop of CRP on Natural Fibres

One day internal review workshop of CRP on Natural was organized at ICAR- CIRCOT on 16th January, 2020. Principal Investigators of different projects from lead as well as cooperating centres namely ICAR-NIRJAFT, Kolkata, Assam Agricultural University, Jorhat, Tamilnadu Agricultural University, Coimbatore participated in the workshop. Dr. P.G. Patil, Director, ICAR-CIRCOT and Nodal officer for CRP-Natural Fibre project chaired the technical session and two distinguished scientists namely Dr. A.J. Shaikh, former director of CIRCOT and Dr. R.P. Nachane Former Head, QEID, CIRCOT acted as subject experts for the review meeting. Totally 13 projects presentation were made during the workshop by the PIs of the projects. The products developed under the project like pineapple fibre made shawl, yak-jute blended jackets, salt free dyeing technology based shirts etc. were shown to the chairman and experts.



CRP Internal Review Meeting

ICAR-CIRCOT, the lead centre of CRP on Natural fibres organized an "Internal Review Meeting" on 16th December, 2020 to review the progress of the projects undertaken by lead and cooperative centres. during the year 2020.

Meeting of RIC

The 1st Meeting of RKVY–RAFTAAR Incubation (RIC) Committee for 2nd Cohort of CIRCOT-R-ABI was held in parts on 9th, 10th, 11th and 16th September 2020 under the chairmanship of Dr. P. G. Patil, Director, ICAR-CIRCOT, Mumbai. 2nd RIC of 2nd Cohort for Pre-Seed stage funding & Seed-Stage funding held on 19th & 21st December 2020.

FMS training cum workshop



ICAR-Central Institute for Research on Cotton Technology (CIRCOT), Mumbai had organised a one day Workshop cum Training programme on ICAR Financial Management System (FMS) on 4th Jan, 2020 for the finance and administrative personnel of ICAR institutes. Total 65 nos. of participants from 16 ICAR Institutes including regional stations located at Maharashtra, Gujarat, Goa & Kerala had participated in the Workshop.

Dr. P.G. Patil, Director, CIRCOT, Mumbai welcomed Shri G.P. Sharma, Director (Fin.), ICAR, New Delhi and all the participants and opened the Workshop by his welcome remarks about the background and objective of the training session on FMS in ICAR. Shri G.P. Sharma, Director (Fin.) interacted and gave valuable inputs to all the participants on important issues especially on maintenance of the asset register, loans and advances and various other issues pertaining to the Financial Management System (FMS). Participants also expressed high appreciation for the topic and objectives of the training workshop, as very relevant to their work.

e-Office Training

e-Office support team from ICAR-IASRI visited ICAR-CIRCOT and conducted a training to the local admins and master trainers during 09th -10th January, 2020 for the implementation of e-Office in the institute. 10 staff members attended the training.

World Cotton Day International webinar



An International webinar on “Resilience of Cotton Sector amidst global pandemic” was organized to celebrate World Cotton Day by ICAR-CIRCOT, Mumbai in collaboration with the Indian Society for Cotton Improvement (ISCI) on 7th October, 2020. Dr. Trilochan Mohapatra, Secretary DARE, and DG, ICAR was the Chief Guest on the

occasion. Dr. K. Alagusundaram, DDG (Agricultural Engineering), was the Chairman and Dr. T. R. Sharma was the Guest of Honour. The delegates of the webinar include ADG's (Engineering and Crop Science), representatives from ICAC, UNCTAD, Stakeholders involved in Cotton processing and trade, researchers, academia, and students.

Seminar on Mahila Kisan Divas

Mahila Kisan Divas was celebrated on 15th October 2020. With a view to increase the active participation and empower women in the mainstream of agriculture, 15 October is being celebrated nationwide as National Women Farmers Day. On this occasion, a seminar was organized in the Institute by the Internal Complaints Committee with the theme, 'Women farmers' contribution to agriculture'

Dr. Sujata Saxena, Principal Scientist & Head i/c CBPD & Chair person of the committee welcomed all present. Dr.P.G.Patil, Director, ICAR-CIRCOT, in his presidential speech said that it is the responsibility of agricultural scientists to invent women-friendly gadgets, ergonomics-based equipment and machinery and technologies for various agricultural operations so that they should be able to do agricultural work with minimum labor and maximum ease.



Dr. Sharmila Patil, Dr. Jyoti Dhakane and Dr. Kanika Sharma Scientists at the institute expressed their views on the topic. They outlined

the objectives of organizing Mahila Kisan Divas. Expressed their views about present status of women farmers and insisted on a constant need to sensitize them for better farming practices with which they can improve their life, need of providing innovative farming techniques for upliftment of women farmers, insights on lack of equality rights in land ownership, difficulties faced by women farmer due to lack of women-friendly equipment and machinery for agricultural operations etc. They also highlighted the efforts being made by the government towards empowerment of women farmers by way of providing loans and subsidies on soft terms and also mentioned about women centric strategies and micro-finance initiatives being undertaken in that direction.

Dr. S. N. Pandey Memorial Lecture

The first Dr. S.N. Pandey Memorial lecture was jointly organized by the ICAR- Central Institute for Research on Cotton Technology (CIRCOT) and the Indian Fibre Society (IFS), Mumbai on 24th January, 2020 in the Jubilee Hall of ICAR- CIRCOT at 3.30 PM. This inaugural lecture was delivered by Mr. C. N. Sivaramakrishnan, Industry Consultant & Chartered Colourist on Technological Options for Sustainable Processing of Textiles.

Dr. S. N. Pandey was the former Director of ICAR-CIRCOT and founder chairman and president of IFS. He was an excellent researcher with more than 400 publications and many patents to his credit and his main field of interest was textile processing and finishing and by product utilization. He was an able administrator also and at one point of time, he was successfully holding the charge of the Director of three

ICAR institutes viz. JTRL, Kolkata, CRIJAF, Barrackpore and CIAE, Bhopal. Though he was the Director of CIRCOT for a short time of 5-6 months only but he could achieve many things like formation of Indian Fibre Society and organization of a seminar in a five star hotel without any funding support from the ICAR/institute. The speaker Mr. C. N. Sivaramakrishnan is well-known textile consultant with long experience in wet processing and Speciality Chemicals Manufacturing Industries. Mr. Sivaramakrishnan in his lecture spoke at length about sustainability and the technological advances today available to the textile processors to make this industry more sustainable. He said that use of ultra-low liquor ratio machines and combining of two or more processing steps can result in substantial savings of resources. Recycling of process chemicals and water and their reuse are the need of hour in view of the zero liquid discharge norms prescribed by the regulations. Eco regulations for the finished products are also getting stricter and due to the fragmented nature of textile value chain, caution has to be exercised in procurement of inputs at each and every step of manufacturing process to eliminate the risk of inadvertent incorporation of banned substances such as phthalates, heavy metals etc. in textiles. There was good participation from textile researchers in the programme.



Accreditation Audits

NABL Accreditation Renewal

External audit for Renewal of NABL Accreditation to the institute was successfully conducted on 4th & 5th February, 2020 with Mr. S.P Singh as lead assessor and Mr. R. A. Shaikh as technical assessor and no non-conformities were observed

ISO 9001:2015 Recertification Audit

Bureau of Indian Standards (BIS) has conducted a re-certification audit for the ISO 9001:2015 quality management system of the Institute during 11th and 12th of December 2020. Three auditors, Mr. P. K. Kush (Lead Auditor), Mr. Tilak Raj (Auditor) and Mr Jitu Adhyapak, (Auditor – in Bureau of Indian Standards (BIS) has conducted a re-certification audit for the ISO 9001:2015 quality management system of the Institute during 11th and 12th of December 2020. Three auditors, Mr. P. K. Kush (Lead Auditor), Mr. Tilak Raj (Auditor) and Mr Jitu Adhyapak, (Auditor – in – Training) conducted the audit through virtual mode covering all the Divisions & Sections under the scope for the effective implementation of ISO 9001:2015 standard. Based on the audit conducted by the way of verification of

documents, records, interaction with the concerned officers and verification of system of internal audit and management review and physical evidences collected, the auditors concluded that institute is implementing documented quality management systems as per IS/ISO 9001:2015 effectively and also demonstrated the continual improvement in systems and processes. During the closing meeting of audit on 12th December 2020, the lead auditor Mr. P.K. Kush appreciated the institute for effective implementation of QMS and recommended the renewal of Institute license under IS/ISO 9001:2015 for the period of three years.



Other Events

Celebration of Foundation Day

ICAR-CIRCOT celebrated its 97th Foundation Day and Agricultural Education Day in a virtual platform on 3rd December 2020.

Dr.P.G.Patil Director, ICAR-CIRCOT welcomed the dignitaries for the function and highlighted major achievements and congratulated all the staff members of the institute for their committed work.

Dr. K. Alagusundaram, Deputy Director General (Agrl, Engg) was the Chief Guest on the occasion. The Chief Guest congratulated the Director and staff for bagging “Sardar Patel Outstanding ICAR Institute Award – 2019”. He also inaugurated the state of the art 'National Laboratory for Advanced Material Characterization' during the occasion and expressed his satisfaction on creation of such unique centralized facility.

Dr. S.N. Jha, ADG (PE) highlighted the achievements made by the institute in the research domain and applauded the accomplishment on revenue generation front.

Dr. K. K. Singh ADG (PE) and Directors of ICAR-CIAE, Bhopal, ICAR-NINFET, Kolkata and ICAR-CIPHET, Ludhiana were also present on the occasion and bestowed their wishes.

Former Directors of the institute Dr. K. R. K. Iyer, Dr. S. Sreenivasan and Dr. A. J. Shaikh were also present and shared their memories.



A mobile app on CIRCOT R-ABI was also launched to improve the ease of access to the potential Agripreneurs. The certificate for best employees among scientific, technical and administrative category were also accorded. The Corona warriors were also felicitated on the occasion.

Communal Harmony week

National Communal Harmony week being celebrated during 19th – 25th November, 2020. National Unity pledge was taken on 19th November, 2020 by all staff with necessary COVID precautions

Vigilance Awareness week

ICAR-CIRCOT observed Vigilance Awareness Week during 27th October to 02nd November 2020 with the theme “Vigilant India, Prosperous India”. The Integrity Pledge was administered by Dr. P. G. Patil, Director to the staff of the Institute on 27th October 2020, following necessary COVID guidelines.



A vigilance awareness lecture was delivered by Dr. Barsing K Rajput, Superintendent of Police, Maharashtra Cyber on 29th October 2020 to commemorate this occasion. Holding a doctoral degree from Tata Institute of Social Sciences and having strategic expertise in the field of cybersecurity, Dr. Rajput sensitized the audience about the need of vigilance in cyber related activities. He insisted the relevant of being vigilant in a research organization like ICAR-CIRCOT is to protect its Intellectual Property Rights and Intellectuals / Scientists. He elaborated various types of cyber-crimes with national & international examples. He stressed upon the requirement of security audit for Institute's website and online transactions. Also, he insisted to use only trusted / reliable / certified websites and apps (with limited permissions) for routine work. Finally, he summed up to rely more on social engineering than on technology to have secured transactions in this digital era.



Constitution Day

As part of continuation of Celebration of Constitution Day on the occasion of 70th Anniversary of adoption of constitution and

activities planned throughout the year up to 26th November, 2020 the institute staff read the preamble of constitution of India and constitution duties along with their family members in their respective homes on 14th April 2020.

Ambedkar Jayanti Celebration

Birth Anniversary of Dr. B R Ambedkar was celebrated by garlanding Dr. Ambedkar's photo and lighting of a candle on 14th April, 2020 by staff members who could reach the office during lockdown. As part of continuation of Celebration of 70th Anniversary of adoption of constitution staff members read the preamble of constitution of India and constitution duties along with their family members in their respective homes. Those who are in the staff quarters did it along with other staff members residing in the premises.



GTC conducted a tree plantation drive on 29th September, 2020 and an online lecture on "Gandhian Philosophy on Agriculture" on 01st October, 2020. Padma Shri Hon. Dr. Vikas Mahatme, Member of Parliament, Upper-house also planted a mango tree at GTC campus on 01st October, 2020

International Women's Day

As part of International Women's Day celebration, a lecture for ladies staff members was organized by the Internal Complaints Committee of the Institute on 11th March 2020. Advocate Ms. Mamta Bhatt delivered a lecture on 'घर और बाहरी दुनिया में महिलाओं के कानूनी अधिकार तथा परिवार और कार्यालयीन परिवेश में महिला उत्पीड़न

निवारण – Legal Rights Of Women At Home And In The Outside World And Prevention Of Harassment In Domestic And Workplace Environment'. Different issues such as gender inequality, personal liberty, legal rights over ancestral and in-law property, importance of will, sexual harassment and prevention at home & workplace, use of social media for protection were discussed. Addressing the questions asked by the attendees, she said that women should act confidently and fearlessly in social life and also at her workplace. Women should always be vigilant and take decisions more practically in personal life.

On this occasion, women personnel who received awards for their outstanding performance during the year 2019 were honored.



Workshop on Gender Sensitization

Workshop on Gender Sensitization was organized by ICAR on 15th December, 2020 to celebrate the seventh anniversary of notification of "the Sexual Harassment of women at workplace (prevention, prohibition and redressal) act 2013". Internal complaints committee of the institute along with HoDs, Lady Scientists, Lady Technical officers and Lady AAOs attended the programme online.



11. Hindi Implementation

11.1 Hindi Day / Chetana Maas/ Hindi Pakhwada 2020 celebration

ICAR- CIRCOT celebrated Hindi Day on 14th September 2021 and Hindi Fortnight during 14-28 September 2021 along with Chetana Maas for full month of September in honour of Official Language Hindi. During this period, different competitions were organized such as Hindi Essay, Hindi writing, Unicode typing, Technical Writing in Hindi and Poster Presentation to promote Hindi language use. 'The contribution of CIRCOT technologies in making farmers self-reliant' was the theme of the Presentation; for which all the posters were presented in Hindi language. Despite the Covid-19 crisis, there was enthusiastic participation from the employees for these competitions. The Chetna Maas was celebrated by using more and more Hindi in signature, noting & drafting and office correspondence.

On 14th September, the inauguration program was held under the chairmanship of Dr. P.G. Patil, Director, ICAR-CIRCOT. In his inaugural address, he said that all the languages of the country are important. But Hindi is accepted by masses as most of the Indians can speak, write and understand Hindi. The closing ceremony was on September 28, 2020. Director, in his presidential address said that it is our responsibility to use Hindi in our everyday work. He appreciated the in time activities of Official Language Hindi Cell for the implementation of Official Language. Dr. V. G. Arude, senior scientist and In-charge MPD, announced the winners. The E-certificates and the prize money in cashless form were distributed to the winners. Also, awards were

given to those employees who participated and excelled in Hindi Incentive Scheme for year 2019-20 for maximum drafting in Hindi in routine file work. Chal Vyjayanti Shield for excellent use of official language in office work for the year 2019-20 was awarded to Administration One (Personnel Section) in the Administrative category and Transfer of Technology Division in the Scientific Research category.

On 30th September, i.e., concluding day of Hindi Chetna Maas and also to commemorate the closing year of the 150th birth anniversary of Mahatma Gandhi, a combined workshop was organized with the topic; 'Father of the Nation Mahatma Gandhi and Hindi', in which Dr. Anant Shrimali, former Assistant Director, Hindi Teaching Scheme was invited. This workshop was conducted online from the institute's headquarters in which the officers and employees of the regional units at Nagpur, Dharwad, Guntur, Coimbatore, Sirsa and Surat also actively participated. Dr. Anant Shrimali in his address described how Gandhi is not just a name but an idea. Gandhi had an understanding of the ages. It was his foresight that he first understood the importance of Hindi in order to make the freedom struggle a pan India success. Hindi played an important role as an effective communication language to unite different provincial, different linguistic masses of India.

All the events were organized following Covid-19 guidelines.



Hindi week at GTC of ICAR-CIRCOT, Nagpur

Hindi Week was celebrated at Ginning Training Centre, ICAR-CIRCOT, Nagpur starting with Hindi Diwas i.e. 14th September, 2020. Hindi Week was inaugurated on 14th September, 2020 by Dr. S. K. Shukla, Officer in charge & Principal Scientist of the centre. The inauguration ceremony was held in the open lawn observing social distancing norms in accordance to the government's guidelines pertaining corona pandemic. In his presidential speech, Dr. S. K. Shukla stressed upon the importance of Hindi as the most spoken language in India. A large number of people of the nation speaks and understands Hindi. The numbers of Hindi news channels in our country surpass other languages

elucidating that most of the people of the country use Hindi as a primary mode of communication. Hindi is one of the richest languages in vocabulary. After independence, the Constituent Assembly has declared Hindi as the official language of the country. He appealed to all employees of the centre to work in Hindi. In view of the corona pandemic, greater emphasis was given to oral competitions as compared to written competitions. Dr. Shukla briefed on the competitions to be held such as: singing/reciting poetry, proper guessing, word search, extempore speech etc. At the end of the programme, Dr. S.K. Shukla thanked all the employees of the centre for their cooperation in conducting Hindi Day. All GTC staff participated in various competitions enthusiastically.

The closing ceremony of the Hindi week was held on September 21, 2020. On this occasion, Dr. S.K. Shukla, Principal Scientist, presented a brief overview of the Hindi Week celebration organized in the Centre. In his concluding speech, he said that the orders received from Head Office and Town Official Language Implementation Committee related to implementation of official language policies are strictly complied in this centre. Throughout the year, training related to ginning, official work correspondence etc. is done in Hindi Language or bilingual. As a result, the Centre has completed the target of Hindi correspondence. The cash award to the winning employees was announced by the Officer in charge.

The inauguration and closing ceremony of the Hindi Week was conducted by Mr. R. D. Shambharkar. At the end of the programme, he expressed his gratitude towards Director, CIRCOT, Mumbai and Officer Incharge, GTC as well as entire GTC staff who have assisted in making the programme a grand success.



11.2 Hindi Workshops

1. A Hindi workshop on working through ICAR e-office (आय.सी.ए.आर.ई-ऑफिस के माध्यम से कार्य) was organized for administrative staff of the institute from 11-2-2020 to 21-2-2020 and a total of 20 officers / employees participated in the workshop.
2. Dr. Mahendra Jain, Professor Hindi Teaching Scheme, CBD, Belapur conducted the Hindi workshop on the subject of Current Status and Future Of Hindi (हिंदी की वर्तमान स्थिति और भविष्य) (on 30-6-2020 for administrative officers / employees. A total of 11 officers / employees took advantage of this.
3. Online Quarterly Hindi Workshop for the staff of the institute was held on 30-9-2020. Dr. Anant Shrimali, Asst. Director, Hindi Teaching Scheme, CBD, Belapur conducted the workshop on Father of the Nation Mahatma Gandhi And Hindi (राष्ट्रपिता महात्मा गांधी और हिंदी) for all scientific, technical and administrative officers/employees. 57 officers / employees attended the workshop.
4. Dr. Rajeshwar Uniyal, Ex. Deputy Director, (Official Language), CIFE, Mumbai Scheme, gave online lecture on the topic "Official Language Implementation Prospects in

Online System" (ऑन लाईन पध्दति में राज भाषा कार्यावयन की संभावनाएं) on 18-12-2020, for all administrative officers / staff and skilled support staff, 84 officers / employees took advantage of the workshop.

5. A workshop by Dr. Anant Srimali, former Assistant Director of the Department of Official Language, Government of India on the subject of "Father of the Nation Mahatma Gandhi and Hindi" was organized on the concluding day of Hindi Chetna Maas on 30th September, 2020.



11.3 Meetings of the Official Language Implementation Committee

A total of 4 meetings were held during the year on the following dates.

1. 26-02-2020
2. 26-06-2020
3. 31-08-2020
4. 25-11-2020

City Official Language Implementation Committee Meeting

The director of the institute, Dr. P.G. Patil attended online meeting organized by Nagar Official Language Implementation Committee, Mumbai on 20-10-2020.

12. Distinguished Visitors

Hon'ble Member of Parliament Shri Sadashiv Kisan Lokhande

Hon'ble Member of Parliament Shri Sadashiv Kisan Lokhande (a member of the 17th Lok Sabha) who represents the Shirdi, Karjat Vidhan Sabha constituency in Ahmednagar district Maharashtra visited ICAR-CIRCOT, Mumbai on 20th August, 2020. He discussed about the Institute's mandate and cotton processing technologies in general. Director, ICAR-CIRCOT briefed him about the Institute and made him acquainted with technologies developed by the institute.



Shri G. P. Sharma, Director (Finance), ICAR

Shri G. P. Sharma, Director (Finance), ICAR, New Delhi visited ICAR-CIRCOT on 04th January, 2020 and participated in the "One Day FMS Training cum Workshop" as Guest speaker.



Dr. Y. G. Prasad, Director, ICAR-CICR, Nagpur

Dr. Y. G. Prasad, Director, ICAR-CICR, Nagpur visited ICAR-CIRCOT on 17th December, 2020.



Delegates from Mizoram

Nine members from Mizoram Agriculture, Horticulture, Forestry and Marketing Cooperative Society Ltd., visited ICAR-CIRCOT, on 20th February, 2020. They visited Quality Evaluation and Improvement Division and Mechanical Processing Division of the institute.



13. SWACHH BHARAT ABHIYAN

The Prime Minister, Shri Narendra Modi, launched the **Swachh Bharat Abhiyan**, a nation-wide programme on 2nd October, 2014 to fulfill Mahatma Gandhi's vision of "Clean India". ICAR-CIRCOT, Mumbai is also making all efforts in implementing Swachh Bharat Mission of the Government of India. The various activities conducted during the year 2020 were as follows:

As a part of Swachh Bharat Abhiyan and as per the instructions received from the council, a

campaign called "**Swachhta pakhwada**" was launched in ICAR-CIRCOT, Mumbai and its regional stations from **16th December to 31st December, 2020** by undertaking various activities like Swachhta pledge, organizing drawing competition, special drives on cleanliness, etc. During the programme the following activities were carried out:

Sl. No	Date	Activities
1.	16.12.2020	Display of banner at prominent places, taking Swachhta pledge, Stock taking & briefing of the activities to be organized during the Pakhwada, plantation of trees.
2.	17.12.2020	Basic maintenance: Stock taking on digitization of office records/ e-office implementation. Cleanliness drive including cleaning of offices, corridors and premises. Review of progress on weeding out old records, disposing of old and obsolete furniture's, junk materials and white washing/painting.
3.	18.12.2020	Sanitation and SWM Cleanliness and sanitation drive in the villages adopted under the Mera Gaon Mera Gaurav Programme and/or other schemes by ICAR Institutes/KVKs involving village community. Reviewing the progress made under ongoing Swachhta activities including implementation of Swachhta Action Plan (SAP) & providing at the spot solutions.
4.	19.12.2020	Sanitation and SWM Cleanliness and sanitation drive within campuses and surroundings including residential colonies, common market places. Stock taking of biodegradable and non-biodegradable waste disposal status and providing on the spot solutions.
5.	20.12.2020	Stock taking of waste management & other activities including utilization of organic wastes/ generation of wealth from waste, polythene free status, composting of kitchen and home waste materials. Promoting clean & green technologies and organic farming practices in kitchen gardens of residential colonies and at least one nearby village and proving on the spot technology solutions.
6.	21.12.2020	Campaign on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/ horticulture application/kitchen gardens in residential colonies/ 1-2 nearby villages.

7.	22.12.2020	Organising Workshops, exhibitions, technology demonstrations on agricultural technologies for conversion of waste to wealth, safe disposal of all kinds of wastes. Debate on Swachhata at the DARE/ICAR establishments, Seminars, awareness camps, rallies, street plays and expert talks
8.	23.12.2020	Celebration of Special Day- KisanDiwas (Farmer's Day)-23 December inviting farmers. Experience sharing on Swachhata initiatives by farmers and civil society officials. Felicitating farmers/ civil society officials for exemplary initiatives on Swachhata.
9.	24.12.2020	Swachhta Awareness at local level (organizing Sanitation Campaigns involving and with the help of the farmers, farm women and village youth in new villages not adopted under any scheme by Institutes/ establishments.
10.	25.12.2020	Cleaning of public places, community market places and/or nearby tourist/selected spots.
11.	26.12.2020	Fostering healthy competition:Organising competition and rewarding best offices/ residential areas/ campuses on cleanliness. Quiz, essay & drawing competitions for school children, village youth.
12.	27.12.2020	Awareness on waste management & other activities including utilization of organic wastes/ generation of wealth from waste, polythene free status.Composting of kitchen and home waste materials,promoting clean & green technologies and organic farming practices in new area.
13.	28.12.2020	Campaign on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/ horticulture application/kitchen gardens in residential colonies.Outside campuses/ nearby villages with the involvement of local/ village communities.
14.	29.12.2020	Visits of community waste disposal sites/ compost pits, cleaning and creating awareness on treatment & safe disposal of bio-degradable/ non-bio-degradable wastes by involving civil/ farming community.
15.	30.12.2020	Involvement of VIP/VVIPs in the Swachhta activities, Involvement of print and electronic media may be ensured so that adequate publicity is given to the Swachhta Pakhwada
16.	31.12.2020	Organization of press conference for highlighting the activities of Swachh Bharat Pakhwada by involving all stake holders including farmers/ VIPs/ press and electronic media.

On this occasion, on the first day i.e. on 16th December, 2020, Director administrated the oath to all the staff to maintain cleanliness of their working places and residential premises. During this period, a special cleanliness drive a major cleanliness drive was arranged at Matunga, Mumbai. Under the “Swatchh Bharat Mission” a

Swachhta Awareness campaign with emphasis on creating awareness on treatment and safe disposal of bio-degradable waste by involving civil community and visits of community wasted disposal sites / compost pits cleaning. Two community waste disposal place such as waste disposal place at Five garden and common

waste disposal place in L.N.Road, Matunga East, near Ramnarain Ruia Autonomous College were taken for this activities. A group comprising of Scientific, Technical, Supporting and contractual staff members of the Mechanical Processing Division of Institute were participated this activities. During this programme staff members were cleaned the community waste disposal area and made the instructions labels such as Biodegradable waste, non-biodegradable waste, dry waste, wet waste and pasted wherever required. Also, create the awareness to general public about the biodegradable and non-biodegradable waste and advised to collect and segregate garbage and waste and dispose of accordingly.

In total, 16 cleanliness drives were covered during the pakhawada. All the staff members of ICAR-CIRCOT, Mumbai and its regional stations participated enthusiastically in all the cleaning programmes.

Ginning Training Centre, ICAR-CIRCOT, Nagpur conducted an awareness programme on clean cotton picking and benefits of maintaining cleanliness in surroundings at village Ghorad, Tah. Sello, district Wardha on Dec 18, 2020. About 25 farmers from village Ghorad participated in this programme. On this occasion, scientists and technical officers from GTC of delivered lectures on ill effects of cotton contaminations that lowers the value of end products to a significant extent. Proper method for contamination free cotton picking was demonstrated to the farmers.

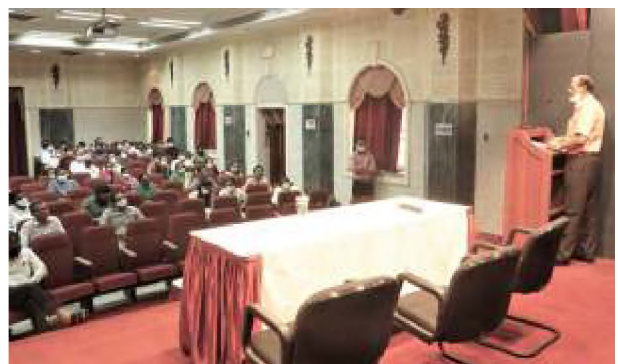
Also, a cleanliness drive was also taken up in this village by all the participants. The photographs taken, during the above mentioned activities conducted under “Swachh Bharat Abhiyan” in the institute, are attached below:



Display of Banner in office premises



Display of Banner



Director administered the oath to maintain cleanliness



Cleanliness drive in Five Garden



Aerobic composting of bio-degradable waste



Swachhta awareness programme conducted by GTC, Nagpur



Involvement of school children in Drawing competition

In addition to all these activities, the committee conducted cleanliness programme in the various divisions of the institute as listed below:

Sr. No.	Date	Division Participated in the Swachh Bharat Abhiyan
1	09/01/2020	Accounts
2	27/02/2020	QEID
3	07/03/2020	CBPD
4	28/10/2020	QEID



Cleaning programme at staff quarters premises



14. MERA GAON MERA GAURAV

Launched in 2015, the 'Mera Gaon Mera Gaurav' (MGMG) programme is one of the major initiatives of the government towards doubling the farm income by speeding up the "lab to land" process. Under this initiative, the ICAR-CIRCOT has identified and adopted 30 villages in Wardha district in Vidarbha region of Maharashtra. Six teams comprising four multidisciplinary scientists in each team have been formed and five villages allotted each team for implementation of the programme. Experience gained in the previous successive years was utilized to formulate the action plan for the year 2020 for sustainable cotton production and doubling farm income in the adopted MGMG villages through regular interaction with farmers, organization of awareness programmes, field and technology demonstrations, kisan gosthis/meets, skill development and knowledge enhancement programmes. In addition, the interaction of experts roped in from other research institutes and organizations were also arranged for providing crop specific package of advices to the farmers, thus creating a linkage between farmers and research institutes, NGOs, state departments and industry.

In this extraordinary year 2020 of the COVID19 pandemic, MGMG activities were also adversely hit to some extent. However, still the enthusiasm continued as before and the ICAR-CIRCOT conducted 2 webinars, 4 village visits, 14 interface meetings, 4 demonstrations and awareness programs in which about 370 farmers participated. Latest technologies, processes and products of the Institute were showcased during these programmes and various farming related issues were discussed. Farmers were enlightened through organisation of webinars about the norms and practices adopted by The CCI and The Cotton Federation for procurement of cotton on Minimum Support Price (MSP). Number of experts from the CCI, Farmer Producers

Company and others delivered lectures and answered queries from the farmers. They were also explained about various cotton contaminants, which affect cotton quality and its export potential.

Other than COVID 19 situation this year, the farmers have also faced an unprecedented attack of Pink Bollworm (PBW) menace at a very early crop stage. Several farmers have suffered severe crop damage to the extent over 50% losses. Visits of experts from the sister organisations were arranged to minimize the damage and guide the farmers. Awareness Programmes and Field visits were also organised in the adopted villages in collaboration with the Confederation of Indian Textile Industry-Cotton Development a Research Association (CITI-CDRA) for controlling of the PBW.

At present, cotton contamination, particularly polypropylene is a major problem faced by cotton processing industry. Such contaminants enter in the cotton right during picking, transportation and storage by farmers. Demonstrations of different contaminants detected in spinning mills were arranged to farmers and the problems posed by each and every contaminant during cotton processing were explained. In addition, farmers were also educated about various other cotton quality parameters and appropriate cotton harvesting and storage practices.

An Awareness Programme was organized by GTC at Nagpur in association with ICAR-National Bureau of Soil Survey & Land Use Planning (NBSS&LUP), Nagpur and ICAR-Central Citrus Research Institute (CCRI), Nagpur to educate the farmers about the Historical three Farm Acts recently passed by the Indian Parliament primarily to double the farm income and increase investment in the agriculture sector. About 100 farmers from almost all 30 adopted villages participated in this programme.

A number of Scientists and Technical Officers from all the four local ICAR institutes and stake holders also participated in this programme. The chief guest of the program Hon. Dr. Vikas Mahatme, Member of Parliament spoke in lengths about benefits of all the three newly enacted farm acts 2020. He explained that these Agri-acts would provide more selling

options to farmers, increase storage facilities of non-essential agricultural commodities and attracts big corporate houses to enter into contract farming with local farmers. On the occasion of world cotton day, five progressive farmers and a prominent textile mill entrepreneur were also felicitated.



Photos pertaining to activities undertaken by ICAR-CIRCOT under MGMP Programme in 2020



15. Infrastructural Facilities

ICAR-CIRCOT is well equipped with state-of-art research and testing facilities for conducting research in post-harvest processing of cotton and allied fibres.

Some of the facilities available in the Institute include

- **Fibre, Yarn and Fabric Testing Laboratory** (*With High Volume Instrument and Advanced Fibre Information System*): The laboratory has all the instruments for analysing the quality parameters of the Cotton and other fibres, yarn and fabrics. Besides research, this service is also provided to the Traders and other stakeholders in the cotton value chain.
- **Nanocellulose Pilot Plant Facility**: Capacity to produce 10 kg of Nanocellulose per day (Facility first of its kind in India): Service extended to Research organizations, Industrial stakeholders for carrying out studies on application of nanocellulose.
- Other Unique research and instrumentation facility available at the institute include Scanning Electron Microscopy (SEM); DREF Spinning Machines; Kawabata Evaluation System (KES); Atomic Force Microscopy (AFM); Thermo Gravimetric Analyser; Fourier Transformation Infrared Spectrometer; Atomic Absorption Spectrometer; Ultra High Pressure Homogenizer; Nano particle size analyser; Gas Chromatography with Mass Spectrometer:
- Electrospinning Facility
- Computerised sample Weaving Facility
- Composite Lab facility
- Modern Ginning and Pressing Plant

- Cottonseed Processing Plant
- Particle Board Manufacturing Plant: One tonne per day production capacity plant is established in Nagpur. The facility is used by Incubatees to undertake scale up trials.
- Pelleting Plant

National Laboratory for Advanced Material Characterization

“National Laboratory for Advanced Material Characterization (NLAMC)” established with the financial support from ICAR-National Agricultural Innovation Fund (NAIF), ICAR-Scheduled Caste Sub Plan (SCSP) and Rashtriya Krishi Vikas Yojana – Renumerative Approaches for Agriculture and Allied Sectors Rejuvenation (RKVY-RAFTAAR) Scheme, Ministry of Agriculture and Farmers Welfare (MoA&FW) New Delhi. This specific laboratory is proud enhancement to the facilities offered by ICAR-CIRCOT. The facility was virtually inaugurated by DDG (Engg.), ICAR on 3rd December, 2020. To support research, testing and incubation needs of start-ups, students, researchers, entrepreneurs and industries, the laboratory is adequately equipped with sophisticated instruments.

- X-ray Diffractometer: It is widely used for the identification of unknown crystalline materials.
- X-ray fluorescence spectrometer: It is applied for relatively non-destructive elemental and chemical analysis of different materials.
- Weather-O-meter: It brings together all weather parameters and checks its impact on textiles and polymers for light fastness & durability properties.

- Automatic single yarn tensile strength tester: It tests tensile strength & elongation, compression strength, and tearing strength of fabrics.
- Particle size analyser: It determines the size of submicron and nano particles such as nano-cellulose, nano-silver, nano-zinc oxide, nano-sulphur, etc.
- Goniometer: It analyses the wetting properties of a surface and records the interfacial tension, contact angle, surface energy of different materials.
- Polarized light microscope: It can be utilized for both quantitative and qualitative studies of wide range of anisotropic specimens like natural and textile fibres and polymers.
- Security Feature Detection System : It is used in the qualitative and quantitative analysis of substances in trace amounts on different matrices such as cloth, security paper, fiber etc., without extensive sample preparation in a non-destructive manner.
- With an ardent commitment to evolve with the times, the “National Laboratory for Advanced Material Characterization” is ready to meet all intricate research demands with clockwork precision and seamless quality.



Instruments/Equipment/ facilities procured during the year.

• Ozone System



Under BNPM sponsored project, Ozone system capable of disinfecting the water used for pulping was established

• Thermo Gravimetric Analyser



• Security Feature Detection System



Annexure 1

Ongoing Research Projects

Institute Funded Projects

S. No.	Title	Investigators	Duration
Core Area I: Pre-Ginning and Ginning			
1.	Development of an Efficient system for processing of kawadi cotton in ginneries	S. V. Ghadge (PI)	2018-21
2.	Development of a Rotary Tubular Drum Dryer for Quarantine of Pink Bollworm infested Cottonseeds in Ginneries	S. K. Shukla (PI) V. G. Arude Archana Mahapatra	2018-21
3.	Development of Digital Ginning Percent Indicator for Portable Cotton Gins	V. G. Arude (PI) S. K. Shukla P. S. Deshmukh	2020-22
4.	Assessment of suitability of adoption of seed cotton contamination cleaner for contamination and trash control in Indian ginning industry	V. G. Arude (PI) S. K. Shukla S. S. Kautkar	2020-22
5.	Device for seed cotton ginning percentage measurement	P. S. Deshmukh (PI) V. G. Arude M. K. Mahawar	2020-23
6.	Optimization of groove profile and diameter of chrome leather roller for enhancing the performance of double roller gin	S. S. Kautkar (PI) S. K. Shukla S. V. Ghadge V. G. Arude	2020-21
Core Area II: Mechanical Processing, Technical Textiles and Composites			
7.	Evaluation of spinnability and formulation of guidelines for spinning of recycled fibre from fabric waste and develop value added products	T. Senthilkumar (PI) G. Krishna Prasad V. G. Arude A. S. M. Raja	2020-23
8.	Development of cellulosic nanofibre based micronutrient delivery system for urban farming	G. T. V. Prabu (PI) T. Senthilkumar N. Vigneshwaran	2020-22
9.	Development of filter fabric for indoor decontamination	Kirti Jalgaonkar (PI) P. Jagajanthan	2020-22
10.	Development of Composite Material based Sanitary C Pad	Dattatreya M Kadam (PI) P. Jagajanthan	2018-21

Core Area III: Characterisation of Cotton and other Natural Fibres, Yarns and Textiles			
11.	AICRP on Cotton (Quality Research)	P.K. Mandhyan (PI) A. Arputharaj P. Jagajanantha	2017-21
12.	Development of Marker Fibres: A Tool for traceability of cotton textiles	A. Arputharaj (PI) P.K. Mandhyan G. Krishna Prasad	2018-21
Core Area IV: Chemical and Biological Processing, Biomass and By-products Utilisation			
13.	Toxicological and Environmental impact of ICAR-CIRCOT's nanomaterials (Nanocellulose, Nanosilver and Nano-ZnO)	N. Vigneshwaran (PI) A. K. Bharimalla A. S. M. Raja A. Arputharaj Kanika Sharma	2020-22
14.	Development of a healthier cottonseed based cooking oil by blending with other vegetable oils	Sujata Saxena (PI) Manoj Kumar Kanika Sharma	2020-22
Core Area V: Entrepreneurship and Human Resource Development			
15.	Development of Nanocellulose based Edible Coating for Fruits and Vegetables	Archana Mahapatra (PI) A. K. Bharimalla Manoj Kumar Jyoti Dhakane-Lad Sharmila Patil	2019-21
16.	Refinement and popularisation of nutrient-enriched compost production from cotton micro-dust	K. Pandiyan (PI) S. K. Shukla S. S. Kautkar	2020-22
17.	Development of process protocol for synthesis of nano-sulphur and its application in agriculture	M. K. Mahawar (PI) A. K. Bharimalla N. Vigneshwaran A. Arputharaj	2020-23
18.	Impact Assessment of CIRCOT technologies	C. Sundaramoorthy (PI) A. K. Bharimalla Himanshu Chaurasia	2020-25
Consortia Research Platform (CRP) on Natural Fibres			
19.	Development of cotton incorporated Personal Protective Equipment (PPE) body suit with smart respirator for healthcare workers with enhanced comfort	P. K. Mandhyan (PI) A. Arputharaj A. S. M. Raja P. Jagajanantha Kirti Jalgaonkar	2020-22

S. No.	Title (Funding Agency)	Investigators	Duration
20.	Development of Cotton Based face mask with improved particle filtration efficiency and breathability using electro spun nano materials and antiviral coatings -	A. S. M. Raja (PI) T. Senthilkumar G. Krishna Prasad G. T. V. Prabu N. Vigneshwaran C. Sundaramoorthy A. K. Bharimalla P. K. Mandhyan	2020-22
Externally Funded Projects			
S. No.	Title (Funding Agency)	Investigators	Duration
21.	Agri Business Incubation Centre at ICAR – CIRCOT, Mumbai (NAIF -Incubation Fund)	A. K. Bharimalla (PI) S. K. Shukla N. Vigneshwaran P. K. Mandhyan V. G. Arude C. Sundaramoorthy	2015-21
22.	An Inclusive Agribusiness Model for Sustainable Cotton Marketing in the State of Maharashtra (NASF)	C. Sundaramoorthy (PI) G. Krishna Prasad	2018-21
23.	Valorisation of Cottonseed Meal: Extraction of Quality Protein for improving the Livelihood of Cotton Farmers (DST)	Manoj Kumar (PI) Sujata Saxena	2019-21
24.	Remunerative Approaches for Agriculture and Allied Sectors Rejuvenation (RAFTAAR)Agribusiness Incubation Centre (R-ABI) (DAC&FW)	A. K. Bharimalla (PI) C. Sundaramoorthy P. S. Deshmukh V. G. Arude P. K. Mandhyan N. Vigneshwaran Sharmila Patil S. K. Shukla	2019-21
25.	Application of Irradiation for Extraction of Protein from Deoiled Cotton Cake & By Product Utilization (BRNS)	D. M. Kadam (PI) Sharmila Patil Manoj Kumar N. Vigneshwaran	2020-23
26.	Development of biocompatible nano-clay polymer composites and nanoparticles with reference to retention and release of iron and zink in Grape (Vitis Vinifera L.) (Inter institutional project with ICAR-NRCG, Pune)	P. K. Mandhyan (PI) Sharmila Patil	2020-23

Annexure II

PERSONNEL

(As on December 31, 2020)

DIRECTOR

Dr. P. G. Patil

M. Tech. (P.H.E.), Ph.D. (Engg.), F.T.A., FISAE., FIE.

HQ, MUMBAI

1. Dr. (Smt.) Sujata Saxena, M.Sc., Ph.D.
(Organic Chemistry)
Head i/c, Chemical and Biochemical Processing
Division
2. Dr. Dattatreya M. Kadam, M.Tech (ASPE), Ph.D
3. Dr. A. S. M. Raja, M. Sc., Ph.D.
(Textile Chemistry)
4. Dr. P. K. Mandhyan, M.Sc., Ph.D., A.T.A (Tech.
Textiles) Head i/c, Quality Evaluation and
Improvement Division
5. Dr. N. Vigneshwaran, M.Sc. (Agri.), M.B.A., Ph.D.
(Agricultural Microbiology)

SENIOR SCIENTIST

1. Dr. (Mrs.) Jyoti M. Nath, M.Sc., Ph.D.
(Electronics & Instrumentation)
2. Dr. A. K. Bharimalla, M. Tech., Ph.D.
(Composite)
Head i/c, Technology Transfer Division
3. Dr. P. S. Deshmukh, M. Tech., Ph.D., FIE.
(Farm Machinery & Power)
4. Dr. C. Sundaramoorthy, M.Sc., Ph.D.
(Agricultural Economics)
5. Dr. V. G. Arude, M. Tech. Ph.D.
(Farm Machinery & Power), Head i/c, MPD

SCIENTIST

1. Dr. A. Arputharaj, M.Sc., M. Tech., Ph.D.
(Textile Chemistry)
2. Dr. T. Senthilkumar, M. Tech., Ph.D.
(Textile Manufacture)
3. Dr. G. Krishna Prasad, M. Tech., Ph.D.
(Textile Tech.)
4. Dr. Jalgaonkar Kirti Ramesh, M.Sc. (PHT), Ph.D.,
(Agricultural Structures and Process
Engineering)
5. Dr. Manoj Kumar Mahawar, M.Tech. Ph.D.
(Agricultural Structures and Process
Engineering)
6. Shri G. T. V. Prabu, M. Tech. (Textile Tech.)
7. Dr. P. Jagajanantha, M. Tech., Ph.D.
(Textile Tech.)
8. Dr. (Smt.) Sharmila Patil, M.Sc. (P.H.T.), Ph.D.
(Agricultural Process Engineering)
9. Dr. (Smt.) Archana Mahapatra, M.Tech., Ph.D.
(Agricultural Process Engineering)
10. Dr. Manoj Kumar, M.Sc., Ph.D.
(Plant Biochemistry)
11. Er. (Smt.) Jyoti Dhakane- Lad, M.Sc. (PHT)
12. Dr. Kanika Sharma, M.Sc., Ph.D.
(Plant Biochemistry)
13. Shri Himanshu Shekhar Chourasia, M.Sc.
(Computer Application & IT)

GTC, NAGPUR

PRINCIPAL SCIENTIST

1. Dr. S. K. Shukla, M. Tech., Ph.D.
(Agricultural Process Engineering)
Officer-In-Charge, GTC
2. Dr. S. V. Ghadge, M.E. (Ag.) M.B.A., Ph.D.
(Farm Machinery & Power)

SCIENTIST

1. Dr. K. Pandian, M.Sc. Ph.D.
Agricultural Microbiology
2. Er. (Ms.) Varsha Satankar, M.Tech.
(Agricultural Structures and Process
Engineering) (On study leave)
3. Dr. Kautkar Sheshrao Sakharam, M.Sc. Ph.D.
(Agricultural Structures and Process
Engineering)

HQ, MUMBAI

CHIEF TECHNICAL OFFICER

1. Dr. (Smt.) Sheela Raj, M.Sc., Ph.D.
2. Dr. (Smt.) Sudha Tiwari, M.Sc., Ph.D.
3. Shri T. Venugopal, B.E.
4. Dr. (Smt.) N. M. Ashtaputre, M.Sc., Ph. D.
5. Shri R. S. Prabhudesai, M.Sc., D.C.M.
6. Shri G. B. Hadge, M.Sc.
7. Dr. M. V. Vivekanandan, M.Sc., Ph.D.
8. Shri S. Banerjee, M.Sc.
9. Shri B. R. Pawar, M. Sc., LL.M.
10. Shri R. K. Jadhav, M.Sc.

ASSISTANT CHIEF TECHNICAL OFFICER

1. Shri R. R. Chhagani, M.Sc.
2. Shri H. S. Koli, M.Sc., LL.B.
3. Dr. (Smt.) S. R. Kawlekar, M.Sc., P.I.M.R., Ph.D.
4. Shri P. N. Sahane, D.I.F.T.
5. Shri K. Narayanan, B.Sc.
6. Smt. P. S. Nirhali, M.Sc.
7. Shri S. V. Kokane, M.A.
8. Shri D. U. Kamble, B.Sc.
9. Er. Chandrika Ram, M. Tech.
(APFE) (on deputation)

SENIOR TECHNICAL OFFICER

1. Smt. Binu Sunil, M.Sc.
2. Smt. Bindu Venugopal, M.Sc.
3. Dr. (Ms.) C. P. D' Souza, M.Sc., Ph.D.
4. Shri R. S. Narkar, M.Sc., D.C.I.A.
5. Smt. P. R. Mhatre, B.Sc., M.Lib.
6. Smt. C. D. Prabha, M.Sc.

TECHNICAL OFFICER

1. Shri V. D. Kalsekar, B.Sc.
2. Shri C. V. Shivgan, Cert. Elec. Supr. PWD, Cert. M.
& A.W. Technician
3. Shri M. G. Ambare, M.Sc.
4. Shri S. N. Patil, B.E. (Civil)
5. Shri N. D. Kambli, M.Sc.
6. Shri D. M. Correia, I.T.I., N.C.T.V.T. (Mechanic)

SENIOR TECHNICAL ASSISTANT

1. Smt. H. R. Pednekar, B.A., B.Lib.
2. Shri R. P. Kadam, M.Sc.
3. Smt. M. P. Kamble, B.A., M.Lib.
4. Shri A. R. Jadhav, B.Sc.
5. Shri Krishna Bara, D.H.T.

TECHNICAL ASSISTANT

1. Shri D. A. Salaskar, Driver
2. Shri P. P. Thakur
3. Shri P. G. Gavhale
4. Shri D. M. Raje
5. Shri R. R. Gosai

SENIOR TECHNICIAN

1. Shri Mahabir Singh
2. Shri S. V. Kokane, Driver
3. Shri M. M. Kadam
4. Shri S. G. Phalke
5. Shri D. J. Dhodia
6. Shri Yogesh Nagpure

GTC, NAGPUR**CHIEF TECHNICAL OFFICER**

1. Er. D. U. Patil, B. Tech. (Agril. Engg.)

ASSISTANT CHIEF TECHNICAL OFFICER

1. Shri U. D. Devikar, M.Sc.
2. Shri S. L. Bhanuse, M.Sc.

SENIOR TECHNICAL OFFICER

1. Shri R. G. Dhakate, B.Sc.

TECHNICAL OFFICER

1. Shri B.V. Shirsath, B.A., I.T.I

TECHNICAL ASSISTANT

1. Shri S. K. Parab, Cert. Cot. Spin.

QE UNIT, COIMBATORE

1. Shri K. Thiagarajan, M.Sc., (Chief Technical Officer)
2. Shri M. Bhaskar, Dip. Ref. & Air-Cond., (Technical Officer)

QE UNIT, DHARWAD

1. Smt. V. G. Udikeri, M.Sc., Technical Officer

QE UNIT, GUNTUR

1. Shri C. M. More, M.Sc. (Asst. Chief Technical Officer)
2. Shri S. N. Hedau, B.Sc. (Asst. Chief Technical Officer)

QE UNIT, SIRSA

1. Dr. Hamid Hasan, M.Sc., Ph.D. (Chief Technical Officer)
2. Dr. Jal Singh, M.Sc., Ph.D. (Senior Technical Officer)
3. Shri Umrao Meena (Senior Technician)

QE UNIT, SURAT

1. Shri M. B. Patel, B.Sc., L.L.B, (Senior Technical Officer)

ADMINISTRATIVE STAFF**HQ, MUMBAI**

- SR. ADMINISTRATIVE OFFICER** : Shri Sunil Kumar, B.A. (Hons.)
ADMINISTRATIVE OFFICER : Smt. Sujata Koshy, B.Com.
FINANCE & ACCOUNTS OFFICER : Shri M. Radhakrishnan

ASSISTANT ADMINISTRATIVE OFFICER

1. Smt. T. P. Mokal, M.A.(Hindi)
2. Shri K. Parleshwar, HSc
3. Shri S. A. Telpande, M.Com.
4. Smt. N. M. Deshmukh, M.A., LL.B.
5. Shri S. D. Ambolkar

ASSISTANT FINANCE & ACCOUNTS OFFICER:

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

ASSISTANT

1. Kum. Pooja Tiwari, B.Sc.
2. Kum. Himani P. Singh, B.E.
3. Shri P. V. Jadhav
4. Smt. S. P. Paiyala
5. Smt. S. G. Parab, B.A. (Sociology), B.A. (Hindi)

UPPER DIVISION CLERK

1. Shri V. M. Sable
2. Smt. J. R. Chavkute
3. Smt. B. D. Kherodkar
4. Shri S. S. Angane
5. Shri T. D. Dhamange, B.Com.
6. Shri S. N. Bandre
7. Smt. V. N. Walzade, B.A

LOWER DIVISION CLERK

1. Shri Avinash Aman, B. Tech.
2. Shri S. N. Sahane

PRIVATE SECRETARY : Smt. U. N. Bhandari

PERSONAL ASSISTANT : Smt. R. R. Tawde, B.Com

STENOGRAPHER : Smt. V. R. Naik, B.A.

GTC, NAGPUR

ASSISTANT ADMINISTRATIVE OFFICER : Shri Y. R. Pathare, B.Sc., M.B.A.

LOWER DIVISION CLERK : Shri R. G. Matel,

PERSONAL ASSISTANT : Shri R. D. Shambharkar, M.A.

SKILLED SUPPORT STAFF**HQ, MUMBAI**

1. Shri M. J. Sumra
2. Shri K. T. Mahida
3. Shri H. B. Vesmiya
4. Shri M. M. Katpara
5. Shri S. K. Bobate
6. Shri P. P. Patil
7. Shri R. G. Tak
8. Shri R. P. Karkate
9. Shri S. B. Worlikar
10. Shri D. G. Gole
11. Shri M. K. Prabhulkar
12. Shri J. D. Sakpal
13. Shri V. Murugan
14. Shri S. D. Magar

15. Shri Sunil R. Tondse
16. Shri V. B. Poojari
17. Shri S. P. Naik
18. Shri M. N. Kamble
19. Smt. Kamala Murugan
20. Shri D. K. Kasar
21. Shri Suhas R. Tondse
22. Shri S. S. Surkule
23. Shri D. R. Gawde
24. Shri S. M. Chandanshive
25. Shri P. E. Gurav
26. Shri Mahesh C. Solanki
27. Shri Thapa Gorkha Bahadur Ovilar

GTC, NAGPUR

Shri R. B. Kautkar
Shri R. S. Umare
Smt. M. M. Bhandakkar

QE UNIT, COIMBATORE

Shri V. Subbaiah

QE UNIT, DHARWAD

Shri A. F. Gudadur

QE UNIT, SURAT

Shri M. G. Sosa

APPOINTMENTS

- Dr. (Ms.) Kanika Sharma, Scientist (Plant Biochemistry) joined on 4th April, 2020
- Shri Himanshushekhar Chourasia, Scientist (Computer Application & IT) joined on 4th April, 2020

PROMOTIONS

Sr. No.	Name of Staff	Grade to which Promoted	Effective Date of Promotion
1.	Shri T Venugopal	Chief Technical Officer	05-11-2016
2.	Shri M. Mukundan	Chief Technical Officer	03-02-2017
3.	Shri S. M. Gogate	Assistant Chief Technical Officer	01-07-2014
4.	Shri K. Narayanan	Assistant Chief Technical Officer	17-05-2015
5.	Shri R. G. Dhakate	Assistant Chief Technical Officer	01-01-2017
6.	Shri D. U. Kamble	Assistant Chief Technical Officer	10-06-2018
7.	Shri S. D. Ambolkar	Assistant Administrative Officer	27-10-2020
8.	Smt. S. G. Parab	Assistant	23-10-2020
9.	Smt. V. N. Valzade	Upper Division Clerk	23-10-2020
10.	Smt. U. N. Bhandari	Private Secretary	01-12-2020
11.	Smt. R. R. Tawade	Personal Assistant	23-10-2020
12.	Shri R. D. Shambharkar	Personal Assistant	01-12-2020



TRANSFERS

Scientists

Dr. Santanu Basak, Scientist transferred from ICAR-CIRCOT, Mumbai to ICAR-NINFET, Kolkatta w.e.f. 7th August, 2020.

Technical

Shri K. Thiagarajan, Chief Technical Officer transferred from Guntur to Regional QE Unit, Coimbatore w. e. f. 5th March 2020

Shri Paresh P. Thakur, Technical Assistant transferred from ICAR-CIRCOT, Mumbai to GTC, Nagpur 5th March 2020

Shri S. K. Parab, Technical Assistant transferred from GTC, Nagpur to ICAR-CIRCOT, Mumbai w. e. f. 5th March 2020

Shri S. N. Hedau, Assistant Chief Technical Officer transferred from GTC, Nagpur to Regional QE Unit Guntur w. e. f. 5th March 2020

Shri C. M. More, Assistant Chief Technical Officer transferred from ICAR-CIRCOT, Mumbai to Regional QE Unit Guntur w. e. f. 19th October, 2020

Shri C. V. Shivgan, Technical Officer transferred from GTC, Nagpur to ICAR-CIRCOT, Mumbai w. e. f. 19th October, 2020

Administrative

Shri Y. R. Pathare, Assistant Administrative Officer transferred from ICAR-CIRCOT, Mumbai to GTC, Nagpur w. e. f. 19th October, 2020

Shri S. A. Telpande, Assistant Administrative Officer transferred from GTC, Nagpur to ICAR-CIRCOT, Mumbai w. e. f. 19th October, 2020

RETIREMENTS

1. Shri C. J. Bagalkoti, Skilled Support Staff at Dharwad unit superannuated on 31-01-2020
2. Dr. S. K. Chattopadhyay, Principal Scientist superannuated on 29-02-2020
3. Dr. R. D. Nagarkar, Chief Technical Officer superannuated on 31-03-2020
4. Shri. S. Mukundan, Chief Technical Officer at Coimbatore unit superannuated on 30-06-2020
5. Shri R. K. Pallewad, Assistant Administrative Officer superannuated on 31-07-2020
6. Smt. T. T. D'Souza, Personal Assistant superannuated on 31-08-2020
7. Shri M. Z. Rathi, Skilled Support Staff superannuated on 30-11-2020
8. Smt. S. D. Dudam, Private Secretary superannuated on 30-11-2020
9. Shri G. B. Hadge, Chief Technical Officer superannuated on 31-12-2020
10. Shri R. R. Gosai, Technical Assistant superannuated on 31-12-2020

Annexure III

LIST OF COMMITTEES

Institute Management Committee (IMC)

Dr. P.G. Patil,	Director, Chairman
Dr. S.N. Jha,	ADG (PE), ICAR, New Delhi
Dr. Abhijit Kar,	Principal Scientist, Indian Agricultural Research Institute, New Delhi
Dr. G. Balasubramani,	Principal Scientist, ICAR-Central Institute for Cotton Research, Nagpur
Dr. Vilas Kharche,	Director of Research, Dr. PDKV, Akola
Dr. L. K. Nayak,	Principal Scientist, ICAR- NINFET, Kolkata
Shri D. B. Sawale Patil,	ex-MLA, Buldhana, Maharashtra
Dr. (Smt.) Sujata Saxena,	Principal Scientist, ICAR-CIRCOT, Mumbai
Shri Sunil Kumar,	Sr. AO, Member Secretary

Research Advisory Committee (RAC)

Dr. N. C. Patel,	Former VC, JAU & AAU, Chairman
Dr. M. K. Sharma,	CEO, M/s. Bajaj Steel Industries Ltd, Nagpur
Prof. (Dr.) U. J. Patil,	Head, Department of Textiles D.K.T.E., Ichalkaranji
Dr. N.N. Mahapatra,	Business Head (Dyes) SHREE PUSHKAR CHEMICALS & FERTILISERS LTD.
Prof. (Dr.) S. R. Shukla,	Former Professor, ICT, Mumbai
Dr. Narendra G. Shah,	Professor, IIT Mumbai
Dr. P.G. Patil,	Director, ICAR-CIRCOT, Mumbai
Dr. S. N. Jha,	ADG (PE), ICAR, New Delhi

Project Monitoring and Evaluation Committee (PMC)

Dr. P.G. Patil,	Director, Chairman
Dr. (Smt.) S. Saxena,	In-charge Head, CBPD
Dr. P.K. Mandhyan,	In-charge Head, QEID
Dr. A.K. Bharimalla,	In-charge, TTD
Dr. V.G. Arude,	in-charge MPD
Dr. A.S. M. Raja,	in-charge PME Cell, Member secretary

Priority-setting, Monitoring & Evaluation (PME) Committee

Dr. A. S. M. Raja,	Principal Scientist, In-charge
Dr. A.K. Bharimalla,	Senior Scientist
Dr. P.K. Mandhyan,	Principal Scientist
Dr. N. Vigneshwaran,	Principal Scientist
Dr. C. Sundaramoorthy,	Sr. Scientist



Priority-setting, Monitoring & Evaluation (PME) Cell

Dr. A. S. M. Raja,	Principal Scientist, In-charge
Shri GTV Prabu,	Scientist, Nodal Officer, PME
Shri K. Narayanan,	ACTO
Smt. H. R. Pednekar,	STA
Shri Anand R Jadhav,	STA

Institute Technology Management Committee (ITMC)

Dr. P.G. Patil,	Director, Chairman
Dr. P. K. Mandhyan,	Principal Scientist, I/c. Head, QEID
Dr. A. S. M. Raja,	Principal Scientist, CBPD
Dr. C. Sundaramoorthy,	Senior Scientist, Member Secretary of IRC
Dr. B.B. Nayak,	Principal Scientist, CIFE, Mumbai
Dr. N. Vigneshwaran,	Principal Scientist, CBPD
Dr. A.K. Bharimalla,	Senior Scientist, Officer -In-charge ITMU, Member Secretary

Institute Technology Management Unit (ITMU)

Dr. A.K. Bharimalla,	Senior Scientist, Officer-In-charge
Dr. N. Vigneshwaran,	Principal Scientist
Dr. P.K. Mandhyan,	Principal Scientist
Dr. M.V. Vivekanandan,	CTO, TTD
Shri G.B. Hadge,	CTO, TTD

Institute Joint Staff Council

Dr. P.G. Patil,	Director, Chairman
Dr. P.S. Deshmukh,	Sr. Scientist
Shri Sunil Kumar,	Senior Administrative Officer
Shri S. V. Kasabe,	A. F & AO, Office side member
Dr. (Smt.) S. S. Patil,	Scientist, Office side member
Shri B. R. Pawar,	ACTO, Office side member
Shri Mahavir Singh,	Sr. Technician
Shri Yogesh Nagpure,	Technical Assistant
Smt. Smita Paiyala,	Assistant
Smt. Bharati Kherodkar,	UDC
Shri S. D. Magar,	SSS, staff side member
Shri Sudhakar Chandanshive,	SSS, staff side member
Shri P.V. Jadhav,	Assistant, CJSC Member
Shri M K Prabhulkar,	Secretary, IJSC
Shri Y. Pathare,	AAO, Member Secretary



Internal Complaints Committee

Dr. (Smt.) S. Saxena,	Principal Scientist, In-charge Head, CBPD, Chairperson
Smt. Shilpa Charankar,	Former Principal, Dr. BNM college of Home science, Matunga, External Member
Dr. P. S. Deshmukh,	Senior Scientist, Member
Smt. Sujatha Koshy,	AO, Member
Dr. (Smt.) N. Ashtaputre,	CTO, Member
Smt. P. R. Mhatre,	STO, Member
Smt. Sujatha Koshy,	AO , Member Secretary

Staff Welfare Fund Committee

Dr. P.K. Mandhyan,	Principal Scientist, Chairman
Shri D.U. Kamble,	ACTO, Member
Shri S.V. Kasabe,	AF&AO, Member
Shri P.V. Jadhav,	Assistant, Member
Smt. Sujatha Koshy,	AO, Member Secretary

ISO-9001:2015 Management Committee

Dr. P.G. Patil,	Director, Chairman
Dr. (Smt.) S. Saxena,	Principal Scientist, Head In-charge, CBPD, Member
Dr. P.K. Mandhyan,	Principal Scientist, In-charge Head, QEID, Member
Dr. A.K. Bharimalla,	Senior Scientist, Head In-charge, TTD, Member
Dr. V.G. Arude,	Senior Scientist, In-charge Head, MPD, Member
Shri. Sunil Kumar,	Senior AO, Member
Shri. S. Radhakrishnan,	FAO, Member
Dr. A.S.M. Raja,	Principal Scientist, Management Representative
Dr. A. Arputharaj,	Scientist, Deputy Management Representative

Purchase Committee

Dr. P. K. Mandhyan,	Principal Scientist & in-charge Head CBPD, Chairman
Dr. A. K. Bharimalla,	Senior Scientist, TTD, Member
Dr. G. Krishna Prasad,	Scientist, MPD, Member
Dr. P. Jagajanantha,	Scientist, QEID, Member
Shri Sunil Kumar,	SAO, Member
Shri. M. Radhakrishnan,	FAO, Member
Smt.Sujatha Koshy,	AO, Member
Mr. K. P. Parleshwar,	AAO, Member Secretary

Technical Evaluation Committee

Dr. A. S. M. Raja,	Principal Scientist, Chairman
Dr. Senthilkumar,	Scientist, Member
Dr. P. Jagajanantha,	Scientist, Member
Smt. Sujatha Koshy,	AO, Member Secretary



Swachhata Mission Committee

Dr. P. G. Patil,	Director, Chairman
Dr. A. S. M. Raja,	Principal Scientist, Member
Shri Sunil Kumar,	Senior Administrative Officer, Member
Shri S. V. Kasabe,	AFAO, Member
Shri Sharad V. Kokane,	Security Officer, Member
Dr. A. K. Bharimalla,	Senior Scientist, Member
Dr. G. Krishna Prasad,	Scientist, Member
Dr. Nishant D. Kambli,	Technical Officer, Member Secretary

Rajbhasha Karyanvayan Committee

Dr. P. G. Patil,	Director, Chairman
Dr. (Smt.) S. Saxena,	Principal Scientist, in-charge Head CBPD, Member
Dr. P. K. Mandhyan,	Principal Scientist, in-charge Head QEID, Member
Dr. A. K. Bharimalla,	Senior Scientist, in-charge, TTD, Member
Dr. V. G. Arude,	Senior Scientist, in-charge, MPD, Member
Shri Sunil Kumar,	Senior Administrative Officer, Member
Smt. S. Koshy,	AO, Member
Shri M. Radhakrishnan,	FAO, Member
Shri S. V. Kasabe,	A F & AO, Member
Smt. P. R. Mhatre,	Senior Technical Officer, Member
Shri S. A. Telpande,	AAO, Member
Shri K. Parleshwar,	AAO, Member
Smt. N. Deshmukh,	AAO, Member
Shri S. D. Ambolkar,	AAO, Member
Smt. T.P. Mokal,	AAO, Member Secretary

Works Committee

Dr. A. K. Bharimalla,	Sr. Scientist & in-charge Head TTD, Chairman
Shri Sunil Kumar,	Senior Administrative Officer, Member
Dr. A. Arputharaj,	Scientist, Member
Shri B.R. Pawar,	CTO, Member
Shri S. V. Kasabe,	A. F & AO, Member
Er. T. Venugopal,	Officer in-charge Engg., Member Secretary

Test Fee Revision Committee

Dr. (Smt.) S. Saxena,	Principal Scientist & in-charge Head, CBPD, Chairperson
Dr. P.K. Mandhyan,	Principal Scientist and In-charge Head, QEID, Member
Dr. A. K. Bharimalla,	Senior Scientist and In-charge Head TTD, Member
Dr. V. G. Arude,	Senior Scientist, HoD In-charge, MPD, Member
Dr. Senthil Kumar,	Scientist, Member
Shri B. R. Pawar,	CTO, Member
Smt. P. S. Nirhali,	ACTO, Member Secretary



Grievance Committee

Dr. P. G. Patil, Director, Chairman

Nominated Members

Dr. P. K. Mandhyan, Principal Scientist
Shri Sunil Kumar, SAO
Shri S. V. Kasabe, FAO
Shri. Y. R. Pathare, AAO (Member Secretary)

Elected Members

Dr. P.S. Deshmukh, Senior Scientist (Scientific Category)
Shri B. R. Pawar, ACTO (Technical Category)
Smt. Smita P. Paiyala, UDC (Administrative Category)
Shri. Mahesh Solanki, S. S. S (Skilled Supporting Staff Category)

ABI Advisory Committee

Dr. P. G. Patil, Director, Chairman
Dr. R. P. Kachru, Former ADG (PE), ICAR, New Delhi, Member
Dr. S. Sreenivasan, Former Director, ICAR-CIRCOT, Mumbai, Member
Prof. Narendra Shah, CTARA, IIT, Mumbai, Member
Dr. M. K. Sharma, Whole Time Director & CEO,
Bajaj Steel Industries Limited, Nagpur, Member
Dr. A. K. Bharimalla, Sr. Scientist, Principal Investigator:
ICAR-CIRCOT-ABI Centre, Member-Secretary

RAFTAAR-Incubation Committee (RIC) Members of CIIRCOT RABI

Dr. P. G. Patil, Director, Chairman
Dr. G. R. Anap, Former International Cotton Consultant, World Bank Project (Africa)
Prof. (Dr.) V. D. Gotmare, Former HOD, Textile Manufacture Department, VJTI, Mumbai
Prof. (Dr.) A. S. Vastrad, Professor and Dy. Director, Student Welfare,
University of Agricultural Science (UAS), Dharwad
Shri. D. B. Bote, Joint Director Agriculture, Commissionerate of Agriculture, Pune
Mr. Ramesh. R Kadam, RTD, General Manager, Bank of India, Member
(Representative of Bank)
Dr. Ashok K. Bharimalla, Senior Scientist, PI-CEO: CIRCOT-R-ABI, Member Secretary

CRP on Natural Fibres Project Implementation Unit

Dr. P. G. Patil, Director, Nodal Officer
Dr. A. S. M. Raja, Principal Scientist, Lead Centre Project Coordinator
Dr. C. Sundaramoorthy, Senior Scientist, Member
Shri Sunil Kumar, Sr. AO, Member
Shri M Radhakrishnan, FAO, Member
Smt. Sujatha Koshy, AO, Member
Shri S. V. Kasabe, AFAO, Member



CITIZEN'S/CLIENT'S CHARTER

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

Phone: (022) 24127273/76, 24184274/75, Fax: (022) 24130835

Website: <http://www.circot.res.in>



VISION

Global Excellence in Cotton Technology

MISSION

To provide scientific and managerial interventions to post-harvest processing and value addition to cotton and other natural fibres and utilization of their by-products to maximize economic, environmental and societal benefits.

MAIN SERVICES/TRANSACTIONS

Sr. No.	Services/Transactions	Responsible Persons
1.	Commercial Testing: Fibre, Yarn, Fabric, Garment, Spinnability, Non-Lint Content, Linter, Seed, Paper, Board, Absorbent cotton, Chemical and Biochemical Tests of Textile Materials, ECO, SEM, XRD, etc.	Mrs. P.S. Nirhali Assistant Chief Technical Officer Incharge, Test House test.circot@icar.gov.in , cottontest@rediff.com Phone Ext 456 / 457
2.	Imparting Training to Stakeholders	Dr. A.K. Bharimalla Technology Transfer Division ashokbhari72@gmail.com Phone Ext 467 and Dr. S.K. Shukla Ginning Training Centre, Nagpur skshukla2000@gmail.com Phone (0712) 2500592 , 2500289
3.	Supply of Calibration Cotton	Dr. P.K. Mandhyan Quality Evaluation and Improvement Division pkmandhyan@gmail.com Phone Ext 447
4.	Consultancy and Technology Transfer	Dr. A.K. Bharimalla Technology Transfer Division ashokbhari72@gmail.com Phone Ext 467

Public Grievance Officer

Shri Sunil Kumar, Senior Administrative officer

Phone: 022-24127627, E-mail sunkr2@rediffmail.com, Ext 138

For Further Information, Contact

Dr. P.G. Patil, Director, ICAR-CIRCOT, Mumbai



हमारा उद्देश्य
OUR MOTIVE

पारदर्शिता को बढ़ावा देने के लिए
To Promote Transparency

जवाबदेही को बढ़ावा देने के लिए
To Promote Accountability

सूचना का अधिकार अधिनियम, 2005 की घोषणा के अनुसरण में निम्नलिखित अधिकारियों को इस संस्थान में जनसूचना अधिकारी, सहायक जनसूचना अधिकारी और अपीलिय प्राधिकारी के रूप में नामित किया गया है।

In Pursuance of the promulgation of Right to Information Act, 2005, the following Officers are designed as CPIO, Assistant CPIO and Appellate Authority at this Institute.

<p>केन्द्रीय लोक सूचना अधिकारी Central Public Information Officer श्री सुनील कुमार वरिष्ठ प्रशासनिक अधिकारी, भा. कृ. अनु. प. - के. क. प्रौ. अनु. सं. E-mail : director.circot@icar.gov.in : sunil.kumar12@icar.gov.in Tel : 2412 7627 : 2412 7273 / 76, 2418 4274 / 75 FAX No. : 2413 0835 / 2415 7239</p>	<p>अपीलीय प्राधिकारी Appellate Authority डॉ. पी. जी. पाटील निदेशक, भा. कृ. अनु. प. - के. क. प्रौ. अनु. सं. E-mail : director.circot@icar.gov.in Tel : 2414 6002 : 2412 7273 / 76, 2418 4274 / 75 FAX No. : 2413 0835 / 2415 7239</p>
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