

# वार्षिक प्रतिवेदन 2024

## ANNUAL REPORT 2024



ICAR-Central Institute for Research on Cotton Technology  
Adenwala Road, Matunga (East), Mumbai - 400 019.





# ICAR-CIRCOT

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# ANNUAL REPORT 2024



**ICAR-Central Institute for Research on Cotton Technology**  
Adenwala Road, Matunga (East), Mumbai-400 019  
(An ISO 9001:2015 Certified Institute and NABL Accredited Lab)

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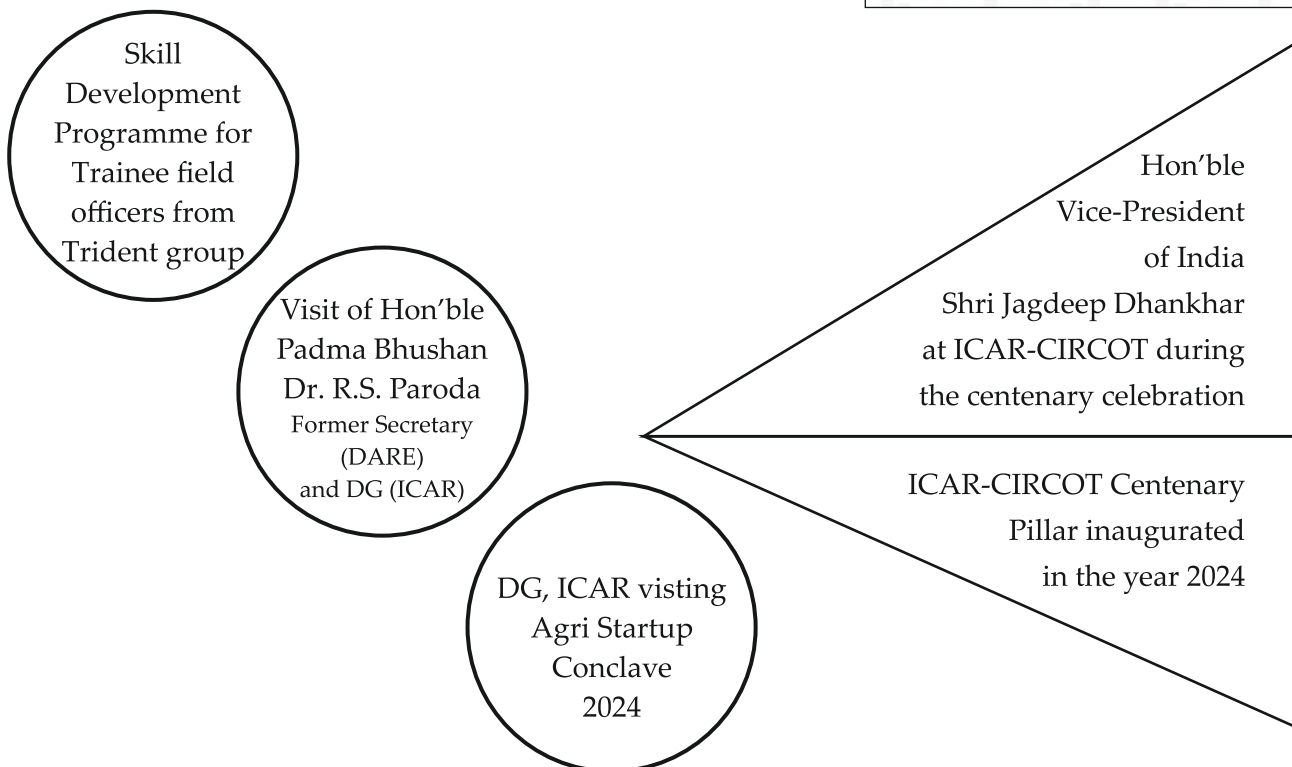
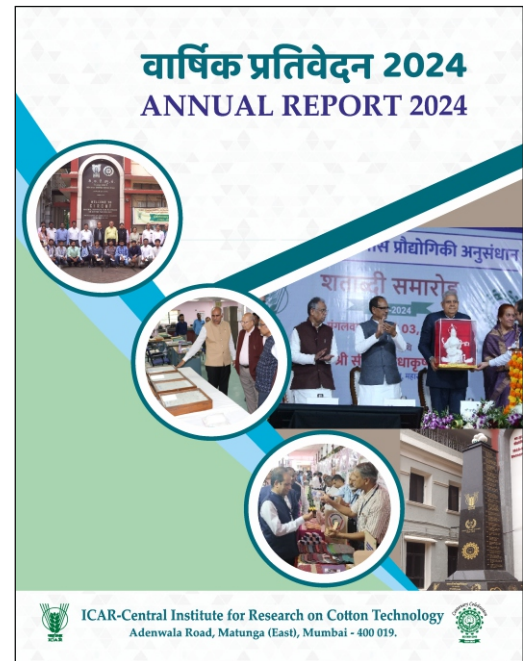
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## प्राक्कथन



सेंट्रल इंस्टीट्यूट फॉर रिसर्च ऑन कॉटन टेक्नोलॉजी (सिरकॉट) की यह 100वीं वार्षिक रिपोर्ट प्रस्तुत करते हुए मुझे बेहद खुशी हो रही है, जो 01 जनवरी, 2024 से 31 दिसंबर, 2024 तक की अवधि को कवर करती है। देश में कपास क्षेत्र चुनौतियों और अवसरों के मिश्रण का सामना कर रहा है। कपास की खेती के तहत आने वाले क्षेत्र में गिरावट आ रही है और पिछले सीजन की तुलना में घरेलू उत्पादन में भी कमी आई है। भारत, 2002-03 के प्रारंभ में बीटी कपास की शुरुआत के बाद कपास का शुद्ध निर्यातक बन गया था, अब कपास का शुद्ध आयातक बन गया है। घटती उत्पादकता, उत्पादन की बढ़ती लागत, अंतरराष्ट्रीय कीमत की तुलना में घरेलू बाजार में कपास लिंट की ऊंची कीमत और गुणवत्ता के मुद्दे और विशेष रूप से संदूषण देश के कपास क्षेत्र पर महत्वपूर्ण प्रभाव डाल रहे हैं। कपास उत्पादकता पर मिशन, कस्तूरी कपास कार्यक्रम आदि जैसी सरकारी पहलों के साथ-साथ बढ़ती वैश्विक मांग इस क्षेत्र के पुनरुत्थान के लिए आवश्यक प्रोत्साहन प्रदान कर रही है।

आईसीएआर-सिरकॉट कपास की गुणवत्ता, कटाई के बाद कपास प्रबंधन और प्रसंस्करण से संबंधित मुद्दों के समाधान, कपास से विविध मूल्यवर्धित उत्पादों के विकास के लिए निरंतर प्रयास कर रहा है, इसके अलावा हितधारकों को कौशल विकास, परामर्श, वाणिज्यिक परीक्षण और व्यवसाय ऊष्मायन सेवाएं भी प्रदान कर रहा है।

कपास वस्त्रों के लिए रेफरल प्रयोगशाला के रूप में, संस्थान को एमसीएक्स द्वारा कमोडिटी बाजार में कपास की गुणवत्ता के अनुमोदनकर्ता के रूप में मान्यता दी गई है। संस्थान को कस्तूरी कपास के लिए मानदंड तैयार करने के लिए पहचाना गया है, जिसे कपड़ा मंत्रालय, भारत सरकार द्वारा भारतीय कपास के लिए एक ब्रांड बनाने के लिए स्थापित किया गया है। आईसीएआर-सिरकॉट कपास पर एआईसीआरपी के तहत कपास के वैरिएटल विकास का भी एक हिस्सा है जो प्रजनन कार्यक्रम के लिए कपास की गुणवत्ता-आधारित इनपुट प्रदान करता है।

इस वर्ष संस्थान का शताब्दी वर्ष मनाया जा रहा है, जिसकी स्थापना 1924 में हुई थी। शताब्दी वर्ष समारोह में आइसीएआर-सिरकॉट शताब्दी व्याख्यान श्रृंखला, अंतर्राष्ट्रीय सम्मेलन और राष्ट्रीय स्तर की संगोष्ठी और कार्यशालाओं जैसे कार्यक्रम आयोजित किए गए। संस्थान के शताब्दी स्थापना दिवस पर भारत के माननीय उपराष्ट्रपति श्री जगदीप धनखड़ और माननीय केंद्रीय कृषि एवं किसान कल्याण मंत्री तथा महाराष्ट्र के माननीय राज्यपाल की उपस्थिति ने संस्थान की गरिमा बढ़ाई।

संस्थान कपास क्षेत्र के सामने आने वाली चुनौतियों का समाधान करने के लिए नए जोश के साथ अपने शोध और विकास गतिविधियों को शुरू करने के लिए तैयार है। अग्रतः कपास की चुनाई और उसके प्रसंस्करण के मशीनीकरण, कपास मूल्य श्रृंखला के लिए ट्रेसेबिलिटी समाधान, कपास उप-उत्पादों से बढ़िया रसायनों का निष्कर्षण, अक्षय ऊर्जा समाधानों पर ध्यान देने के साथ कपास बायोमास में मूल्य संवर्धन और क्षेत्र स्तर पर वस्तुनिष्ठ ग्रेडिंग प्रणाली के माध्यम से कपास विपणन में पारदर्शिता लाने के मुद्दों से निपटना है।

वर्ष के दौरान उल्लेखनीय उपलब्धियों में आइसीएआर स्थापना दिवस पर कट प्रतिरोध दस्ताने पर संस्थान की तकनीक का विमोचन, परिषद द्वारा संस्थान द्वारा विकसित 8 तकनीकों का प्रमाणन, 5 तकनीकों का व्यावसायीकरण, पत्रिकाओं और सम्मेलनों में 38 शोध प्रकाशन, बौद्धिक संपदा के क्षेत्र में संस्थान को दो पेटेंट की प्राप्ति तथा शोध, शिक्षा और प्रौद्योगिकी व्यावसायीकरण में सहयोग के लिए 16 समझौता ज्ञापनों पर हस्ताक्षर किए गए। संस्थान ने वर्ष के दौरान 4.12 करोड़ रुपये का राजस्व अर्जित करके राजस्व सृजन में नई ऊंचाइयों को छुआ है।

मैं इस अवसर पर संस्थान में वर्तमान में कार्यरत वैज्ञानिक, तकनीकी और प्रशासनिक कर्मचारियों के योगदान की सराहना करता हूं, साथ ही उन सभी पूर्व कर्मिकों की भी सराहना करता हूं जिन्होंने अतीत में कपास क्षेत्र के लिए निरंतर सेवा करते हुए 100 वर्षों से अधिक की विरासत बनाई है।

**( एस. के. शुक्ल )**

निदेशक

## PREFACE



It gives me immense joy to present this 100th Annual Report of the ICAR-Central Institute for Research on Cotton Technology (CIRCOT) which covers the period from January 01, 2024 to December 31, 2024. The cotton sector in the country is at the cross roads faced with a mix of challenges and opportunities. The area under cotton cultivation is on decline coupled with dwindling domestic production compared to the previous season. India, which emerged as a net exporter of cotton in the aftermath of introduction of Bt cotton in early 2002-03, has now become the net importer of cotton. The declining productivity, increasing cost of production, higher price of the cotton lint in domestic market compared to international price and the quality issues, especially contamination, are having a significant influence on the cotton sector of the country. The rising global demand coupled with the government initiatives like mission on increasing cotton productivity, Kasturi cotton programme to brand Indian cotton based on quality etc., are providing the necessary impetus for the resurgence of the sector.

ICAR-CIRCOT is making a consistent effort in addressing issues pertaining to the quality of cotton, post-harvest handling and processing of cotton, and in development of diverse value-added products from cotton, besides providing the stakeholders with skill development, consultancy, commercial testing and business incubation services.

In its epitome as the referral laboratory for the cotton textiles, the institute has been recognised as the approver assayer of cotton quality in commodity market by Multicommodity Exchange (MCX). The institute has devised the norms for the Kasturi cotton, which is established to create a brand for Indian cotton by the Ministry of Textiles, GoI. ICAR-CIRCOT is also a part of varietal development programme, AICRP on Cotton, providing cotton quality-based inputs for the cotton breeding programme in the country.

This year marks the year of centenary celebration for the institute that was established in 1924. The Centenary year celebrations were marked with events like ICAR-CIRCOT Centenary lecture series, international conference and national level seminar and workshops. The centenary foundation day of the institute on December 03, 2024 was graced by the presence of Hon'ble Vice president of India Shri Jagdeep Dhankhar in the presence of Hon'ble Union Minister of Agriculture & Farmers Welfare and Hon'ble Governor of Maharashtra.

The institute is poised, to undertake its research and development activities to address the emerging challenges faced by the sector, with renewed vigour. The major focus that lies ahead are the issues of mechanization of cotton harvesting and its processing, traceability solution for the cotton value chain, extraction of fine chemicals from the cotton by-produce, value addition to cotton biomass with a focus on renewable energy solutions and bring in transparency in cotton marketing through objective grading system at field level.

The significant achievements during the year include release of the institute technology on cut resistance gloves on the ICAR foundation day, certification of 8 technologies developed at the institute by the Council, commercialization of 5 technologies, 39 research publications in journals. In the intellectual property front, two patents were granted to the institute and 17 MoU's were signed for collaboration in research, education and technology commercialization. Institute has achieved new heights in revenue generation with Rs. 4.12 crore earned during the year.

I take this opportunity to acknowledge the contribution made by the present scientific, technical and administrative staff working at the institute and also those who have rendered their service in the past for creating a legacy of 100 years and more to come in the coming years.

**S.K. Shukla**  
Director

## कार्यकारी सारांश

1924 में स्थापित भाकृअनुप - केन्द्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान (आईसीएआर-सिरकॉट) कृषि इंजीनियरिंग एसएमडी के तहत आईसीएआर का एक प्रमुख संस्थान है, जो कपास मूल्य श्रृंखला पर सकारात्मक प्रभाव डाल रहा है, जिससे कपास किसानों और कपड़ा उद्योग को लाभ हो रहा है। संस्थान को कपास और उसके कृषि अवशेषों के प्रसंस्करण, मूल्यवर्धित उत्पादों के विकास और कपास की गुणवत्ता के आकलन पर बुनियादी और रणनीतिक अनुसंधान का कार्य सौंपा गया है, जिसका उद्देश्य कपास प्रौद्योगिकी में वैश्विक उत्कृष्टता प्राप्त करना है। संस्थान कौशल विकास के साथ-साथ उद्भवन सेवाएं भी प्रदान कर रहा है और संस्थान को कपास रेशों के लिए रेफरल प्रयोगशाला के रूप में मान्यता प्राप्त है।

संस्थान ने कपास क्षेत्र की सेवा में अपनी यात्रा के 100 वर्ष पूरे करके 2024 में एक मील का पत्थर हासिल किया। कपास की गुणवत्ता के आकलन के लिए एक परीक्षण प्रयोगशाला के रूप में शुरुआत करने और तत्कालीन बॉम्बे के कपड़ा मिल क्षेत्रों में व्यापक उपस्थिति के साथ, संस्थान ने एक सदी में उभरते मुद्दों को संबोधित करने और हितधारकों की बदलती जरूरतों को पूरा करने के लिए अपने दायरे को व्यापक बनाया है, और कपास क्षेत्र की सेवा के लिए समर्पण और प्रतिबद्धता के साथ आगे बढ़ रहा है।

भारत के माननीय उपराष्ट्रपति श्री जगदीश धनखड़, उपराष्ट्रपति महोदया, केन्द्रीय कृषि एवं किसान कल्याण मंत्री श्री शिवराज सिंह चौहान, महाराष्ट्र के माननीय राज्यपाल श्री सी.पी. राधाकृष्णन और अन्य गणमान्य व्यक्तियों की उपस्थिति में संस्थान के शताब्दी वर्ष स्थापना दिवस, 03 दिसंबर, 2024 को गौरवान्वित किया गया।

### संस्थान के बारे में:

आईसीएआर-सिरकॉट कपास की चुनाई -पश्चात प्रसंस्करण और उसके उपोत्पाद उपयोग पर बुनियादी और अनुप्रयुक्त अनुसंधान करता है और इन क्षेत्रों में प्रशिक्षण प्रदान करता है।

### संस्थान निम्नलिखित 5 मुख्य क्षेत्रों में अनुसंधान गतिविधियाँ संचालित करता है:

- प्री-ओटनिंग और ओटनिंग;
- यांत्रिक प्रसंस्करण, तकनीकी वस्त्र और मिश्रित वस्त्र;
- अभिलक्षण - कपास और अन्य प्राकृतिक रेशे, सूत और वस्त्र;
- कपास का रासायनिक और जैवरासायनिक प्रसंस्करण

और बायोमास एवं उपोत्पाद उपयोग; और,

- उद्यमिता और मानव संसाधन विकास

### वर्ष 2024 के दौरान संस्थान द्वारा हासिल की गई प्रमुख उपलब्धियाँ इस प्रकार हैं:

#### • अनुसंधान

वर्ष 2024 के दौरान निम्नलिखित मशीनरी, प्रक्रिया प्रौद्योगिकी, नए मूल्यवर्धित उत्पाद और अन्य महत्वपूर्ण अनुसंधान उपलब्धियाँ प्राप्त हुई हैं।

- लॉग स्टेपल कपास के एचवीआई मशीन परीक्षण के लिए लॉग स्टेपल अंशांकन कपास
- प्रभावी आंतरिक वायु निस्पंदन के लिए सक्रिय चारकोल एम्बेडेड बहुपरत कपड़े का उपयोग करके वायु शोधक परदा।
- नवीन जैव नैनो मिश्रित फिल्म: सिंथेटिक पैकेजिंग का पर्यावरण अनुकूल विकल्प।
- बेहतर मजबूती के साथ कॉयर-मिश्रित घन प्रबलित कंक्रीट।
- पॉलीस्टाइरिन थर्मोकोल के प्रतिस्थापन के रूप में लिग्रो सेल्यूलोसिक फोम सामग्री
- गुलाब की खेती करने वाले किसानों के लिए सूती सुरक्षात्मक दस्ताने।

#### • प्रौद्योगिकी का विमोचन और प्रमाणन

- आईसीएआर स्थापना दिवस 2024 के दौरान "औद्योगिक बहुस्तरीय बुने हुए कट-प्रतिरोधी दस्ताने" प्रौद्योगिकी का विमोचन किया गया।
- आईसीएआर स्थापना दिवस 2024 के दौरान, आईसीएआर-सिरकॉट की आठ प्रौद्योगिकियों को मान्यता दी गई और प्रमाण पत्र प्रदान किए गए, जिनमें से 'भारतीय जिनरियों में कपास ओटाई के लिए प्रयुक्त वन-टाइम प्री गूड क्रोम लेदर रोलर्स' प्रौद्योगिकी को आईसीएआर के कृषि अभियांत्रिकी प्रभाग के अंतर्गत विकसित शीर्ष चार प्रौद्योगिकियों में स्थान दिया गया।

#### • व्यवसायीकरण

वर्ष 2024 में संस्थान द्वारा विकसित 5 प्रौद्योगिकियों का व्यवसायीकरण किया गया।

- **प्रकाशन**  
रेफरीड समीक्षा पत्रिकाओं में 39 शोध पत्र प्रकाशित; 23 सम्मेलन पत्र; 11 पुस्तक, 14 पुस्तक अध्याय, 23 लोकप्रिय लेख और लगभग 07 ब्रोशर/पत्रक आदि प्रकाशित।
- **कौशल विकास कार्यक्रम**
- ATMA और स्मार्ट कॉटन पहल के अंतर्गत लगभग 39 कौशल विकास कार्यक्रम आयोजित किए गए, जिनसे लगभग 630 किसानों, प्रमुख संसाधन व्यक्ति (Lead Resource Person) और कृषि अधिकारियों सहित लगभग 1230 हितधारकों को लाभ हुआ।
- वर्ष 2024-25 के दौरान प्रशिक्षण से ₹63.00 लाख की आय हुई।
- **प्रौद्योगिकी प्रबंधन और लोकप्रियकरण**
- **पेटेंट**
  - (i) नैनोफाइबर उत्पादन और नैनोकणों को नैनोफाइबर में समाहित करने के लिए प्रोफाइल्ड मल्टी-पिन इलेक्ट्रोस्पिनिंग। पेटेंट संख्या: 5269071
  - (ii) पौधों के लिए जैवनिम्नीकरणीय बहुलक नैनोफाइबर पोषक तत्व मैट्रिक्स और उसे तैयार करने की विधि। पेटेंट संख्या: 5537931
- **कॉपीराइट**
  - (i) "प्लांट पैथोपीपीआई: प्लांट-पैथोजन प्रोटीन-प्रोटीन इंटरैक्शन प्रेडिक्शन टूल" 2024 के लिए कॉपीराइट अनुदान।
  - (ii) "एसीआरसीएएसपीपीआई: एंटी-क्रिस्पर और क्रिस्पर कैस प्रोटीन-प्रोटीन इंटरैक्शन प्रेडिक्शन टूल" 2024 के लिए कॉपीराइट अनुदान।
  - (iii) "भौतिक गुणों के आधार पर फलों/सब्जियों के सामूहिक मॉडलिंग हेतु कार्यक्रम" शीर्षक से कॉपीराइट (अनुरोध संख्या 154362) 12-09-2024 को दायर किया गया है।
- इस अवधि के दौरान उन्नीस परामर्श परियोजनाएँ क्रियान्वित की गईं।
- **शैक्षणिक/अनुसंधान सहयोग और प्रौद्योगिकी**  
व्यावसायिकरण के लिए सोलह समझौता ज्ञापनों पर हस्ताक्षर किए गए और C I R C O T R K V Y - R A F T A A R कृषि-व्यवसाय इनक्यूबेटर के अंतर्गत इनक्यूबेशन के लिए स्टार्ट-अप के साथ एक समझौता ज्ञापन पर हस्ताक्षर किए गए।
- एमजीएमजी कार्यक्रमों, ATMA और स्मार्ट कॉटन प्रशिक्षण पहल के अंतर्गत इक्कीस **जागरूकता सह प्रदर्शन कार्यक्रम** आयोजित किए गए। तेरह प्रदर्शनियों में भाग लिया गया और संस्थान के वैज्ञानिकों ने हितधारकों के बीच संस्थान की प्रौद्योगिकियों को लोकप्रिय बनाने के लिए विभिन्न बैठकों, संगोष्ठियों, कार्यशालाओं और सम्मेलनों में भाग लिया।
- **मीडिया**
  - संस्थान के वैज्ञानिकों द्वारा ऑल इंडिया रेडियो, अस्मिता वाहिनी, मुंबई पर तीन रेडियो वार्ताएँ दी गईं और तीन टीवी वार्ताएँ प्रसारित की गईं और आइसीएआर-सिरकॉट के शताब्दी समारोह के संबंध में दो टीवी कवरेज प्रसारित किए गए। उल्लेखनीय रूप से, संसद टीवी ने एक खंड में CIRCOT के शताब्दी समारोह को कवर किया। माननीय उपराष्ट्रपति की ICAR-CIRCOT यात्रा का प्रसारण आधिकारिक हैंडल @Vicepresidentofindia.nic.in पर भी किया गया। भारतीय कृषि अनुसंधान परिषद की वेबसाइट पर "ICAR CIRCOT ने कपास प्रौद्योगिकी में उत्कृष्टता के सौ वर्ष पूरे किए" शीर्षक से समाचार अपलोड किया गया।
- **सोशल मीडिया**
  - CIRCOT ने संस्थान के फेसबुक, यूट्यूब, एक्स और इंस्टाग्राम पेजों तथा अपनी वेबसाइट के माध्यम से अपनी तकनीकों का प्रचार करके सोशल मीडिया में भी अपनी उपस्थिति दर्ज कराई। (Facebook 1989 यूजर्स, Youtube 446 यूजर्स, Twitter 667 यूजर्स, Instagram 104 यूजर्स)
- **शताब्दी समारोह**
  - संस्थान के शताब्दी वर्ष के उपलक्ष्य में संस्थान परिसर में शताब्दी स्तंभ स्थापित किया गया है, जिसका अनावरण 03 दिसंबर, 2024 को भारत के माननीय उपराष्ट्रपति के हाथों किया गया।
  - आइसीएआर-सिरकॉट शताब्दी व्याख्यान श्रृंखला: प्रख्यात शोधकर्ताओं और प्रसिद्ध हस्तियों द्वारा सात शताब्दी व्याख्यान दिए गए।
  - 27 सितंबर 2024 को 'भारत में कपास कटाई के मशीनीकरण को सफलतापूर्वक अपनाने की चुनौतियाँ और

रणनीतियाँ' विषय पर राष्ट्रीय संगोष्ठी का आयोजन किया गया।

- 29 अप्रैल, 2024 को "बौद्धिक संपदा और सतत विकास लक्ष्य" विषय पर संगोष्ठी का आयोजन किया गया।
- 16 मई, 2024 को नागपुर में कपास वस्त्र निर्यात संवर्धन परिषद (टेक्सपोसिल), मुंबई और विदर्भ कपास संघ, नागपुर के सहयोग से जीटीसी, आइसीएआर-सिरकॉट द्वारा "विदर्भ कपास को कस्तूरी के रूप में ब्रांडिंग" विषय पर राष्ट्रीय कार्यशाला का आयोजन किया गया।
- 3-4 दिसंबर, 2024 को शताब्दी स्थापना दिवस के अवसर पर कृषि-स्टार्ट-अप सम्मेलन का आयोजन किया गया।
- **प्रत्यायन**
- भारतीय मानक ब्यूरो द्वारा गुणवत्ता प्रबंधन प्रणाली हेतु ISO 9001:2015 के साथ 28 जून, 2026 तक मान्यता प्राप्त।
- ISO/IEC 17025:2017 के अंतर्गत सूती रेशे के धागे और कपड़ों के यांत्रिक और भौतिक परीक्षण हेतु NABL के अंतर्गत मान्यता प्रमाणपत्र का नवीनीकरण किया गया है और यह 1 मार्च, 2026 तक मान्य है। मान्यता के दायरे में यांत्रिक और रासायनिक परीक्षण सहित 44 मानदंड शामिल हैं।
- कस्तूरी कपास के परीक्षण और अनुरूपता मूल्यांकन हेतु सूचीबद्ध प्रयोगशाला। संस्थान ने "कस्तूरी कपास" ब्रांडिंग के लिए प्रोटोकॉल प्रदान किया।
- आइसीएआर-सिरकॉट, भारतीय समाशोधन निगम लिमिटेड और मल्टी कमोडिटी एक्सचेंज ऑफ इंडिया लिमिटेड के साथ अनुमोदित परखकर्ता के रूप में कार्यरत रहा।
- **वाणिज्यिक सेवाएँ**
- वर्ष 2024 - 2025 के दौरान, मुंबई मुख्यालय, जीटीसी, नागपुर और अन्य क्षेत्रीय इकाइयों में कुल 54,514 नमूनों का परीक्षण किया गया, जिससे कुल ₹214.31 लाख का राजस्व प्राप्त हुआ।
- आइसीएआर-सिरकॉट अंशांकन कपास (HVI) उपकरणों के अंशांकन हेतु यूएसडीए मानकों का एक आयात विकल्प) - हितधारकों को 108 कंटेनर बेचे गए, जिससे वित्तीय वर्ष 2024-25 के दौरान ₹1.02 लाख का राजस्व प्राप्त हुआ।

## इनक्यूबेशन

- आइसीएआर-सिरकॉट में एबीआई केंद्र: चार नए उद्यमियों को इनक्यूबेशन के लिए प्रवेश दिया गया, बारह इनक्यूबेटी स्नातक हुए और छह इनक्यूबेशन प्रगति पर हैं।
- जनवरी से दिसंबर 2024 की अवधि के दौरान\* आइसीएआर-सिरकॉट-रफ्तार-कृषि व्यवसाय इनक्यूबेटर (आर ए बी आई) के 8वें कोहर्ट के अंतर्गत 04 प्री-सीड और 16 सीड स्टेज कृषि स्टार्टअप के लिए कृषि अभिविन्यास कार्यक्रम (AOP) और सीड कृषि-नवाचार कार्यक्रम (SAIP), मार्च 2024 से मई 2024 के दौरान आयोजित किए गए।\* 9वें कोहर्ट के 03 प्री-सीड और 20 सीड स्टेज कृषि स्टार्टअप के लिए AOP और SAIP 12 दिसंबर 2024 से शुरू हो गए हैं।\* 7वें कोहर्ट की कोहर्ट निवेश समिति (CIC) ने 01 प्री-सीड स्टार्टअप के लिए 5.00 लाख रुपये और 8 सीड स्टेज स्टार्टअप के लिए 195.00 लाख रुपये और 8वें कोहर्ट की स्टार्टअप निवेश समिति (एसआईसी) ने 02 प्री-सीड और 12 सीड स्टेज कृषि स्टार्टअप को क्रमशः 8.00 लाख रुपये और 245.00 लाख रुपये के वित्त पोषण की सिफारिश की।\* स्थापना के बाद से, आइसीएआर-सिरकॉट-रफ्तार-कृषि व्यवसाय इनक्यूबेटर (आर ए बी आई) ने 159 स्टार्टअप को इनक्यूबेट किया है, जिनमें से 81 स्टार्टअप को 1235.75 लाख रुपये के अनुदान सहायता के साथ वित्त पोषित किया गया है।

## वित्तीय प्रबंधन

- संस्थान में सभी लेन-देन शत-प्रतिशत डिजिटल और नकद रहित हैं।
- संस्थान ने वित्त वर्ष 2024-25 के दौरान स्वीकृत बजट आवंटन का पूर्ण उपयोग (100%) सुनिश्चित किया।
- वित्त वर्ष 2024-25 में राजस्व सृजन रिकॉर्ड ₹412.11 लाख रहा।

## अन्य गतिविधियाँ

- "स्वभाव स्वच्छता - संस्कार स्वच्छता" विषय पर स्वच्छता ही सेवा और स्वच्छता पखवाड़ा आयोजित करके स्वच्छ भारत अभियान कार्यक्रम का क्रियान्वयन किया।
- अंतर्राष्ट्रीय योग दिवस, अंतर्राष्ट्रीय महिला दिवस, सतर्कता जागरूकता अभियान, हिंदी चेतना माह, हिंदी पखवाड़ा आदि मनाया गया।

# EXECUTIVE SUMMARY

ICAR-Central Institute for Research on Cotton Technology (CIRCOT), established in 1924, is a premier institute of ICAR under the Agricultural Engineering SMD, making a positive impact on cotton value chain benefitting the cotton farmers and textile industry. The institute is mandated with Basic and Strategic research on processing cotton and its agro residues, development of value-added products & cotton quality assessment with a vision of achieving Global Excellence in Cotton Technology. The institute is providing skill development as well as incubation services and is recognized as referral laboratory for cotton fibres.

The institute attained a milestone in 2024 by completing 100 years of its journey in the service to the cotton fraternity. Beginning as a Technological laboratory for cotton quality assessment, with its presence in the textile mills areas in then Bombay, over the years the institute has widened its scope to address the emerging issues throughout a century and serve the changing needs of the stakeholders, and is moving ahead with dedication and commitment to serve the stakeholders.

The centenary year foundation day at the institute on December 03, 2024, was honoured by the presence of Hon'ble Vice President of India Shri Jagdeep Dhankhar, Madam Vice-President, Union Minister of Agriculture & Farmers Welfare Shri Shivraj Singh Chouhan, Hon'ble Governor of Maharashtra Shri C.P. Radhakrishnan and other dignitaries.

## About the Institute:

ICAR-CIRCOT conducts basic and applied research in the post-harvest processing of cotton & its byproduct utilization and imparts training in these areas. The Institute undertakes research activities in the following five major core areas:

- Pre-ginning and Ginning;
- Mechanical processing, Technical textiles and Composites;
- Characterization - Cotton and other natural fibres, yarns and textiles;
- Chemical and Biochemical processing of cotton and biomass & by-product utilization; and,
- Entrepreneurship and Human Resource Development

*The salient achievements made by the institute during 2024, are:*

## Research

During the year, the following machinery, process technology, value-added products and other significant research outcomes have been achieved,

- Extra Long Staple Calibration Cotton for calibration of HVI machines for ELS cotton.
- Air Purifying curtain using activated charcoal embedded multilayer fabric for effective indoor air filtration.
- Novel bio nano composite film: Eco friendly alternative to synthetic packaging.

- Coir-composite cube reinforced concrete with improved strength.
- Ligno-cellulosic foam material as replacement to polystyrene thermocol.
- Cotton based protective gloves for rose cultivation farmers.

### Technology Release and Certification

- The Technology “Industrial multi layered woven cut-resistance gloves” was released during ICAR foundation day 2024.
- Eight technologies of ICAR-CIRCOT were acknowledged with certificates, during ICAR foundation day 2024, out of which ‘One time pre-grooved chrome leather rollers used for cotton ginning in Indian ginneries’, was ranked among the top four technologies, developed under the Agricultural Engineering Division of ICAR

### Publications

- Published 39 research papers in peer reviewed journals; 23 Conference papers; 11 Books, 14 Book chapters, 23 popular articles and 07 Brochures/Leaflets.

### Skill Development Programmes

- Thirty-nine skill development programmes were organized benefitting about 1228 stakeholders including 630 farmers.
- Revenue generated from training during 2024-25 was Rs. 63.00 lakhs.

### Technology Management and Popularization

#### Patents

- Profiled Multi-pin Electrospinning for nanofibre production and encapsulation of

nanoparticle into nanofibre. (Patent No:526907)

- Biodegradable polymeric nanofibre nutrient matrix for plants and method to prepare the same. (Patent No:553793)

#### Copyright

- (I) “Plant Patho Ppi: Plant Pathogen Protein Protein Interaction Prediction Tool”. (Reg. No.SW-19816/2024)
- (ii) “ACRCASPPI: Anti Crispr and Crispr-Cas Protein-Protein Interaction Prediction Tool” (Reg. No.SW-19805/2024)
- (iii) Copyright titled “Program for mass modelling of fruits/vegetables based on physical properties” (filed on 12/9/2024)

#### Commercialization

Five technologies were commercialized in the year 2024

#### Consultancy

Eight consultancy projects were implemented during the period.

#### Collaboration

Sixteen MoUs were signed for academic cooperation, research collaboration and technology commercialization and one MoA were signed with Start-Up for incubation under CIRCOT RKVY RAFTAAR Agri-Business Incubator.

#### Awareness program and Exhibition

Twenty-one awareness cum demonstration programme was organized, including M G M G programmes, ATMA and S M A R T cotton initiative.

Participated in thirteen exhibitions. Institute scientists participated in various meetings, seminars, workshops and conferences for popularizing institute technologies among stakeholders.

#### *Mass Media*

Three Radio talks on All India Radio, Asmita Vahini, Mumbai were delivered by institute scientists. Three TV talks were broadcast and Two TV coverage of Centenary celebration of ICAR CIRCOT were telecast. Notably, the Sansad TV covered the Centenary celebration of CIRCOT in a special segment. The visit of the Hon'ble Vice president to ICAR CIRCOT was also broadcast on the official handle @Vicepresidentofindia.nic.in. The news item titled, "ICAR-CIRCOT Marks Hundred Years of Excellence in Cotton Technology", was uploaded on the Indian Council of Agricultural Research website.

#### *Social Media*

CIRCOT further registered its presence in the social media by promoting its technologies through the Facebook (No. of followers-1989), YouTube (No. of followers 446), X (No. of followers-667) and Instagram (No. of followers-104).

### **Centenary Celebrations**

- **The Centenary pillar** to commemorate the centenary year of the institute has been erected in the institute premises which was unveiled at the hands of Hon'ble Vice President of India on December 03, 2024.
- ICAR-CIRCOT Centenary Lecture Series: **Seven Centenary Lectures** were delivered

by eminent researchers and renowned personalities.

- National Seminar on 'Challenges and Strategies for the Successful Adoption of Mechanization of Cotton Harvesting in India" was organised on September 27, 2024.
- Seminar on "Intellectual Property and the Sustainable Development Goals" was organized on April 29, 2024.
- National Workshop on "Branding of the Vidarbha Cotton as Kasturi" was organized by GTC, ICAR-CIRCOT in association with The Cotton Textiles Export Promotion Council (TEXPOCIL), Mumbai and Vidarbha Cotton Association, Nagpur at Nagpur on May 16, 2024.
- Agri-Start-up conclave was organised on the occasion of Centenary Foundation Day on December 3-4, 2024.

#### **Accreditation**

- Accreditation with ISO 9001:2015 for Quality Management System by Bureau of Indian Standards till June 28, 2026
- Certificate of Accreditation under NABL for Mechanical and Physical testing of cotton fibre yarn and fabrics under ISO/ IEC 17025:2017 was renewed and is valid up to March 01, 2026. The scope of accreditation covers 44 parameters covering Mechanical and Physical testing.
- Empaneled Laboratory for testing and conformity assessment of Kasturi Cotton. The institute provided the Quality Standard for "Kasturi Cotton" branding.

- ICAR-CIRCOT continued as Approved Assayer with Indian Clearing Corporation Ltd. and Multi Commodity Exchange of India Ltd.

### Commercial Services

- During 2024-25, a total of 54,514 samples were tested at Mumbai headquarters, GTC, Nagpur and other regional units generating a total revenue of Rs. 214.31 lakh through commercial *testing in FY 2024-25*.
- ICAR-CIRCOT calibration cotton (an import substitute for USDA standards for calibrating HVI equipment) -108 containers sold to stakeholders generating revenue of Rs. 1,02,060/- during the year 2024-25.

### Incubation Services

- Four new entrepreneurs admitted for incubation, twelve incubatees graduated and six incubations are in progress at the ABIC of CIRCOT.
- RKVY-RAFTAAR - Agri Business Incubator (R-ABI) is functioning at ICAR-CIRCOT. During the period (Jan to Dec 2024), 8th and 9th cohorts were under progress, 2 AOP and 2 SAIP were completed for 7 pre-seed and 36 seed stage startups. The CIC of 7th Cohort & SIC of 8th Cohort recommended for funding of 20 seed stage and 03 pre seed stage startups with Grand in Aid of Rs. 440 lakhs and Rs. 13 lakhs (seed & pre seed founding) respectively.

### Financial Management

- All transactions in the Institute are 100% digital and cashless.

- The Institute ensured complete utilization (100%) of the sanctioned budget allocation during FY 2024-25
- The revenue generation in FY 2024-25 was a record Rs. 412.11 lakhs.

### Other activities

- Implemented Swachh Bharat Abhiyan programme by organizing Swachhta Hi Sewa with the theme “Swabhav Swachhata – Sanskar Swachhata” and Swachhta Pakhawada.
- Observed International Yoga Day, International Women's Day, Vigilance Awareness campaign, Hindi Chetna Maas, Hindi Pakhwada etc.

# 1. Introduction

This 100th Annual Report of the ICAR-Central Institute for Research on Cotton Technology (CIRCOT) covers the period from January 1, 2024 to December 31, 2024.

CIRCOT was established in the year 1924 as Technological Laboratory by the then Indian Central Cotton Committee (ICCC). After the abolition of commodity committees including the ICCC, the administrative control of the institute was transferred to the Indian Council of Agricultural Research (ICAR) and the name of the Institute was changed to Cotton Technological Research Laboratory (CTRL) in 1966. This name was changed to Central Institute for Research on Cotton Technology (CIRCOT) with effect from 1st April 1991.

ICAR-Central Institute for Research on Cotton Technology (CIRCOT) is a Premier Institute under the Indian Council of Agricultural Research (ICAR), mandated to carry out basic and strategic research in post-harvest technology of cotton and value addition to its by-produce. It is globally unique in its R&D efforts on utilizing every part of the cotton plant and serves as a referral laboratory for cotton fibres. Since the initiation of the All India Coordinated Cotton Improvement Programme (AICCI) in 1966 (renamed as All India Coordinated Research Project (AICRP) on cotton recently), the Institute has been providing technological assistance for breeding, with particular focus on fibre quality. The Institute is also committed to enhancing the skills of farmers and other stakeholders in the sector through its Skill Development Programmes, as well as providing Agri-business incubation services and other commercial services such as testing, consultancy and contract research. The Institute has been a pioneer in the world of post-harvest cotton technology research and has made significant contributions over the past 100 years. ICAR-CIRCOT is accredited with ISO 9001:2015 for the Quality Management System by BIS and is also an NABL accredited Laboratory (ISO 17025:2005) for Mechanical and Physical testing. The institute was recipient of Sardar Patel Best

ICAR Institution Award in 2004 and again in 2019, (under the small institute category).

## **Vision**

*“Global Excellence in Cotton Technology”*

## **Mission**

*“To provide scientific and managerial interventions to post-harvest processing and value addition to cotton and utilization of its by-produce to maximize economic, environmental and societal benefits”*

## **Mandate**

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*

ICAR-CIRCOT is headquartered in Mumbai, with regional units located in the northern, central, and southern cotton producing zones. The six regional units of the institute are, Ginning Training Centre (GTC), located at Nagpur and Quality Evaluation Units (QEU) situated in Coimbatore, Dharwad, Guntur, Sirsa and Surat.

The Institute has four distinct research divisions namely,

- Quality Evaluation and Improvement Division (QEID)
- Mechanical Processing Division (MPD)
- Chemical and Biochemical Processing Division (CBPD)
- Engineering Technology Transfer Division (ETTD).

The four divisions along with the regional units facilitate the various activities of the institute viz., Research, Skill Development, Technology Transfer, and Commercial Services including

testing, consultancy, and incubation in the field of post-harvest processing of cotton and value addition to its by-produce and biomass.

### Research

The primary mandate of the institute is to undertake basic and strategic research on processing of the cotton & its by-produce and development of value-added products. The institute's research initiatives are focused on five core areas.

- Pre-ginning and Ginning
- Mechanical Processing, Technical textiles and Composites
- Characterization: Cotton and other Natural Fibres, Yarns and Textiles
- Chemical and Biochemical Processing and Biomass & By-product Utilization
- Entrepreneurship and Human Resource Development

ICAR-CIRCOT is the designated Lead institute and the Nodal Centre for implementing the Consortia Research Platform (CRP) on Natural Fibres project. The objectives of CRP on Natural Fibres project are,

- To exploit the available natural fibres and their by-products by using high end technologies to fuel the growth of fibre sector in India and in turn the farm income as a whole.
- To identify and isolate newer fibrous raw materials for value addition and thereby provide enhanced income to all the stakeholders in the value chain.

The institute has also played a crucial role in the modernization of the ginning industry in the country through the Technology Mission on Cotton (TMC) Phase I. Its research in ginning machinery has not only made the

country self-reliant, but has also turned it into a net exporter of ginning machinery, with exports to Afro-Asian countries. Additionally, ICAR-CIRCOT has been supporting the private sector in their R&D efforts for the development of machinery in the area of post-harvest processing of cotton and value addition to agro-biomass.

Over the years, the institute has successfully commercialized various machines and products, including 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, village level sliver making machine, cotton lint opener, rubber composites for flexi check dam, and many more. The institute has also developed and demonstrated numerous process technologies for value addition of cotton fibres and cotton biomass. In its commitment to promoting the effective utilization of cotton stalks, the institute has developed a low-cost green crematorium and continuously feeding pellet stove which utilises cotton stalk-based briquettes and pellets, and has commercialised them through technology licensing.

The Institute has focused on expanding the diverse use of cotton by creating various products and techniques such as cotton rich blended fabrics for sportswear, utilizing cotton in technical textiles, particularly in medical & protective textiles. CIRCOT has also explored into producing Naturally Coloured Cotton products besides apparels from Banana pseudostem fibres. The institute has also played a role in promoting environmental friendly chemical processing and finishing of cotton textiles. A

significant amount of research has been conducted on extracting and applying natural dyes to cotton textiles, developing eco-friendly mosquito repellent finishes for textile materials using natural extracts, salt free dyeing technology, and more. The institute is actively involved in shaping BIS and ISO standards for the identification of natural dyes. Additionally, the institute has devised a solvent extraction process and a microbial process for removing gossypol from cotton seed meal, allowing for its use as non-ruminant feed.

ICAR-CIRCOT has also achieved significant advancements in nanotechnology research and its application in textiles, composites and agriculture. In 2015, the Institute established India's first Nanocellulose Pilot Plant facility to produce nanocellulose from cotton linter through an indigenous chemo mechanical process. The institute has pioneered in developing methods to apply various functional finishes to cotton textiles, including anti-microbial, UV protective, and water repellent finishes using nanomaterials. Furthermore, nanocellulose has been successfully applied in cement concrete, rubber composite, pulp and paper industries to enhance functional properties. The institute has also demonstrated the production of security grade paper by blending cotton with natural fibre pulp and incorporating security features.

In the domain of using nanotechnology in fertilizer applications, research at CIRCOT has been able to develop an indigenous technology with stable nanoparticles in Nano-Zn suspension as a fertilizer formulation. This technology has been commercialized. Current research efforts are on in the utilization of Nano Sulphur, produced by the Institute, in fertilizer formulations for various crops.

Further, the institute has initiated a range of projects that align with the government's initiative to double the income of farmers. These include enhancement of economic value of cotton stalks by converting them into compost, promoting mushroom cultivation using cotton biomass, and producing briquettes and pellets from cotton stalks for renewable energy generation. These activities are aimed to boost farm income and provide economic benefits and opportunities for farmers.

### Quality Assessment

The institution has developed indigenous Standard Reference Material known as "ICAR-CIRCOT calibration cotton," which is an import substitute for the USDA reference material utilized in calibrating fibre testing equipment like the High-Volume Instrument (HVI). Further, identifying the need to have suitable calibration cotton for Extra Long Staple (ELS) cotton varieties which India imports for domestic consumption, ICAR-CIRCOT, in 2024, developed indigenous ELS calibration cotton suitable for calibration of HVI machines used for ELS cotton testing. The testing protocol for evaluating quality of ELS cotton is different from the short, medium and long staple cottons.

Recently the Indian Government has launched the distinct brand "Kasturi Cotton India" for global visibility of the Indian cotton, in line with the distinct cotton branding followed by USA (Pima) and Egypt (Giza). TEXPROCIL have been authorized to grant 'Kasturi Cotton India' brand certificate and ICAR-CIRCOT is identified as an empanelled laboratory for testing and conformity assessment of Kasturi Cotton and plays vital role in fixing the quality norms for quality parameters of 'Kasturi Cotton India'.

ICAR-CIRCOT has also become Approved Assayer of Multi Commodity Exchange Clearing Corporation Ltd (MCXCL) for Quality Analysis

of Cotton Bales and for conducting quality evaluation of cotton in the commodity market.

### Skill Development

The Institute has been providing customized skill development programme at both national and international levels. Additionally, the institute offers training programme for farmers on post-harvest processing and value addition to cotton by-products, as well as enhancing farm income through production and processing at the village level. In 2024, ICAR-CIRCOT's Ginning Training Centre in Nagpur has conducted training sessions for over 200 agricultural officers and lead resource persons from FPOs as part of the Maharashtra Agribusiness and Rural Transformation (SMART) Livelihood project, which is funded by the World Bank. Besides, the institute has provided training in Double Roller Ginning Technology and Basics of Cotton Grading, Nanotechnology & its Advanced Applications, Cotton Quality Evaluation and Grading and By-product Utilization, DR Gin setting and maintenance, Post-harvest processing of cotton and value addition to cotton by-produce, Advanced characterization of cotton quality and its spinning & Dyeing performance, Composite material, Electrospinning for Nanofibre production, benefitting about 1230 stakeholders comprising of farmers, FPO's, Government officials in agriculture department, SC beneficiaries, researchers, academicians, students, industry personnel, ginners, traders and Agripreneurs.

Besides, Capacity Building, in-plant training is being organised at CIRCOT laboratories for students from Agriculture, Post-harvest and allied sector, benefitting about 110 students from various academic colleges/institutes. In the past, the institute has actively participated in fulfilling the capacity-building needs of the cotton industry in African countries, via the Cotton Technical Assistance Programme (Cotton TAP) for Africa. Additionally, ICAR-CIRCOT has provided support at the United Nations Conference on

Trade and Development (UNCTAD) in executing a UN Development Project designed to enhance the promotion of cotton by-products in Eastern and Southern Africa.

### Incubation Services

The Agri-Business Incubation (ABI) Centre at the institute is dedicated to nurturing and supporting new enterprises that employ innovative technologies for post-harvest processing and enhancing the value of cotton and its biomass, aligning with the Start-Up India initiative by the Government. CIRCOT RKVY RAFTAAR Agri Business Incubator (CIRCOT-R-ABI) was granted approval by the RKVY Division, Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India in January 2019. The incubator provides financial support in the form of a grant-in-aid to agripreneurs for product development, commercialization, and business expansion in agriculture and allied sector.

### Commercial Services

ICAR-CIRCOT is widely acknowledged as a leading laboratory specializing in the testing of cotton fibres, yarn, and textiles composed of cotton blends with other fibres. It offers commercial services to various stakeholders within the cotton value chain. Numerous testing facilities within the institution have been accredited with ISO 17025:2005 by the National Accreditation Board for testing and Calibration of laboratories (NABL) since 1999.

### Research Management & Administration

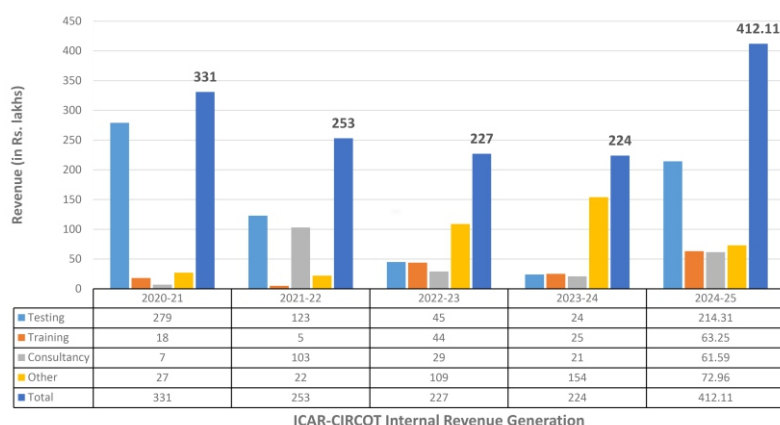
The Institute is administered by the Director, who receives support from the Heads of the Divisions, as well as the administration and finance & accounts sections. The Research Advisory Committee (RAC), which was established by the Council, aids the Director in organizing the institute's research programs. The Institute Management Committee provides crucial support in the administration of the institute's operations. The Director supervises the progress

of the institute's research initiatives through the Institute Research Council, which meets bi-annually. The Priority-setting, Monitoring and Evaluation (PME) Cell supports the Director in evaluating the effectiveness of various research projects, managing communications with the council, and more.

ICAR-CIROT Staff strength as on 31-12-2024

Category	Sanctioned Strength	In position	Vacancy
Scientific Staff	48	29 + 03*	16
Technical Staff	106	60	46
Administrative Staff	37	16	21
Skilled Support Staff	36	18	18
<b>Total</b>	<b>227</b>	<b>126</b>	<b>101</b>

\*Scientists are on lien (Tenure Post)



ICAR-CIRCOT Internal Revenue Generation

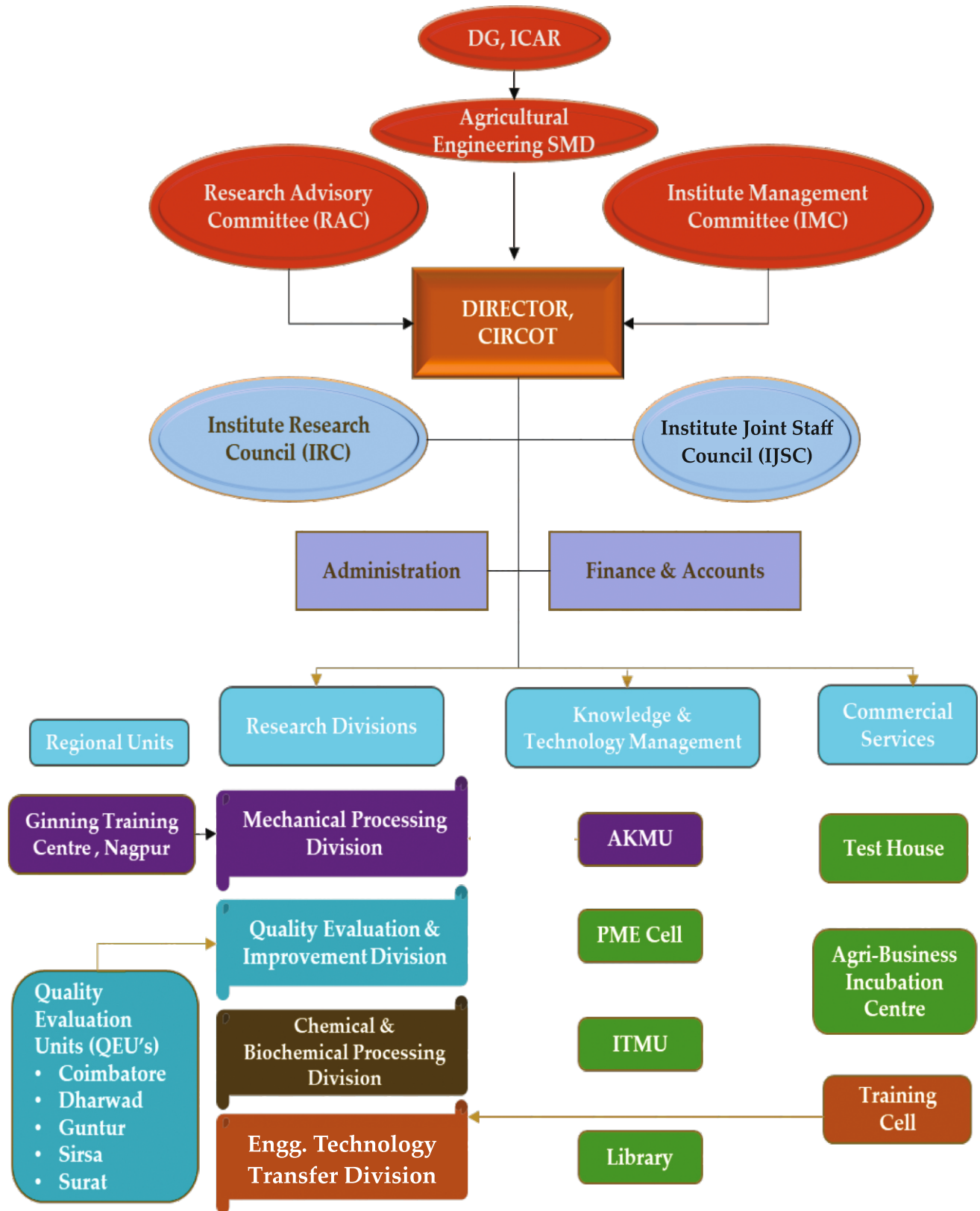
### Fund Utilization under ICAR-CIRCOT (including SCSP) (Rs. in lakhs)

Head of Expenditure		FY 2023-24			Apr- Dec, 2024	
		Allocation	Expenditure	Utilization %	Allocation	Expenditure
Grant-in-Aid-Capital		364.89	364.89	100%	475.00	127.30
Grant-in-Aid-Salaries		1945.05	1945.05	100%	2040.27	1694.50
Grant-in-Aid-General	Pension only	325.08	325.08	100%	667.90	492.77
	Other than Pension	669.30	669.30	100%	765.00	465.87
<b>Total</b>		<b>3304.32</b>	<b>3304.32</b>	<b>100%</b>	<b>3948.17</b>	<b>2780.44</b>

### Fund Utilization under CRP on Natural Fibres (Rs. in lakhs)

Head of Expenditure	FY 2023-24			Apr- Dec, 2024	
	Allocation	Expenditure	Utilization %	Allocation	Expenditure
Grant-in-Aid-Capital	20.00	20.00	100%	25.00	4.03
Grant-in-Aid-General (Other than Pension)	45.00	45.00	100%	80.00	54.82
<b>Total</b>	<b>65.00</b>	<b>65.00</b>	<b>100%</b>	<b>105.00</b>	<b>58.85</b>

Organogram of ICAR-CIRCOT, Mumbai



## 2. Salient Research Achievements

### CORE AREA I: PRE-GINNING AND GINNING

#### 1.1 Optimization Trials on Lint Cleaning (MP.101)

A series of optimization trials to assess the performance of the different lint cleaner configurations were conducted at the Ginning Training Centre (GTC), Nagpur. The different lint cleaner configurations studied include spike-type three-cylinder lint cleaner, spade-type three-cylinder lint cleaner and a spike-type six-cylinder lint cleaner. Around 1.5 tonnes of seed cotton was ginned to obtain lint for these trials.

Experiments were first conducted on the spike-type six-cylinder lint cleaner, followed by trials on the spike-type three-cylinder lint cleaner, across various cylinder speeds ranging from 250 to 475 RPM. Further trials focused on the spade-type three-cylinder lint cleaner, considering the number of cylinders and machine speed as key parameters. Since only a spade-type three-cylinder lint cleaner was available, its performance was simulated for a six-cylinder configuration by passing samples through it twice. The machine speed was varied across seven levels: 250, 275, 300, 325, 350, 375, 400, 425, 450 and 480 RPM in each case.

A total of 40 experiments were performed, to analyse the effects of machine type, cylinder no., and machine speed on various fibre quality parameters viz., HVI parameters, AFIS parameters, trash content, and lint losses. The results indicated that the spike-type six-cylinder lint cleaner exhibited the highest cleaning

efficiency (29%), followed by the spade-type six-cylinder (20%), spike-type three-cylinder (13.5%), and spade-type three-cylinder lint cleaner (11.7%). However, the spike-type six-cylinder lint cleaner also produced the highest neps count (116), followed by the spike-type three-cylinder (110), spade-type six-cylinder (83), and spade-type three-cylinder (73). An increase in neps count per gram was observed with rising cylinder speed.

Distinct trends in lint loss percentages were noted between spike-type and spade-type lint cleaners. The spike-type three-cylinder and six-cylinder lint cleaners had average lint loss percentages of 0.7% and 1.4%, respectively, while the spade-type three-cylinder and six-cylinder lint cleaners recorded 0.3% and 0.7% losses, respectively. Irrespective of the lint cleaner type, lint losses increased with machine speed. The trials also revealed that variations in machine speed did not significantly impact fibre length, micronaire, or strength. However, an enhancement in colour grade was observed with increasing machine speed in spade-type lint cleaners, whereas an inverse trend was noted in spike-type lint cleaners, where the highest Rd value was recorded at lower speeds, and increasing cylinder speed led to a decline in colour grade.



Fig. 1.1.1 Spike Type Cylinder lint cleaner



Fig. 1.1.2 Spade Type Cylinder Lint cleaner

## 1.2 Refinement in heating and cottonseed conveying system of cottonseed dryer (MP.106)

The cottonseed dryer was subject to various modifications and upgradation to improve its efficiency, durability, and overall performance of the system.

### *Modifications in the Combustion Chamber :*

Several critical modifications were made in the combustion chamber to enhance its operational efficiency and longevity. The diameter of the combustion chamber was increased from 1.2 m to 1.4 m to facilitate frequent wood feeding, which was not possible in previous smaller chamber, affecting the overall efficiency. Fire bricks were incorporated in the combustion chamber to reduce overheating issues. The older design lacked fire bricks, leading to excessive heat buildup and structural bulging. Stiffeners were added to the welding joints to prevent cracks caused by overheating. The absence of stiffeners in the previous design resulted in weld failures over time. The duct size for hot air passage from the combustion chamber to the second chamber was small, causing airflow restrictions. The new design includes an enlarged duct to ensure smooth and efficient heat transfer.

**Enhancements in the Heat Exchanger:** To improve heat transfer efficiency, the heat exchanger underwent significant refinements. The previous design had a four-stage heat exchanger. Two

additional stages were introduced, making it a six-stage system, thereby increasing heat transfer effectiveness. Fins were added to the heat exchanger tubes, enhancing the heat transfer rate by increasing the surface area for heat dissipation. High heat loss through the chimney in the old design was mitigated by optimizing the heat exchanger system, thereby improving heat retention and reducing wastage.

### *Upgrades in the Seed Conveying System :*

Several improvements were made to the seed conveying mechanism to enhance durability and operational efficiency. The earlier conveying system used a simple chain with varying inner distances (17 mm and 28 mm). Due to misalignment over time, the chain links climbed over the sprocket, causing operational inefficiencies. In the new design, a specially engineered chain with a uniform inner distance of 29 mm was introduced to eliminate this issue. Ultra-high molecular weight polyethylene (UHMW) was incorporated in the new design. This high-duty, high-impact plastic offers superior wear resistance and a low coefficient of friction, significantly reducing friction-related wear and tear. A rotary overflow air lock, which was absent in the older design, was introduced to maintain controlled material flow and prevent backflow issues. The hole size of the perforated sheet was increased to 5 mm to improve airflow and drying efficiency.

**Installation and Performance Evaluation :** The upgraded continuous flow cottonseed dryer was successfully installed at Shree Krishna Cotton Company, Saoner. A comprehensive performance evaluation was conducted at an industrial level.

The results reveal that the Hot Air Generator (HAG) unit demonstrated an efficiency of 86%. The dryer efficiency was found to be 78%. The overall system efficiency was recorded at 67%.



Fig. 1.2.1 Continuous feeding cottonseed dryer at Shree Krishna Cotton Company, Saoner, Nagpur



Fig. 1.2.2 Continuous feeding cottonseed dryer at Bhagirath Industry, Mohali, Nagpur

### 1.3 Development of standard protocol for determination of ginning percentage of cotton (MP.104)

To standardize the process protocol for determining the ginning percentage (GP) of seed cotton, the effects of moisture content and sample weight on GP were studied across different cotton varieties.

#### **Effect of moisture content on GP of seed cotton :**

Experiments on the ginning of cotton samples conditioned to moisture levels of 4%, 8%, 12%, 16%, 20%, and 24% (w.b.) were conducted on 10 varieties using the Lilliput gin. The atmospheric conditions were maintained at 65% RH, 25°C temperature. It was observed that as the moisture content increased from 4% to 24%, there was a gradual decrease in the GP of seed cotton samples. This trend was consistent across different varieties, with the highest and lowest GP recorded at 4% and 24% moisture levels, respectively. Additionally, increasing the moisture levels in seed cotton led to increased lint moisture losses during the ginning process. However, there were

no notable changes in the moisture content of seeds before and after ginning. Furthermore, high moisture levels resulted in increased invisible losses during ginning, possibly due to increased moisture losses in high moisture content ginning. The ginning rate significantly decreased when the moisture content exceeded 16%. Moreover, a considerable portion of seeds were crushed along with the fibres during ginning, which may yield misleading GP values.

#### **Effect of sample weight on GP of seed cotton :**

The effect of sample weight on GP was studied for two cotton varieties. The experiment included six sample weights viz., 25, 50, 100, 200, 300, and 400 grams. Ginning was performed using a portable Lilliput gin, with three replications for each sample weight. For variety PKV-08, the GP ranged from 33.9% to 34.5%. No consistent trend was observed in the variation of GP with respect to sample weight. ANOVA analysis revealed that the

differences in GP across sample weights were statistically non-significant, suggesting that sample weight had minimal impact on GP. The standard deviation analysis indicated higher variability in GP determination for smaller sample sizes (25 and 50 grams) compared to larger samples (100 grams and above). A similar pattern was observed for variety NCS-2778, where the mean GP ranged from 36.6% to 37.2%, and no

consistent relationship between sample weight and GP was found. In conclusion, the study indicates that sample weight has little to no significant effect on ginning percentage. However, smaller sample sizes (25 and 50 grams) exhibited higher variability in GP determination, emphasizing the importance of using larger sample weights (100 grams or more) for more reliable results.

#### 1.4 Assessment of processing losses in Indian cotton ginning industries (MP.105)

The processing losses during ginning was assessed by taking trials in the ginning industries. During February 2024, the experiments were conducted at a ginning industry (no.1) in Katol (Nagpur). The various outlets were identified and cleaned before the ginning of seed cotton. The initial sample of seed cotton was also collected to analyse the moisture content, ginning percentage, and trash percentage. The industry (25 DR gins) was working with the belt and screw conveying mechanism. The amount of seed cotton processed was 366.08 quintals having initial moisture content of 12% (w.b.). The ginning percentage was 33.10% and the initial trash content was 1.41%. The fibre property evaluation of the lint samples revealed that the UHML was 28.9 mm, MIC 3.6  $\mu\text{g}$  /inch, tenacity 3.2 mm 28.7 g/tex, and Rd value 73.5.

In March 2024, experiments were conducted at a ginning industry (no. 2) in Nagpur operating with belt conveying mechanism having 40 DR gins. The amount of seed cotton processed was 243 quintals. The ginning percentage was 34.1% and the initial trash content was 1.16%. The total processing loss of 1.17% was observed. The fibre property evaluation of the lint samples revealed that the UHML was 29.1 mm, MIC was 4.1  $\mu\text{g}$  /inch, tenacity 3.2 mm was 28.7 g/tex, and Rd value was 77.9.

During December 2024, the experiments were conducted at two ginning industries (no. 3 and 4) in Sirsa. The number of functional DR gins were 40 and 38 and the amount of seed cotton processed was 368 quintals (no. 3), 396.21 quintals (no. 4), respectively. The ginning percentage were 33.80 and 36.73 were observed.



Fig. 1.4.1 Pneumatic conveying of seed cotton



Fig. 1.4.2 Cleaning of pre-cleaner outlet



Fig. 1.4.3 Cleaning of DR gin outlet

The fibre property evaluation of the lint samples taken from the ginning industries was also performed. It revealed that the UHML was  $27.28 \pm 0.08$  mm (no. 3),  $27.13 \pm 0.19$  mm (no. 4). The MIC value was  $3.72 \pm 0.16$   $\mu\text{g}/\text{inch}$  (no. 3),  $3.82 \pm 0.36$   $\mu\text{g}/\text{inch}$  (no. 4). The tenacity 3.2 mm values were  $31.29 \pm 0.98$  g/tex and  $30.92 \pm 0.66$  g/tex, and the uniformity (%) was  $84.25 \pm 0.71$  and  $83.66 \pm 0.67$  for the ginning industries 3 and 4, respectively. The

initial trash content was 2.33 and 2.27%, respectively.

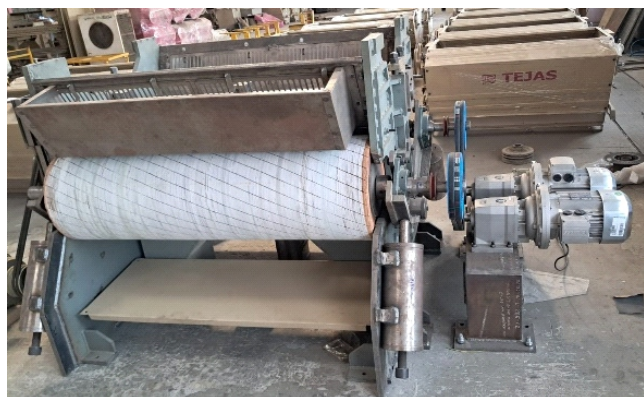
The processing loss was assessed by collecting and weighing the waste samples from different outlets (dispenser, DR gin, lint cleaner, dust room and yellow picking). The cumulative processing loss of the 4 ginning industries was estimated and presented in the table 1.4.1 given below

Table 1.4.1 Waste generated at different outlets and overall processing loss in the ginning

Ginning industry	Dispenser	DR gin	Lint cleaner	Other	Total %
1.	0.01	0.48	0.11	0.02	0.63
2.	0.43	0.42	0.25	0.07	1.17
3.	0.81	0.77	0.28	0.09	1.95
4.	0.31	0.32	0.19	0.06	0.88

## 1.5 Design and Development of High Production Double Roller Gin to Enhance Ginning Efficiency (CRP-CIRCOT 10)

High Production Double Roller (HPDR) gin was designed and first prototype (Fig. 1.5.1) was fabricated with an aim to double the ginning output compared to the conventional DR gin. The special emphasis was placed on increasing roller diameter and increasing cottonseed metering area through seed grid. The roller diameter was increased to 381 mm from 170 mm in conventional DR gin machine. The cottonseed metering area was increased by 53% to that of conventional DR ginning machine. The pressure application mechanism (spring loaded cylinders) between the



*Fig. 1.5.1 HPDR gin with spring loaded cylinder type pressure mechanism*

The developed prototype of high production double roller gin was tested for its functionality of ginning of cotton. The prototype could do the intended function of ginning but effective ginning could not be achieved due to some problems related to machine design and some issues related to machine fabrication, which were experienced during functional testing of the prototype.

The problems encountered during functional testing of HPDR gin were: Improper functioning of pressure application mechanism (spring loaded cylinders) leading to uneven pressure between fixed knife and ginning roller throughout the

fixed knife and ginning roller was employed in place of lever and weight arrangement in conventional DR gin. Independent drive arrangement was made to drive beater and roller separately through VFD for changing speeds of roller and beater independent of each other. Various sub-assemblies of HPDR gin such as roller, beater, seed grid, knife rail, side frame, roller to knife pressure application mechanism, roller and beater drives, auto feeder and control panel etc were also fabricated.



*Fig. 1.5.2 HPDR gin with pneumatic type pressure mechanism*

length of the knife. Roller motor was getting abruptly stopped as excessive load was exerted on roller due to uneven pressure between the knife and roller. Lower hardness of new ginning roller on higher diameter as compared to conventional roller. Bending of leather roller washers was observed at both ends of roller due to small size of end plates fixed on roller. The free flow of lint after ginning was not seen as lint was getting rested on the side edges of knife rail due to its oversize. Further excessive clearance was also seen at both ends of knife rail due to its length shortness. Difficulties were experienced in changing overlap setting by head pin because of space constraint in

gear box. Higher machine vibrations at beater speeds above 1000 strokes per min were observed.

To overcome these difficulties encountered during functional testing following modifications were carried out in prototype for ensuring effective ginning of cotton. It includes reworking of ginning roller by replacing leather washers, repressing, fixing large sized end plates, finishing and

grooving. Other modifications carried out includes replacement of spring-loaded cylinder type pressure mechanism with pneumatic type of pressures mechanism. The knife rail assembly and gear box were redesigned and fabricated. Control panel with independent VFDs for each roller and beater was fabricated. The modified HPDR gin (Fig.1.5.2) was tested for its functionality. Effective ginning was achieved in the modified HPDR gin.

### 1.6 Development & Evaluation of Pre-grooved Chrome Leather Rollers and Automatic Deep-cut-grooving Machine for Double Roller Gin (CRP-CIRCOT-11)

**Ginning experiments:** The performance of newly developed pre-grooved rollers (PGR) was evaluation at the commercial ginneries with five replications using long staple hybrid variety of cotton. The ginning performance of PGR was compared with the performance of conventional

rollers (CR) considering ginning outcome ( $G_{out}$ ) and lint quality parameters as responses. The trails were conducted for one hour and lint realization was calculated and lint samples were analysis. The obtained data is presented in Table 1.6.1.

Table 1.6.1. Ginning experiments with Pre grooved roller & Conventional roller

Parameter	R1		R2		R3		R4		R5		Avg	
	PGR	CR	PGR	CR	PGR	CR	PGR	CR	PGR	CR	PGR	CR
$G_{out}$ (kg/h)	76.8	73.9	78.1	72.4	75.3	72.3	75.2	71.6	75.7	71.8	76.2	72.4

It is evident from the table that the  $G_{out}$  in PGR is more than the CR in the range from 2.9-5.7 kg/h. The average increase in  $G_{out}$  of PGR is more than CR by 3.82 kg/h. The increase in  $G_{out}$  of PGR may be due to several reasons like productive depth of groove in CR reduces with time, however it remains same in PGR, using faulty, damaged, more or less number of grooves, uneven spacing & incomplete grooves in CR while optimum number of equidistant grooves in PGR. Thus, it can be concluded that the PGR performed better than conventional re-grooving type of 2.0 mm deep grooved rollers. The lint quality parameters from

both PGR and CR trails were found within acceptable range.

**Development of automatic deep groove forming machine:** The prototype of automatic deep groove forming machine (Fig. 1.6.1) is developed during the reporting period. The parts of the machine include cutting blade, moving rail, motor, roller holding and pressing mechanism, wheels, control panel etc. The machine can be used to form grooves from 2 mm to 25 mm deep on the periphery of the roller.



*Fig. 1.6.1 Automatic Deep Cut Grooving Machine for DR gin rollers*

**CORE AREA II**  
**MECHANICAL PROCESSING, TECHNICAL TEXTILES AND COMPOSITES**

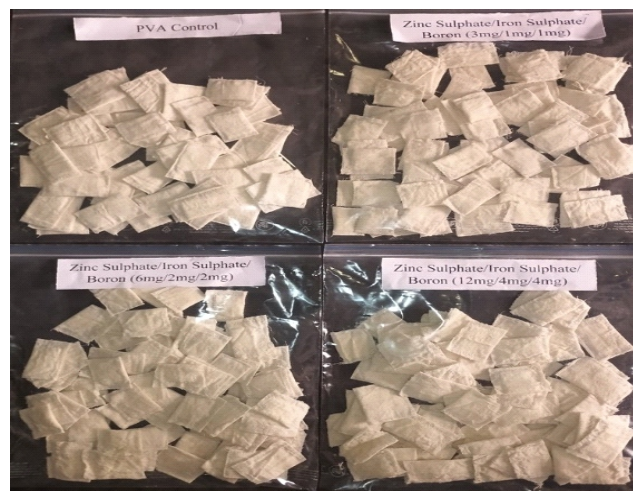
**2.1 Evaluation of Electrospun Nanofiber Based Micro-nutrient Sachet for High-value Crops (MP 102) (Inter-Institutional Project)**

A bulk production of control and three different proportions of multi-nutrient impregnated PVA electrospun mats were produced using a multi-phase electrospinning apparatus (Fig. 2.1.1 & 2.1.2). The process parameters were optimized based on the consistency of fibre production and

the uniform distribution of the fibres to obtain the multi-nutrient impregnated electrospun mat. A rotating drum collector was used to produce aligned nanofibre mat. The produced mat was used for pot culture analysis.



*Fig. 2.1.1 Production of Multi-nutrient nanofibre sachet*



*Fig. 2.1.2 Multi-nutrient sachets prepared using electrospinning process*

### Pot Culture analysis

The pot culture experiment involved six different treatments, utilizing tomato seedlings from the Saaha commercial variety as the experimental material. Each pot contained a single seedling, and the treatments were applied using three different nutrients (zinc sulphate, Iron sulphate, and boron) in various combinations. After 10 days from planting, a nutrient sachet was added to each pot, which were watered daily to maintain sufficient soil moisture. The germination phase extended over 120 days (Figure 2.1.3). The analysis focused on the growth performance of the plants facilitated by the electrospun nanofibre-based nutrient release.

Nutrient uptake by the plants was evaluated through elemental analysis using Atomic Absorption Spectroscopy (AAS). The treatments

were planned in a completely randomized design with five replicates for each treatment. The evaluation of the tomato plants was based on several specific criteria: (a) growth parameters including plant height, number of branches, and stem girth; (b) chlorophyll content assessed with a SPAD meter; (c) dry biomass of the plants; and (d) yield, total soluble solids (TSS), juice content, and dry biomass. The plants demonstrated a significant increase in height, branch count, and stem girth under treatment T3, which included Zinc, Iron, and Boron at concentrations of 6 mg, 2 mg, and 2 mg, respectively. Root density was notably higher in the T3 treatment compared to all other treatments. The yield of tomatoes was significantly enhanced in treatment T3, achieving 1.36 kg, which is comparable to the RDF treatment T2 that utilized 50 mg of RDF nutrients. It is important that the nutrient usage was reduced by 75% in comparison to the RDF amount.

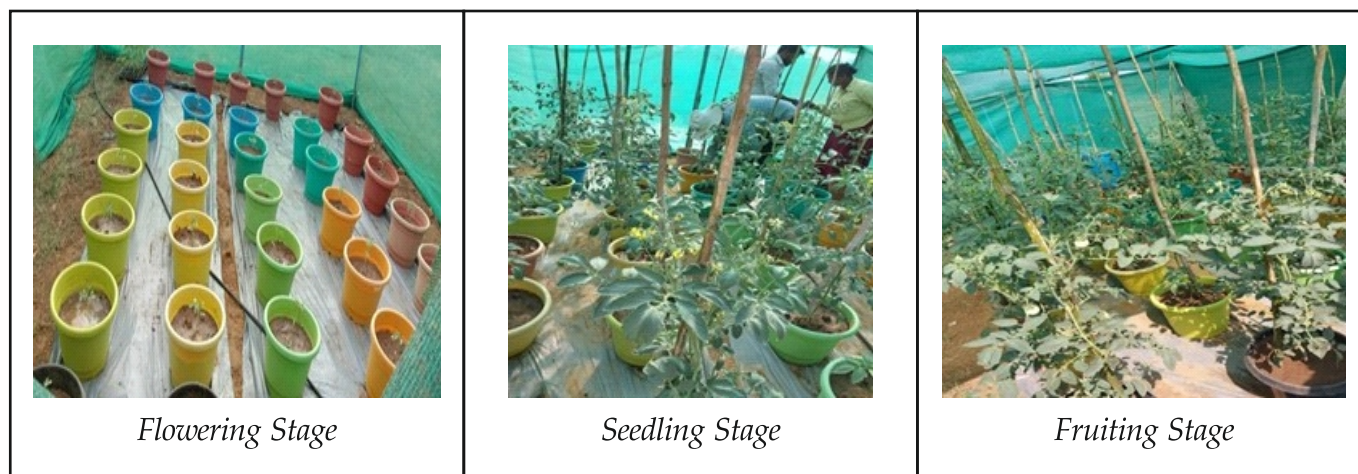


Fig. 2.1.3 Different Stages of Pot Culture Analysis

## 2.2 Evaluation and Improvement of Heat Generating Textile Products (MP 107)

The conductive yarn was tested for its heat-generating properties at various temperatures and time intervals to assess its efficiency and performance. The power consumption of

individual heat-generating products was estimated using a DC power supply unit ranging from 5V to 12V, using the multi-meter as shown in the Fig. 2.2.1.

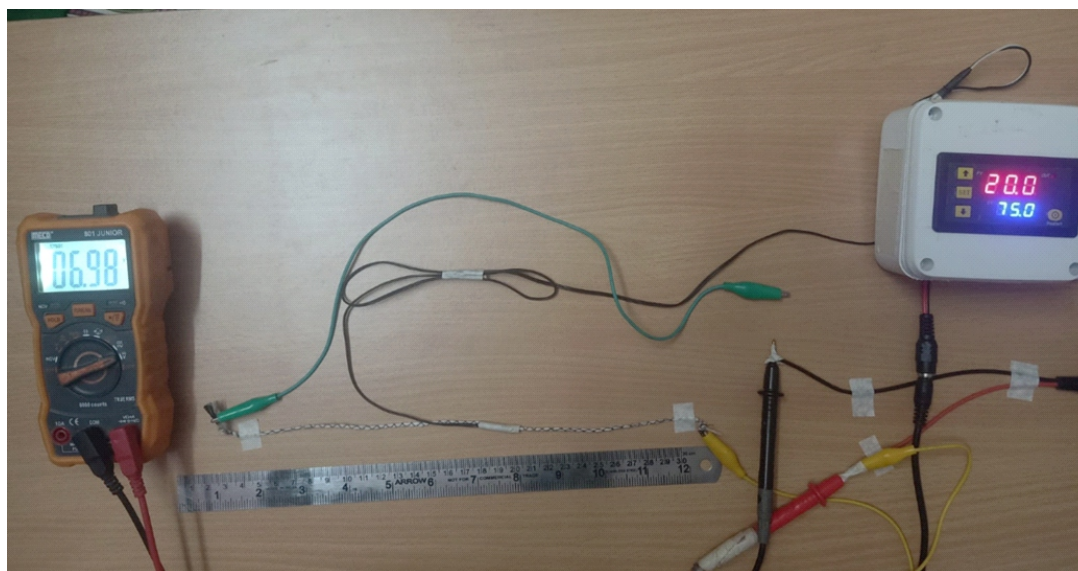


Fig. 2.2.1 Testing of Conductive Yarn at different Ambient Temperature

The rise in temperature at various voltage levels with respect to the time and checked for conductive yarn optimisation, are shown in the Table 2.2.1. Additionally, smart textile products were evaluated using a thermal imaging camera to determine their heat-holding capacity under diverse environmental conditions.

Various heat-generating products, such as thermal jackets, heating gloves, and heating pads, were procured from the market for reference and analysis. A comparative study was conducted between the developed smart textile products and the existing market-available products to identify potential improvements and innovations.

<b>Time (minutes)</b>	<b>5V</b>	<b>6V</b>	<b>7V</b>	<b>8V</b>	<b>9V</b>	<b>10V</b>
<b>1</b>	<b>24.7</b>	<b>25.2</b>	<b>29.6</b>	<b>31.6</b>	<b>36.7</b>	<b>40</b>
<b>2</b>	<b>26.1</b>	<b>26</b>	<b>31</b>	<b>35.9</b>	<b>41.7</b>	<b>46.5</b>
<b>3</b>	<b>26.8</b>	<b>27.1</b>	<b>32.4</b>	<b>36.8</b>	<b>42.7</b>	<b>47.1</b>
<b>4</b>	<b>26.9</b>	<b>27.3</b>	<b>36.1</b>	<b>37.1</b>	<b>43.5</b>	<b>49</b>
<b>5</b>	<b>27</b>	<b>27.6</b>	<b>36.4</b>	<b>37</b>	<b>43.7</b>	<b>49</b>

Table 2.2.1. Rise in temperature at different voltage levels (Ambient Temp. @ 20°C)

### 2.3 Development of bio nanocomposite films using extrusion process (Inter Institutional project) (II.05)

**Biodegradable Nanocomposite Films for Packaging of Perishables :** The present study aimed to develop biodegradable nanocomposite films with functional properties comparable to conventional synthetic films. Nanocomposite films using blend of commercially available biopolymers and thermoplastic starch (TPS)

reinforced with cellulose nanocrystals (CNC) were produced via melt compounding followed by blown film extrusion. The physical, mechanical, and barrier properties of the developed nanocomposite (NC) films were evaluated against commercially available synthetic packaging films.

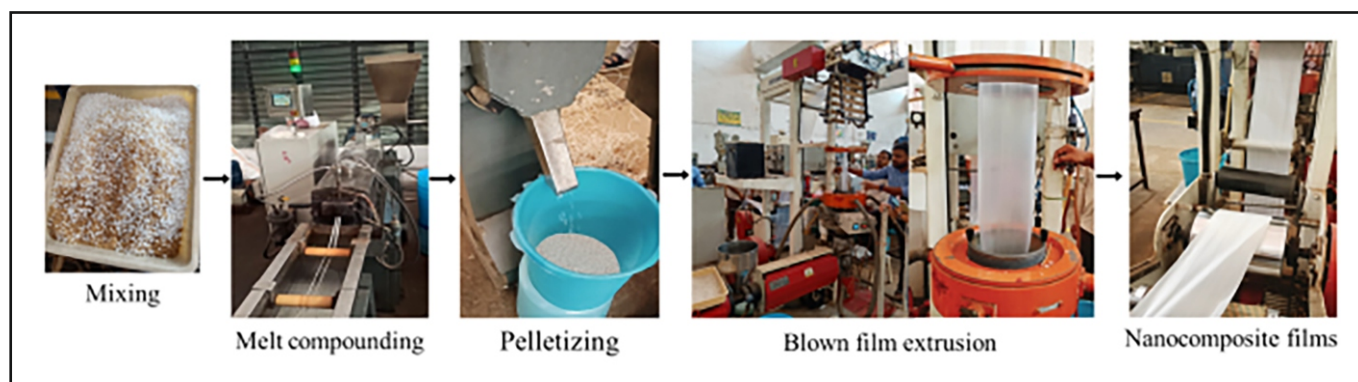


Fig. 2.3.1 Manufacturing of nanocomposite films by blown film extrusion

NC films exhibited a tensile strength of 10.51 MPa, elongation at break of 168.10%, elasticity modulus of 0.87 GPa, and bursting strength of 191 kPa. Although LDPE demonstrated slightly superior mechanical properties, NC films showed comparable performance in most aspects. Notably, NC films outperformed LDPE in oxygen barrier properties, with a lower oxygen transmission rate (OTR) of 51.52 cm<sup>3</sup>·mm/m<sup>2</sup>·day compared to 212.15 cm<sup>3</sup>·mm/m<sup>2</sup>·day for LDPE. However, NC films had a higher water vapour permeability (WVP) (1.209 g·mm/m<sup>2</sup>·day·kPa) compared to LDPE. CNC reinforcement enhanced the elasticity modulus, bursting

strength, WVP, and OTR of the composite blend. Storage studies demonstrated that NC-packaged peeled garlic had lower weight loss, higher pyruvic acid retention, less colour deterioration, and reduced microbial growth after 8 days compared to LDPE packaging. The controlled moisture permeability of NC films minimized condensation inside the package, while their high oxygen barrier helped preserve garlic quality and prevent microbial spoilage, ultimately extending shelf life. The findings highlight CNC-reinforced composite films as a promising eco-friendly alternative for packaging of perishables, offering both environmental and product quality benefits.

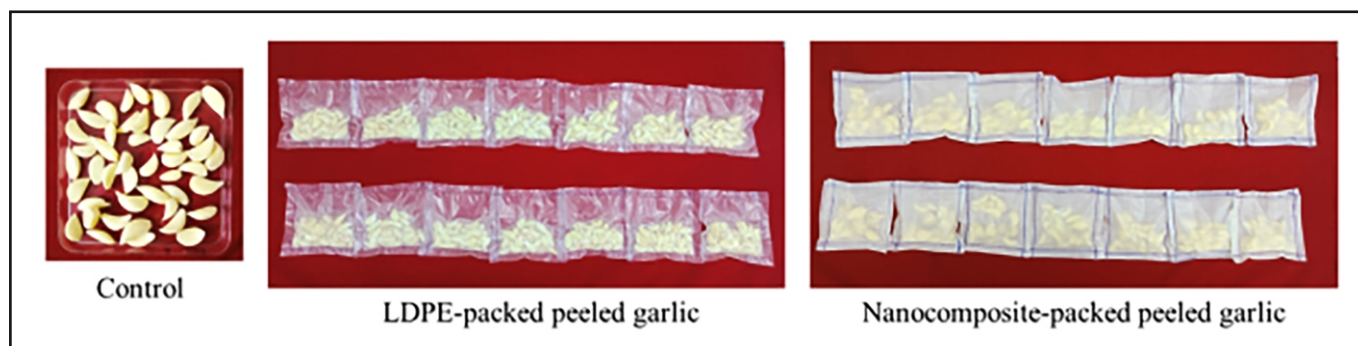


Fig. 2.3.2 Packaging studies of peeled garlic

## 2.4 Nanofibre Bio-composite Development from Fish Waste Resource for Circular Economy (II 09)

**PVA Chitosan & PVA Collagen composite Nanofibre produced through Electrospinning process :** Polyvinyl alcohol (PVA) was utilized as the primary polymer in the development of composite nanofibers that include chitosan and collagen. A chitosan concentration of up to 7.5% was integrated into the PVA matrix to produce the nanofibres. The ideal parameters for the production of the chitosan-mixed electrospun mat were identified as a collector distance between 13 -14 cm, a flow rate of 0.3 mL/ hour, a syringe pump traverse speed of 2 mm/ second, and an applied voltage of 18 kv. The rotating drum collector was operated at 400 revolutions

per minute. These parameters were set to ensure uniform fibre production and an even distribution of the fibres.

Collagen nanofibers were produced using two different proportions (33% & 50%), The optimized conditions for fabricating the collagen impregnated composite electrospun mat included a collector distance of 12 cm, a flow rate of 0.4 mL per hour, a syringe pump traverse speed of 2 mm/Sec, and an applied voltage of 15 kv. The rotating drum collector was maintained at a speed of 400 revolutions per minute.

## 2.5 Development of smart foods, bio-composites, green packaging and bio-energy from agro-residues (NASF)

The banana fibre composites were prepared using 5cm-long fibres, oven-dried at 100°C for 10 minutes, and pressed without a binder. The control composite lacked structural integrity, emphasizing the need for a binder. Using a 5% natural rubber solution as a binder at 120°C and 120-125 bar for 10 minutes caused issues like fibre pull-out, rough edges, and uneven clumping due to rapid drying, leading to weak composites. Increasing the temperature to 160°C improved bonding but did not fully resolve the issues. To

address this, the fibre length was reduced, and chitosan solution was used as the binder. This change improved the quality of the composite, resulting in a smooth texture, uniform colour, and enhanced cohesion, with chitosan providing better processability than natural rubber.

Two approaches were investigated for creating flame-retardant (FR) banana fibre composites. First, banana fibres treated with Saraflam DUR were combined with a chitosan solution as a

binder and then pressed. However, this process yielded unsatisfactory results: the composite showed significant cracking, indicating weak bonding between fibres, and a sticky residue adhered to the press plates. These issues suggested that the flame retardant may have degraded or reacted unexpectedly under high temperature and pressure. Additionally, the excessive fibre spread highlighted potential issues with pressure control or binder interaction, further compromising the structure and integrity of the composite.

As an alternative approach, composites were prepared using DAP-treated fibres. In this approach, pretreated banana fibre was oven-dried to reduce moisture content. The dried fibres were then combined with chitosan solution to ensure an even binder coating, placed into a mold, and pressed in a hydraulic machine. Upon cooling and demolding, the resulting composite displayed a uniform colour, smooth texture, and good structural integrity, with well-bonded fibres and a polished surface. Thermo-gravimetric analysis (TGA) shows enhanced thermal resistance in composite.

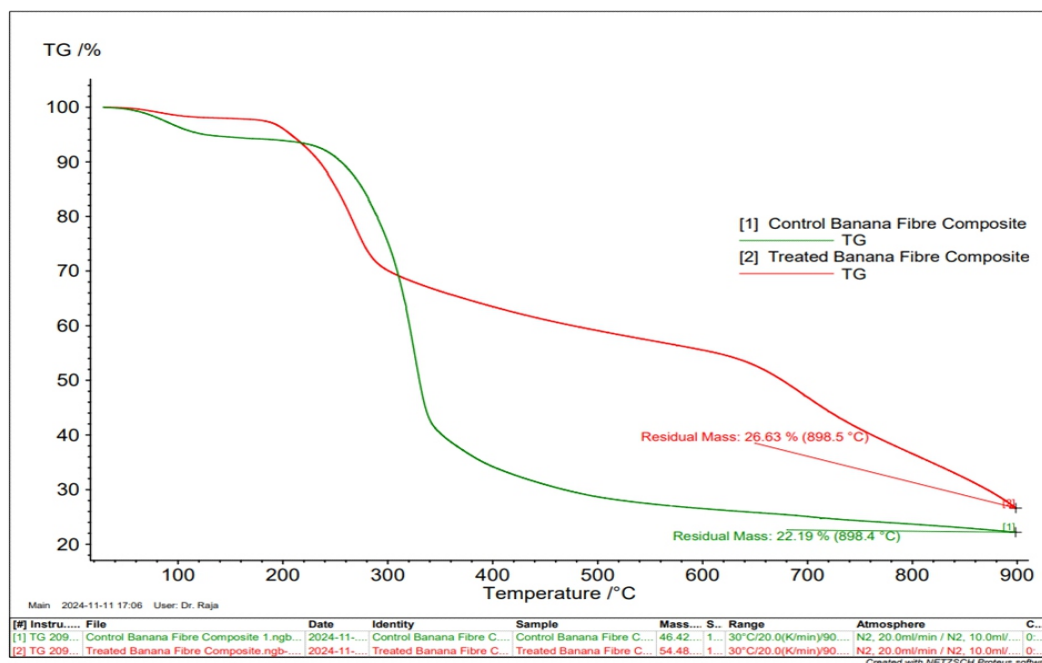


Fig. 2.5.1 Thermo-Gravimetric Analysis of the Composites

## 2.6 Optimization of Spinning Process Parameter for Cotton/Hemp blends and development of value added products (CRP-CIRCOT 12)

**Cotton/Hemp Blend Proportion Optimization in Ring Spinning Systems :** The study investigates the impact of different cotton/hemp blend proportions on yarn properties in a ring spinning system. The hemp fibre (*Cannabis Sativa L.*) used in this study was sourced from ICAR-NINFET, Kolkata and a trader in Surat. An initial spinning trial was conducted for 70/30 (cotton/hemp) ratio, producing a 30s Ne count yarn. The Count

Strength Product (CSP) of this blended yarn was 2243, with a single yarn strength of 16 g/tex. In comparison, 100% cotton yarn of the same count exhibited a higher single yarn strength of 20.3 g/tex and a CSP of 3098, as shown in Table 2.6.1. The results indicated a notable decrease in CSP with an increase in hemp content. A 30% hemp blend (70/30) resulted in a 30% reduction in CSP compared to 100% cotton yarn. Yarn evenness

(U%) and defect counts (thin places, thick places, and neps) increased with higher hemp content due to the inherent coarseness and irregularity of hemp fibres. The 70/30 blend had a U% of 24.9, compared to 13.8 for the 100% cotton yarn.

Further spinning trials were conducted using commercially available cottonized hemp fibre in various blend proportions of 80/20, 60/40, 40/60, and 20/80 (cotton/hemp). The effects of these blends on yarn properties, including CSP, tensile strength, and evenness, were analyzed.

*Table 2.6.1: Tensile and evenness parameters of cotton/cottonized hemp (70:30) blended yarn*

Yarn Properties	Cotton/cottonized Hemp blended yarn (70:30) 30s Ne	100% cotton yarn, 30s Ne
1. Lea Test		
Yarn count ( Ne)	29.8	29.27
Strength (lb)	76	106
CSP	2243	3098
2. Twist Per Inch	25.0	26.5
3. Yarn Evenness Test		
U%	24.9	13.8
Thin -50%/km	930	92
Thick +50%/km	3170	300
Neps +200%/km	600	22
4. Single yarn Tensile strength		
Breaking strength (g)	311	401
Tenacity (g/tex)	16	20.3
Elongation (%)	5.5	6.6

*The results consistently showed that higher hemp content negatively affected CSP and yarn evenness. For improved spinning performance, it is recommended to enhance the cottonization process of hemp fibres.*

## 2.7 Development of High-Performance Woven Protective Gloves and Seamless Knitted Gloves for Industrial Uses (NTTM)

**Industrial Multilayer Woven Cut-Resistance Gloves:** The single-layer high-performance fabric is often inadequate for protecting against sharp tool-object accidents, which account for a significant percentage of injuries. To address this issue, a multilayer weaving technique that combines different materials was used to develop a lightweight cut-resistant glove that maintains its primary functions of protection along with comfort, and mobility. The glove is constructed

with three layers of warp sheets: cotton is used for the top and bottom layers, while Ultra-High Molecular Weight Polyethylene (UHMWPE) multifilament is used in the middle layer. These gloves can be used for application area of appliance manufacturing, bottle and light glass handling, canning, drywall Work, electrical, carpet Installation, HVAC, pulp and paper, automotive assembly, metal fabrication and handling, packaging, aerospace industry etc.



**Standards**  
 Abrasion (Cycles)  
 Cut (Coupe Test)  
 Tear Strength (N)  
 Puncture (N)  
 Cut (ISO 13397) (N)

**Performances**  
 Level 1  
 Level 3  
 Level 4  
 Level 2  
 Level D

EN 388:2016

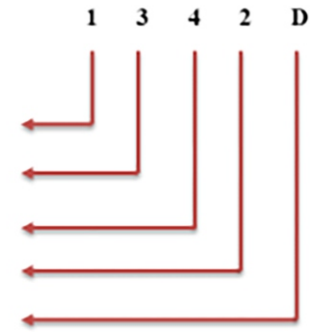


Fig. 2.7.1 Multi layered cut resistance gloves

### 2.8 Development of Building material using Natural fibres and other fibrous crop residues (CRP NINFET 07)

The incorporation of coir composite cubes as a partial replacement for coarse aggregates in concrete has shown promising results in enhancing compressive strength. A study revealed that optimum performance was achieved with a 28% fibre volume fraction (coir fibre to resin) and 18% coarse aggregate replacement. Under these conditions, the coir composite cube-reinforced concrete exhibited a compressive strength of 34 MPa, which was 17% higher than that of the conventional concrete. This

significant improvement in the compressive strength demonstrates the potential of coir composite cubes as an effective and sustainable alternative to traditional coarse aggregates. These findings suggest that the integration of coir composite cubes into concrete mixtures could lead to more robust and environmentally friendly construction materials, opening up new possibilities for sustainable infrastructure development.



Fig. 2.8.1 Coir composite cube



Fig. 2.8.2 Coir Composite cube after concrete after compression strength test

## CORE AREA III

### CHARACTERIZATION OF COTTON & OTHER NATURAL FIBRE, YARN AND TEXTILES

#### 3.1 All India Coordinated Research Project on Cotton Quality (A-1)

ICAR-CIRCOT undertakes the fibre and yarn quality assessment of ICAR-AICRP on Cotton samples and publishes the Annual Technological Report. 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. The quality parameters of all cotton fibre samples were measured by using the High-Volume Instrument operated in the HVI Mode. The total number of samples analysed from different zones are presented in the Table 3.1.1.

*Table 3.1.1 Total number of Cotton samples evaluated from different zones*

Yarn Properties	2019-20	2020-21	2021-22	2022-23	2023-24
<i>National</i>	1457	1163	161	273	330
<i>North Zone</i>	154	110	208	118	205
<i>Central Zone</i>	535	449	266	107	80
<i>South Zone</i>	425	415	192	101	64
<i>Agronomy</i>	46	62	32	51	35
<i>ICAR-Bt.</i>	1147	1297	1749	2596	2826
<i>AICRP other Research samples</i>					768
<b>Total</b>	<b>3764</b>	<b>3496</b>	<b>2611</b>	<b>3246</b>	<b>4308</b>

#### The following are the consolidated observations in terms of fibre quality attributes

- In *G. arboreum* trial most of the entries have shown length in the range of 19 to 21mm & higher micronaire which may be useful only for surgical cotton industry
- Br 02c-Initial Evaluation Trial of *G. hirsutum* & Br 05c-Preliminary Hybrid Trial of H XH under organic condition produced good fibre qualities
- Br 24b – Coordinated Variety Trial - *G. arboreum* at Central and South zone produced good fibre qualities
- In full spinning, 85% of the samples satisfied the count and CSP norms requirement
- In the ICAR Bt trials, Compact Intra Hirsutum Bt Cotton Hybrids showed good fibre qualities.
- The fibre length of Hirsutum Varieties (Hir IET) showed lower length values than the requirement in Central and North Zone.
- No difference in fibre qualities between irrigated and rainfed HX H trials in all zones

### Variety Identified based on 2023-24 research data

- Based on the overall performance including fibre properties, 57 Bt and 7 Non-Bt varieties and hybrids were identified during variety identification meeting held on 05.04.2024
- Concept note for implementing the benchmark values of Ginning Percentage (GP) for different staple length groups was prepared

Ginning Percentage is one of the important economical parameters in cotton trade. Worldwide, several cotton varieties are showing higher GP than Indian cotton. Every 1% increase in GP will approximately increase the lint yield by 2-3%. AICRP fibre quality data for the year 2020-24 as provided by the PI (Cotton breeding) has been analyzed to find out the current status of Ginning Percentage of Indian cotton hybrid released from AICRP on Cotton. Based on the analysis, the benchmark values are arrived and presented in the table 3.1.2

Table 3.1.2 The benchmark ginning percentage for different staple length cotton

S.No.	Staple length category	UHML (mm)	Bench mark GP
1	Long Staple	27.5 – 29.0	36
		29.5 – 32.0	35
2	Extra Long Staple	32.5 – 34.0	33
		34.5 and above	32
3	Medium Long staple	25 – 27	37
4	Medium Staple	24.5-22.5	38
5	Short Staple	Below 22	39

### 3.2 Development of AI based prediction model for yarn quality characteristics (QE 113)

**Predicting Cotton Yarn Tenacity (RKM) using Automated Machine Learning Models:** RKM is abbreviation of Resistance per kilometer. It is the breaking load in grams divided by yarn fineness expressed in tex. It is also called as tenacity with a unit of grams/tex. RKM is one of the yarn properties, which if predicted in advance, one can decide the type of cotton to be used in making the particular yarn. Hence, a study was undertaken to develop model for the prediction of cotton yarn Resistance per Kilometer (RKM) from fiber properties using Automated Machine Learning (AutoML).

A dataset of 176 samples, spanning a range of

count values from 12s to 100s Ne, was used along with cotton with cotton characteristics such as Upper Half Mean Length (UHML), micronaire, bundle strength, Uniformity index and elongation. Azure auto machine learning was used for creating model. On submitting the data for modelling in Automated ML in Azure, it created multiple parallel pipelines each with different algorithms. The data was iterated and the iteration continued until it reaches the set exit criterion like root mean square error or set duration model training.

Automated ML make use of Voting as well as Ensemble methods for combining models. The

algorithms used for training the model are Elastic Net, Light GBM, Gradient Boosting, Decision Tree, K Nearest Neighbours, LARS Lasso,

Stochastic Gradient Descent, Random Forest, Extremely Randomized Trees and Xgboost

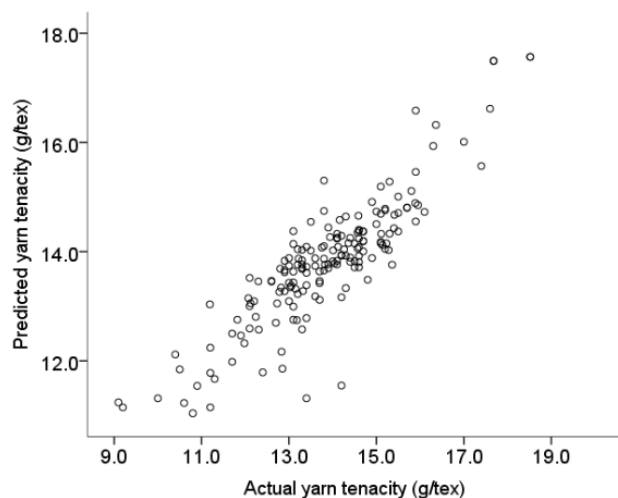


Fig. 3.2.1 Relationship between actual vs predicted

The automl model (voting ensemble algorithm) is found to be more accurate than regression model and the MAE, MAPE and RMSE are less by 37.6%, 38.1% and 53.8% respectively. Fig. 3.2.1 shows the relationship between actual tenacity and predicted tenacity. The points are scattered along 45-degree slope, indicating that the model has performed well. Fig. 3.2.2 depicts the prediction error distribution. The errors are distributed

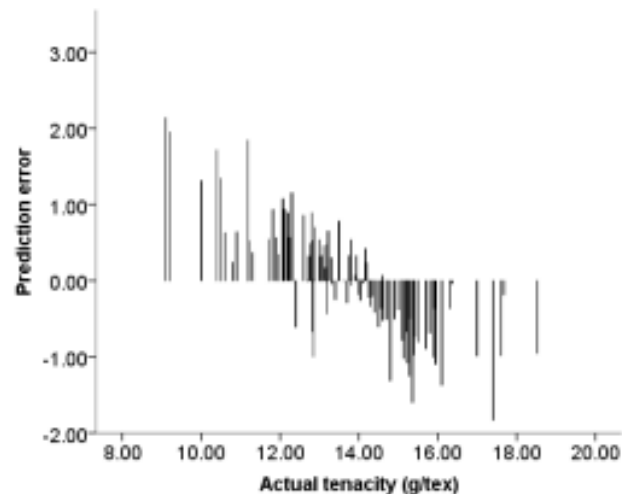


Fig. 3.2.2 Actual yarn tenacity vs prediction error

equally on both the sides. The error range is found to be from -2.08 to +2.13. Permutation feature importance (PFI) algorithm was used to identify the important variables. Upper Half Mean Length is found to be ranked first as highly influencing variable in the prediction of yarn RKM. The second most influencing variable was found to be micronaire.

### 3.3 Development of viscose based marker fibre for the traceability of cotton (QE 114)

To enhance the traceability of cotton, viscose marker fibres were developed using transition and lanthanide series metals. These fibres were synthesized by treating viscose with specific metal salts, ensuring their incorporation into the fibre matrix. The marker fibres were then blended with cotton fibre and processed into yarn. The presence of marker metals in the blended fibres was confirmed using multiple analytical techniques. A colour reaction provided a

preliminary indication of metal incorporation, while X-ray fluorescence spectroscopy (XRF) enabled qualitative and semi-quantitative analysis. Further, Inductively Coupled Plasma Mass Spectrometry (ICP-MS) precisely quantified metal concentrations, ensuring the fibres' traceability. This study demonstrates a novel approach to cotton authentication by integrating marker elements into viscose fibres.

### 3.4 Development of Portable Instrument to measure the colour grade of Cotton (QE 115)

A portable colour-measuring instrument has been developed (Fig. 3.4.1) in collaboration with Logic 1 Technologies, and Bajaj Industries Ltd., Nagpur. The software required for cotton colour measurement has been developed, while the hardware components, such as the cabinet and PCB mounting trays, were fabricated using a 3D printer. The PCBs with microcontrollers were

designed and assembled to communicate with the sensors.

The instrument will be optimized by testing cotton samples, collecting extensive data, and comparing the results with existing instruments like the High-Volume Instrument (HVI).

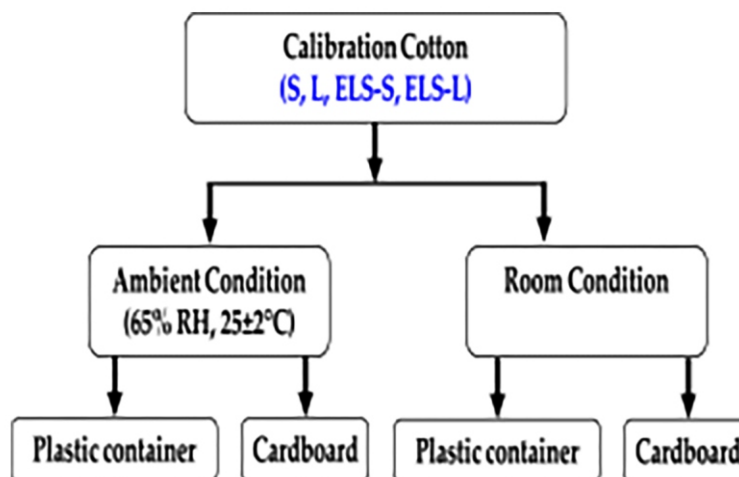


Fig. 3.4.1. Portable instrument to measure the colour grade of cotton

### 3.5 Development of Process Protocol for ICAR-CIRCOT Calibration Cotton for Standard Reference Material Certification (QE 116)

In this study, ICAR-CIRCOT calibration cotton samples (Large, Small, ELS-L, and ELS-S) weighing 200g each were stored in plastic

containers and cardboard boxes under two storage conditions: ambient and room conditions.



The cotton's quality was evaluated based on four key parameters—Upper Half Mean Length (UHML), Uniformity Index (UI), Strength, and Micronaire value. The results showed that there were no significant differences in any of these parameters between the two storage conditions,

indicating that both ambient and room temperature conditions, as well as the type of packaging material, did not significantly affect the quality parameters of developed calibration cotton for over a period of 3-months.

*Table 3.5.1 The Quality Parameters of ICAR-CIRCOT Calibration Cotton*

Code	UHML (mm)	UI (%)	Strength (g/tex)	Micronaire value (µg/inch)
S	20.9	79	19.8	5.6
L	29.6	84	32.9	3.9
ELS-S	26.7	81	26.6	3.6
ELS-L	34.4	83.2	39.0	2.6
Tolerance	±0.5	±1.0	±1.5	±0.1

### 3.6 Development of Image based Trash Measuring Device using Artificial Intelligence (QE117)

Bales of raw cotton naturally contain varying amounts of non-lint material—trash—that can range from about 1% in high-quality cotton to as much as 15% in poorer grades. Factors such as cotton type, growth conditions, harvesting methods, and ginning efficiency influence these levels. Traditional methods like the Shirley trash analyser and High-Volume Instrument (HVI) assess trash content via pneumatic flotation and image processing, respectively. Recently, advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML), and Deep Learning (DL) have emerged to enhance quality assessments by automating and refining trash detection and estimation.

To harness these advanced techniques for more accurate trash content estimation, an innovative image collection setup was developed using a plastic box and a document scanner. This setup enabled the collection of top and bottom view images, alongside supporting data such as

ground truth (trash percentage), from 310 samples with differing trash levels. A diverse array of image analysis techniques—including thresholding, contours, Gabor filtering, colour histograms, Gray Level Co-occurrence Matrix (GLCM), Local Binary Pattern (LBP), and Histogram of Oriented Gradients (HOG)—was employed to extract pertinent features from these images. These features were subsequently used as input parameters for training several machine learning algorithms, including Linear Regression, Random Forest, Gradient Boosting, AdaBoost, LightGBM, and XGBoost. Among these, XGBoost demonstrated superior performance, achieving an  $R^2$  of 0.89 and a Mean Squared Prediction Error (MSPE) of 24.93.

Beyond traditional machine learning models, deep learning algorithms such as ResNet50, DenseNet201, and Inception V3 were utilized to automatically extract features from the collected images. By combining these automatically

extracted features with those derived from conventional image analysis methods, the predictive accuracy was further enhanced. Notably, the integration of DenseNet201 features with traditional image analysis outputs yielded the best overall results. When these combined features were employed to train the XGBoost algorithm, the model's performance improved to an  $R^2$  of 0.903 and an MSPE of 16.86.

This integrated approach—merging traditional image analysis with advanced deep learning techniques—demonstrates a significant advancement over conventional methods for estimating trash content in cotton. By automating feature extraction and harnessing the predictive power of sophisticated machine learning algorithms, the proposed methodology not only enhances accuracy but also offers substantial benefits in decision-making across the entire cotton processing chain.

## CORE AREA IV CHEMICAL AND BIOCHEMICAL PROCESSING & BIOMASS & BY-PRODUCT UTILIZATION

### 4.1 Isolation of Gossypol from Cottonseed meal and its evaluation as Botanical Fungicide (CH 102)

A process protocol was developed and optimized for the recovery of pure gossypol from cottonseed meal and its characterization. The process includes three steps: Optimization of process parameters (temperature, solvent: solid ratio, reflux time, pH, solvent type) for the extraction of gossypol from cottonseed meal; optimization of purification parameters and optimization of crystallization process. Crude cottonseed extract containing gossypol was prepared using optimized process parameters. Gossypol present in the complex concentrated extract was obtained in the purified form using column chromatography in gradient mode. Solvent system for column chromatography was optimized using Thin Layer Chromatography (TLC) for the separation of individual components as discrete bands with proper resolution. Optimized volume of glacial acetic acid was added in the concentrated fractions collected from column to induce crystallization.

The obtained crystals were carefully collected

from the solvent and dried. In UV-Vis spectrum, standard gossypol acetic acid and obtained crystals showed overlapping peaks within the range of 370-375 nm. FTIR spectra also showed peaks at the similar wave numbers with almost similar intensity suggesting the purity of the obtained gossypol acetic acid crystals. HPLC analysis showed more than 95% purity of the obtained gossypol acetic acid. The obtained crystals also showed good DPPH and ABTS radical scavenging activity in the antioxidant assays with an  $IC_{50}$  around 7 and 2  $\mu\text{g/mL}$  respectively.

Gossypol has tremendous potential in anti-cancer medicine and other pharmaceutical applications. The process protocol developed for the recovery of gossypol acetic acid crystals using cottonseed meal as a source material enhance the value of this cotton byproduct and also the easy availability of this valuable compound will further stimulate research into its anticancer and therapeutic potential.

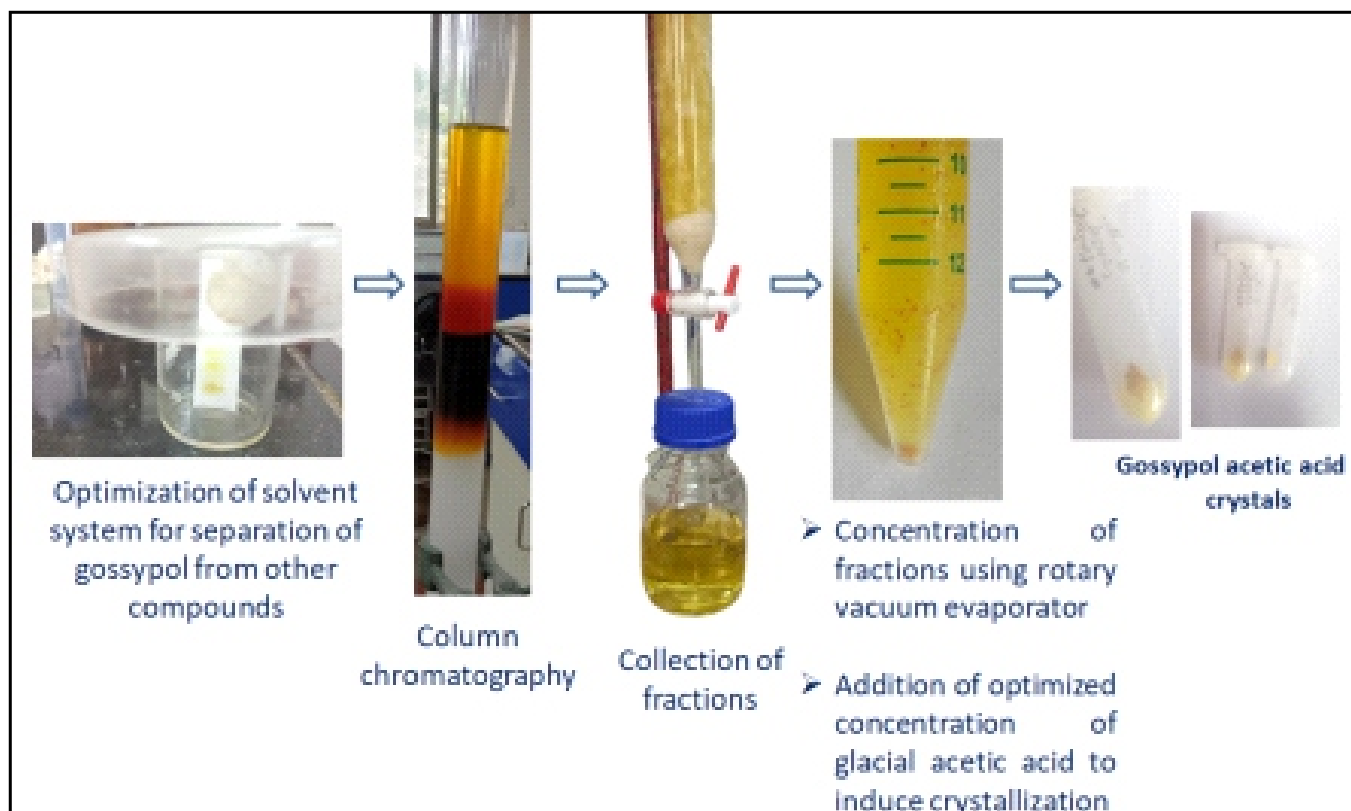


Fig. 4.1.1 Process for recovering the pure gossypol from cottonseed meal

## 4.2 Effect of process parameters on cottonseed oil extraction (CH 104)

**Effect of cottonseed moisture content and expeller screw speed on oil yield :** The study was conducted at seven different cottonseed oil extraction industries located near Parbhani, Nagpur, Sirsa and Bhatinda to check the effect of operating parameters on yield of cottonseed oil. The cottonseed moisture content was in the range of 7 to 19 % (w.b.) and expeller screw speed were 12 to 19 rpm. The analysis of data obtained showed that there was decrease in oil yield with increase in the moisture content of cottonseed. Similar inverse relation was observed between expeller screw speed and cottonseed oil yield, with higher yield at lower screw speed. It was noted that the cottonseed processed at a combination of lowest moisture content ( $7.5 \pm 0.5$  %) and lowest screw speed (11-12 rpm) yielded

the maximum oil recovery (14.8 %) as shown in Table 4.2.1.

The storability of cottonseed cake was notably shorter for the samples obtained from high moisture cottonseed compared to that obtained from cottonseed at low moisture, when stored at ambient conditions. The strong negative correlation between moisture content of cottonseed and oil yield ( $r = -0.69$ ) as well as between screw speed and oil recovery ( $r = -0.86$ ) suggest that the cottonseed oil expeller should be operated at optimum screw speed (15-16 rpm) and cottonseed moisture (10-12%) to achieve higher oil yield and good cake quality.

Table. 4.2.1. Effect of expeller screw speed and cottonseed moisture content on oil yield

Experiment No.	Screw speed (RPM)	Cottonseed moisture (%wb)	Oil yield (%)	Location
T1	15-16	7-8	8	Parbhani
T2		12-14	9.5	
T3	11-12	7.5-8.5	14.81	Nagpur
T4		10-11	13.94	
T5	15-16	9-10	11.57	
T6		19-20	8.18	
T7	17	10-11	9.95	
T8		13-14	8.95	
T9	19	12	11.81	Sirsa
T10		23	6.73	
T11	17	9-10	12.10	Bhatinda
T12	19	14	12.00	

### 4.3 Evaluation of cottonseed hull for production of furfural (CH 105)

The utilization of lignocellulosic biomass for the production of value-added chemicals like furfural, a platform chemical typically produced via the acid-catalyzed dehydration of pentose sugars derived from hemicellulose, is gaining attention in the bio-refinery industry. Cottonseed hulls (CSH), an abundant byproduct of the cotton industry, represent a promising feedstock for furfural production due to relatively higher hemicellulose content (11.6-24.5%), in comparison to hemicellulose content of other lignocellulosic biomass such as wheat bran (22%), bagasse (16.52%) and hemp (10.60%). The objective of this study is to optimize the furfural production process using the Box-Behnken design (BBD), a response surface methodology (RSM), to maximize furfural yield from CSH. The effects of three critical variables pre-treatment condition (A): ratio of varying ratio (5:1 to 15:1) of 1% H<sub>2</sub>SO<sub>4</sub> to the CSH (1% H<sub>2</sub>SO<sub>4</sub>: CSH), acid hydrolysis condition (B): ratio of varying

concentration (2.5-7.5%) of H<sub>2</sub>SO<sub>4</sub> to CSH (% H<sub>2</sub>SO<sub>4</sub>: CSH); reaction time (C): 30-90 min— on furfural yield were systematically investigated.

Statistical analysis using ANOVA confirmed the significance of the model ( $p < 0.05$ ) and revealed that all three variables (either individual or interaction) had significant effects on furfural yield. The optimized process conditions—pretreatment condition of 11.731 (1% H<sub>2</sub>SO<sub>4</sub>: CSH), acid hydrolysis condition of 6.74% (%H<sub>2</sub>SO<sub>4</sub>: CSH), and a reaction time of 81.2 min with desirability 1 resulted in a furfural yield of 14.34% (Fig. 4.3.1). The study optimized the production of furfural from CSH, thus enhancing its potential as an economically viable feedstock for the bio-refinery industry contributing to the advancement of biomass conversion technologies for the sustainable production of high-value chemicals.

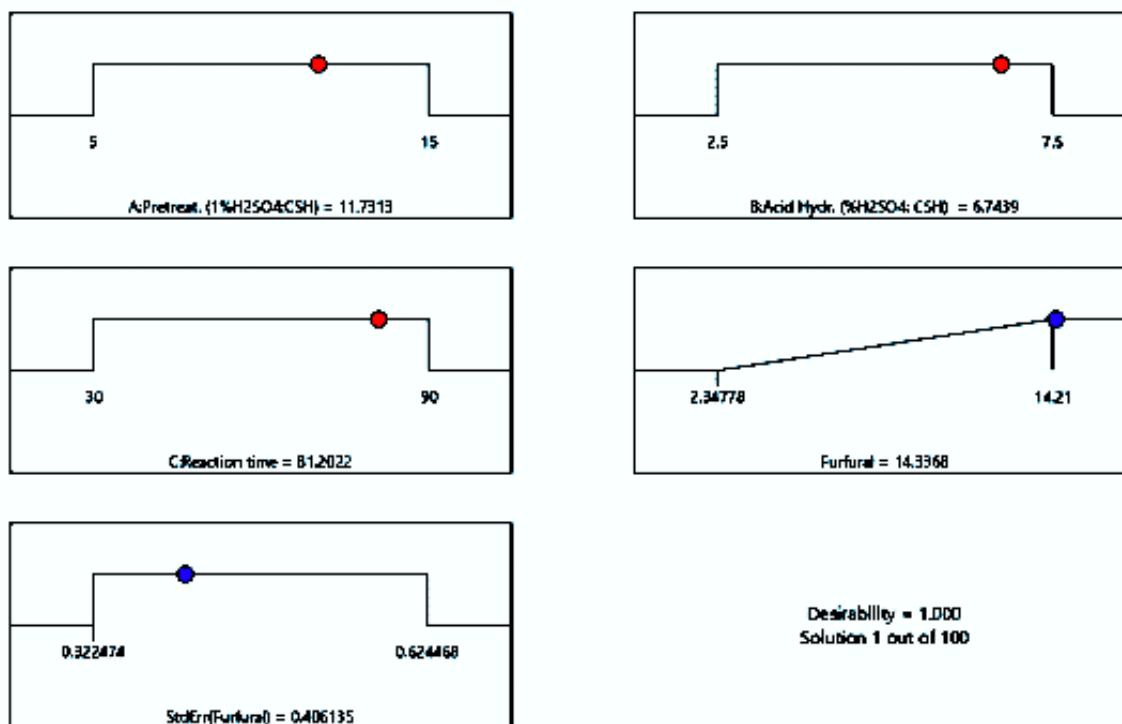


Fig. 4.3.1. The optimized process conditions of pretreatment for achieving highest furfural yield

#### 4.4 Development of Microbial Enzyme-mediated delinting process for Cottonseeds (CH 106)

The enzymatic delinting experiment results showed that the viability of seeds was negatively affected due to incubation of seeds at 50 °C under shaking condition (120 rpm) for 6 h. Hence, an alternative commercial enzyme which has optimal activity at room temperature was screened. A microbial cultures having cellulolytic enzymes with optimal activity at room temperature or below 35 °C was prospected. A fungal strain, *Aspergillus niger* SH3 was procured from Indian Type Culture Collection (ITCC), Indian Agricultural Research Institute (IARI), New Delhi. Cellulase crude enzyme was produced from *A. niger* using cotton stalk and cotton micro-dust.

Enzyme delinting experiment was carried out with above two enzymes at 40 °C for 6 h. The results showed that both the enzymes were not effectively removing the linters from cottonseed. However, enzyme produced from *A. niger* SH3 showed promising delinting of cottonseed at 50 °C for 6 h while other enzymes failed in delinting of cotton seeds.

The commercial enzyme delinted seeds (carried out at 50 °C for 6 h) were analysed for germination and oil content. The results showed that the oil content in delinted seeds was not significantly affected (Table 4.4.1).

Table 4.4.1. Effect of delinting of cotton seed using commercial enzyme LUNA at different enzyme concentrations on total reducing sugar yield, oil content and germination

Enzyme conc.	TRS* (mg/ml)	mg/g of seed (available sugar 100 mg / g of seed)	Oil Content (%)
10%	1.7	17	13.0 ± 0.2
20%	2.1	21	13.1 ± 0.2
30%	6.8	68	13.2 ± 0.5
40%	7.6	76	13.1 ± 0.3
50%	8.6	86	12.0 ± 1.0
Control#	1.2	12	13.0 ± 0.6
Acid delinted seeds	-	-	13.8 ± 0.9
Normal seed			14.4 ± 0.2

\*TRS – Total Reducing Sugars

# Seeds incubated at 50 °C under shaking condition (6 h)

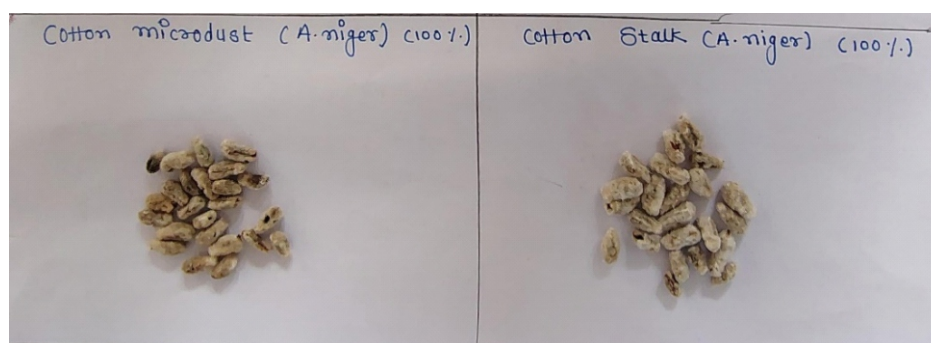


Fig. 4.4.1 Enzyme-mediated delinting of cotton seeds at 40 °C under shaking for 6 h.

#### 4.5 Efficacy evaluation of ICAR-CIRCOT Nano-Sulphur as fertilizer formulation for different field crops (II 06)

Nano sulphur (20% w/v) was synthesised using the standardised process protocol and supplied to the different collaborating institutes to conduct field trials. The field experiments were planned as per the Randomized Block Design with 8 treatments and 3 replications.

**MPKV, Rahuri :** The experiments were conducted on soybean cv. Phule Sangam in the Kharif season of 2024 having Medium deep black soil, 4×3 m (plot size), 30×10 cm (spacing), 30th June (sowing

date) and 16th October 2024. The results suggested that the treatment T4 (T2+ drenching of 100% nano S) was at par with T3 (T2+ES) in terms of yield parameters, protein content and oil yield.

**VNMKV, Parbhani :** The experiments were conducted on cotton and soybean. For cotton, the treatment T5 (T2+ drenching of 75% nano S) was found at par with treatment T3 (T2+ES) in terms of observed yield parameters. The seed cotton yield was 1870 kg/ha (T5) and 1892 kg/ha (T3), and the

average boll weight was 4.93 and 4.67 g, respectively. The maximum ginning percentage of 38.20% was observed for T6. From the HVI analysis, the highest UHML of 27.17 mm, UI of 87%, MIC of 4.13  $\mu\text{g}$  /inch and tenacity of 28.70 g/tex were recorded for T6 (T2+ drenching of 50% nano S) treatment. For soybean, the treatment T4 (T2+ drenching of 100% nano S) was at par with T3 (T2+ES) in terms of observed yield parameters. The yield of 1629.63 and 1597.88 kg/ha was observed for T3 and T4, respectively. The test weight, oil yield and protein content were higher in T4 (T2+ drenching of 100% nano S) as compared

with other treatments. The physical and engineering parameters for soybean seeds were also recorded. The seeds from T5 treatment had maximum dimensions i.e.  $6.82 \pm 0.25$  mm (length),  $6.06 \pm 0.27$  mm (width) and  $4.81 \pm 0.28$  mm (height).

**ICAR-DOGR, Rajgurunagar :** The field experiments were ongoing at ICAR-DOGR Rajgurunagar during the RABI season with ten treatments and four replications. The crops planted viz. onion (cv. Bhima Shakti) on 18th December 2024 and garlic (cv. Bhima Purple) on 11th November 2024.



Fig 4.5.1 Field view of onion cv. Bhima Shakti



Fig 4.5.2 Field view of garlic cv. Bhima Purple

#### 4.6 Microbial electrolysis cell (MEC) for efficient production of Hydrogen gas from cotton biomass (II-10)

This project aims to develop an efficient microbial electrolysis cell for biohydrogen production using cotton stalk and cyclone dust. Cotton stalks, compost (made from cotton stalk) & cyclone dust were collected and characterized for various properties. A comprehensive analysis was conducted to evaluate its chemical and physical properties. The study included proximate

analysis, which determined the moisture content, ash content, volatile matter, and fixed carbon of the biomass. The ultimate analysis focused on the elemental composition, measuring carbon and nitrogen levels in the biomass. Additionally, FTIR analysis was performed to examine the molecular structure and identify functional groups within the biomass. The compositional analysis further

detailed the primary structural components of the cotton biomass, including cellulose, lignin, and hemicellulose.

Pre-treatment of biomass was done by physical, chemical, enzymatic and combination of processes and optimal process was identified. In physical method, cotton stalk & compost were ground using flour mill machine to make it in a powdered form. In chemical method, 0.6% HCl (v/v) solution was used at 100°C for 1 hour to ensure hydrolysis and breakdown of complex carbohydrates. In the enzymatic process, commercial cellulase enzyme was used to break down the cellulose in the biomass into simpler sugars.

For dark fermentation setup, cow dung slurry was used as the inoculum and enzyme pretreated biomass was used as the substrate. The

fermentation setups were incubated at room temperature and covered with foil paper to avoid the entry of light. A gas collection bag was attached to the setup to capture the gases produced during the incubation, and the collected gas samples are monitored by Gas Chromatography. In the MEC setup, *Escherichia coli* was inoculated into a peptone medium containing glucose at a concentration of 30 mM (w/v). Graphite electrodes were inserted into the medium, and a constant voltage of 0.6 volt was applied to facilitate the electron transfer between the microbes and the electrode. The applied voltage helped enhance microbial activity, driving the reduction of protons to hydrogen at the cathode. Hydrogen production is being monitored over time to assess the efficiency of the system using Gas Chromatography.



*Fig. 4.6.1 Dark Fermentation setup for production of hydrogen gas*

ICAR-National Bureau of Agriculturally Important Microorganisms (NBAIM), Mau, the collaborating institute, is working on the pre-treatment of cotton stalks using two different fungal cultures, *Phanerochaete chrysosporium* and *Pleurotus flabellatus*. After the pretreatment,

the enzyme analysis was done for six different enzymes and also the reducing sugar analysis was carried out. Six different enzymes analyzed include, Laccases, polyphenol oxidases, Peroxidases, Cellulase, Xylanase,  $\beta$ -glucosidase.

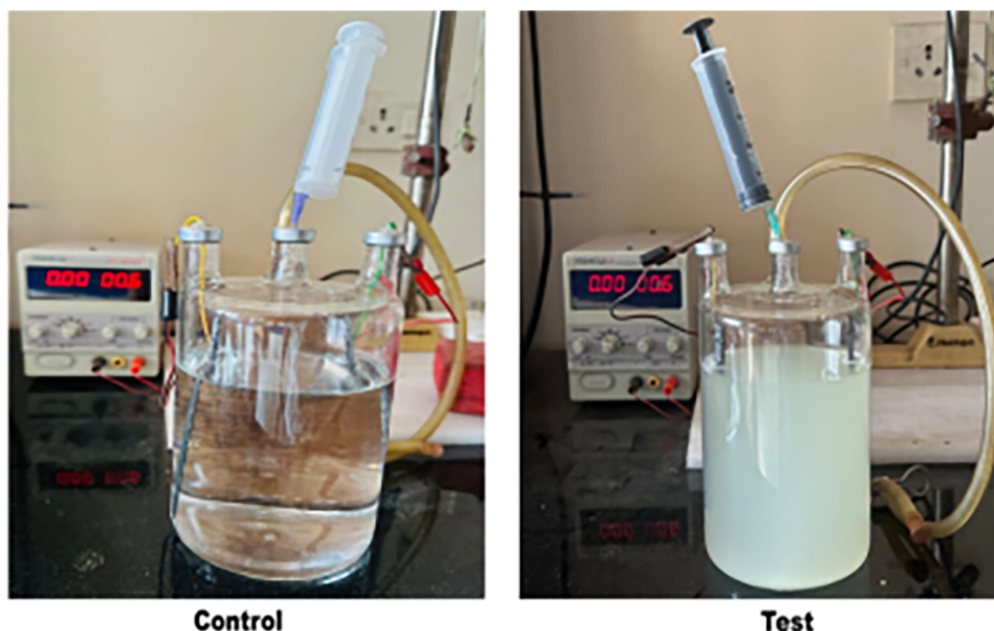


Fig. 4.6.2 Microbial Electrolysis Cell setup for production of hydrogen gas

#### 4.7 Development of antimicrobial cotton fabric for post-harvest handling and packaging of flowers (II 11)

**Preparation of nanoparticle loaded antimicrobial cotton fabric & its characterization** : The preparation of antimicrobial unbleached woven cotton fabric was done by in situ method involving coating of cotton fabric with 1 mM Silver Nitrate ( $\text{AgNO}_3$ ) in 1:10 M:L ratio for 30 minutes at room conditions,

followed by autoclaving (at 121°C for 15 minutes) and drying. Different physico-mechanical properties of untreated and nanoparticles treated cotton fabric such as Ends Per Inch (EPI), Picks Per Inch (PPI), GSM ( $\text{g/m}^2$ ), Count (Ne), Breaking strength (N), and Tearing strength (kg) were evaluated using the standard protocol.

Table 4.7.1. Properties of coarse and less porous cotton grey coloured fabric

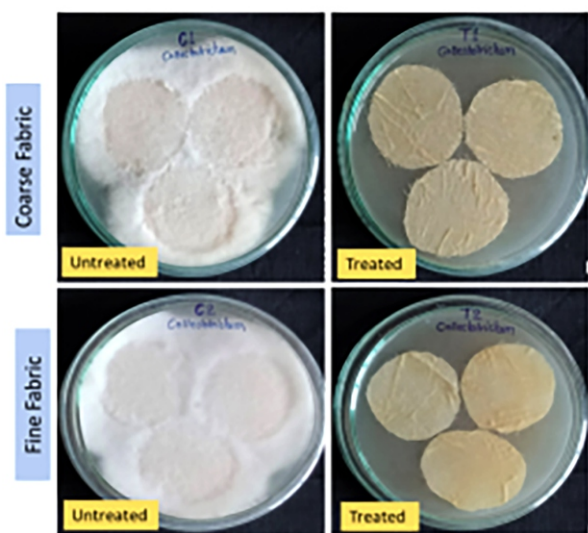
Fabric parameters	Units	Fabric-1 (Coarse And High Porous)		Fabric-2 (Fine And Less Porous)	
		Control	Ag Treated	Control	Ag Treated
Ends Per Inch (EPI)	(IS 1963)	56 ± 0	58 ± 0	89 ± 1.0	87 ± 1.0
Picks Per Inch (PPI)		47.7 ± 0.6	48 ± 0	69 ± 1.0	72 ± 0
Grammage	$\text{g/m}^2$	61.3 ± 2.1	66.8 ± 1.8	57.4 ± 0.8	61.1 ± 1.2
Count	Warp (Ne)	35.6 ± 1.1	41.6 ± 1.5	64.2 ± 1.7	67.9 ± 0
	Weft (Ne)	57.3 ± 0.1	56.8 ± 1.1	89.5 ± 3.4	84.4 ± 2.1
Breaking strength	Warp (N)	223.7 ± 2.4	179.4 ± 5.7	220.1 ± 9.7	180.9 ± 8.4
	Weft(N)	99 ± 1.7	102.9 ± 8.6	126.5 ± 7.4	116.6 ± 11.7
Tearing strength	Warp (kg)	1.9 ± 0.1	2 ± 0.3	1.9 ± 0.2	1.26 ± 0
	Weft (kg)	1.1 ± 0.1	1.36 ± 0	0.8 ± 0.1	0.83 ± 0.1

The EPI and PPI of the untreated and nanoparticles treated coarse cotton fabrics were not significantly different i.e. 56 and 47.7, and 58 and 48, respectively. While, the EPI and PPI of the untreated and nanoparticles treated fine and porous cotton fabric were  $89 \pm 1.0$  and  $69 \pm 1.0$ , and  $87 \pm 1.0$  and  $72 \pm 0.00$ , respectively. The GSM of treated cotton fabric was  $66.8 \pm 1.8$  g/m<sup>2</sup>, which is 8.09 % higher than the untreated fabric ( $61.3 \pm 2.1$  g/m<sup>2</sup>), suggesting coating load on fabric surface. The grammage of nano silver treated cotton fine fabric was  $61.1 \pm 1.2$  g/m<sup>2</sup>, which 6.44 % higher than the untreated fabric ( $61.1 \pm 1.2$  g/m<sup>2</sup>).

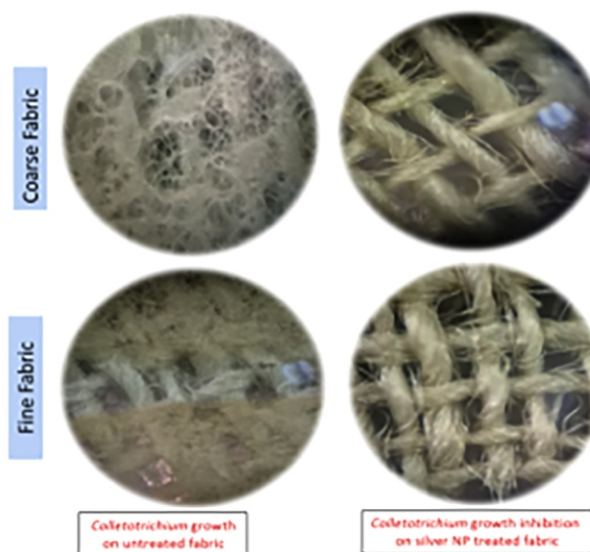
**Antifungal activities of silver treated cotton fabric against flower pathogens :** Antifungal properties of silver treated coarse and fine cotton fabric was evaluated against different fungal pathogens which were isolated and identified from rotting flowers. From the Fig 4.7.1, it is evident that silver treated cotton fabric demonstrated the

The count of untreated and treated coarse fabric in warp direction was  $35.6 \pm 1.1$  Ne and  $41.6 \pm 1.5$  Ne, while it was  $57.3 \pm 0.1$  Ne and  $56.8 \pm 1.1$  Ne in weft direction. The count of untreated and treated fabric in terms of Warp (Ne) was  $64.2 \pm 1.7$  and  $67.9 \pm 0$ , while it was  $89.5 \pm 3.4$  and  $84.4 \pm 2.1$ , in terms of Weft (Ne). The tearing strength of treated cotton coarse fabric was 5% and 23% higher in warp and weft direction, respectively, compared to untreated fabric. However, the breaking strength in warp direction reduced by 19.81% after treatment (Table 4.7.1).

considerable fungicidal activity against various pathogens such as *Fusarium oxysporium*, *Colletotrichum* Species, *Chaetomium globosum*, and *Aspergillus niger*. In terms of spore reduction, nano silver fabric showed 87.2% and 98.0 % inhibition against *Fusarium oxysporium* and *Colletotrichum* Species,



**In vitro** antifungal activity of silver treated and untreated fabric against fungal pathogen, *Colletotrichum* spp



Microscopy images (40X) of fungal pathogen (*Colletotrichum*) growth on silver treated and untreated fabric

Figure 4.7.1. Antifungal properties of silver treated cotton fabric against flower pathogen

#### 4.8 Characterization and utilization of paddy straw and other agro residues for conversion into pellets for co-firing in thermal power plants (TPP) (Biomass Mission)

##### *Development of a model for determination of paddy straw content in pellets and its validation :*

Analysis of paddy straw and four other biomasses and 126 pellets made from various combinations of these biomasses showed that paddy straw had much higher values of ash and acid-insoluble ash contents and an increase in paddy straw content increased their levels in pellets. A Random Forest

model in R, using these parameters, was developed to estimate paddy straw content in pellets, achieving an  $R^2$  of 0.97. Additionally, paddy straw was also found to have much higher manganese (Mn) content as compared to other biomasses, hence a regression model in Excel was also created to estimate its proportion based on the Mn content with an  $R^2$  of 0.92.

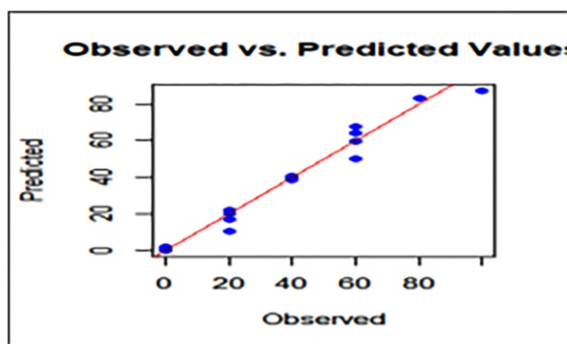


Fig.4.8.1 Observed and predicted values of paddy straw content in pellets using random forest algorithm (Ash and acid insoluble ash)

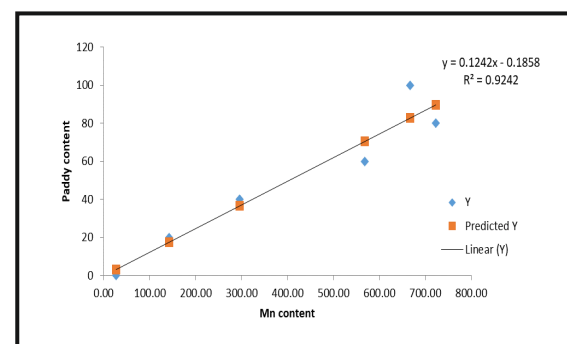


Fig. 4.8.2 Observed and predicted values of paddy straw content using regression analysis in excel (Mn content)

##### *Storage studies on biomass and biomass pellets :*

Five biomass samples viz. paddy straw, cotton stalks, groundnut shells, bamboo dust and soybean stalks stored in heaps for last two years have not shown any visible signs of degradation. Studies on effect of storage of 30 pellet samples (5 kg each) in three environments viz. PP bag, tied PP bag and airtight bags were carried out. These pellets were

analysed for moisture content, ash content and calorific value after every two months. Overall, calorific values showed slight decrease upon storage but tying the PP bag showed lower reduction in the calorific value as compared to open PP bag storage. Moisture gain in the tied PP bag and airtight PE bags was less as compared to the open PP bags. Most pellets showed an increase in the ash content.

##### *Design, development and commissioning of 50 kg/h biomass torrefaction prototype :*

A continuous torrefaction prototype of 50 kg/h capacity was designed and developed in collaboration with M/s Vidarbha Sales, Nagpur. It has been successfully installed and commissioned at GTC, Nagpur in July

2024 (Fig.4.8.3). It comprises of three main components: a pre-heating chamber, a main torrefaction reactor, and a cooling section, along with essential support systems such as feed handling, temperature control and volatiles management. It is electrically heated for precise

temperature control. Material run trials followed by torrefaction trials were successfully completed. Various issues, such as choking of biomass, preventing the air entry into the system,

management of emerging volatile gases and flares in torrefied material were encountered during torrefaction trials which were resolved and it is now functioning smoothly.



Fig.4.8.3 Prototype biomass torrefaction unit



Fig.4.8.4 Torrefied paddy straw

Torrefaction of paddy straw at torrefaction temperatures varying from 250-350°C was conducted for 30 min. An analysis of the properties of the torrefied biomass revealed that the contents of ash, acid insoluble ash, total organic carbon and GCV of the torrefied biomass increased but yield decreased with increasing torrefaction temperature. Volatiles content of the

paddy straw approximated through weight loss between 150-900°C in micro TGA decreased as the torrefaction temperature increased. At the highest torrefaction temperature of 350°C volatiles content of paddy straw decreased by about 59% to a value of 25.7% but yield of torrefied material was only 37%. Results are presented in Table 4.8.1.

Table 4.8.1: Properties of paddy straw torrefied in torrefaction prototype

Temperature °C	Ash (%)	Acid insoluble ash (%)	GCV (cal/g)	Volatiles content (%)	Yield (%)	Total organic carbon (%)
Nil	13.9	10.94	3318	63	-	34.39
250	19.68	13.54	3770	55.62	64	38.94
270	22.96	17.39	4181	49.01	61	40.56
290	26.61	19.91	4231	41.11	52	41.66
310	33.54	21.66	4409	27.98	46	42.29
330	33.60	23.24	4517	28.07	41	42.73
350	33.68	25.39	4575	25.74	37	43.10

Trials were also carried out on the torrefaction of cotton stalk (250°C-330°C) and groundnut shell (250 and 270°C) for 30 min and various properties of torrefied materials presented in Table 4.8.2

reveal a similar trend. Torrefaction increased the calorific value of the biomass and with increase in torrefaction temperature, calorific value increased and the yield gets reduced.

Table 4.8.2: Properties of cotton stalks and groundnut shells torrefied in torrefaction Prototype

Biomass	Temperature °C	Moisture content (%)	Calorific value	Ash content	Yield percentage
Cotton stalk	250	4.12	4961	12	60
	270	3.67	5101	12.92	56
	290	2.84	6124	9.2	40
	310	3.94	6314	9.31	36
	330	2.83	6415	9.41	31
	250	3.27	4314	12.02	61.65
Groundnut shell	270	3.81	5029	14.33	58.04

**Value addition to biomass ash for application as fertilizer :** Pot experiments on cotton crop with cotton stalk ash as fertilizer were conducted at Nagpur. Cotton stalks ash in varying percentages along with compost and RDF was applied across different pots. One plant was harvested from each

pot at 25 days interval and growth parameters were recorded. The data is being analysed. Plant samples consisting of leaves, shoot and roots (180 in number) were dried and these will be analysed for mineral content.

#### 4.9 Bioprocessing of Natural Fibres and Agro residues for Production of Oligo saccharides and lignin-derived aromatics (CRP-TNAU 02)

##### Salient achievements

- Enzyme cocktail (Cellulase + Xylanase + Laccase) for enhanced saccharification process was developed in cotton stalk biomass
- Enzymatic XOS production was optimized and yielded about 12.356 mg mL<sup>-1</sup> and 4.051 mg mL<sup>-1</sup> in cotton stalk and banana fibres respectively
- Enzymatic COS production was optimized and yielded about 1.759 mg mL<sup>-1</sup> and 7.750 mg mL<sup>-1</sup> in cotton stalk and banana fibres respectively.
- Prebiotic index of 1.12 was obtained when combination of 0.5% XOS and 0.5% COS
- Column fractionation of depolymerized EnZolv pre-treated lignin showed Benzoic acid (65.45%) as the predominant LDA found in petroleum ether fraction and 1,3 Benzenedicarboxylic acid<sub>2</sub> (62.46%) in methanol fraction

##### Conversion of Cellulose to Starch:

The process of extraction of sugars from Cotton linters has been successfully optimized. The linters from cottonseed can be hydrolysed into oligosaccharides and cellobiose (disaccharide) using microbial cellulase which comprise of Endoglucanase, Endoglucanase II and

Cellobiohydrolase. For production of endoglucanase, a promising strain of *Bacillus subtilis* has been obtained from National Bureau of Agriculturally Important Microbial Culture Collection (NAIMCC), ICAR-National Bureau of Agriculturally Important Microorganisms

(NBAIM), Mau. The primer for amplification of endoglucanase gene was designed and submitted for synthesis in order to amplify the complete

gene for expression and purification using a suitable vector.

#### 4.10 Engineering Microbial Factories for Enhanced Xylitol Production from Cotton Lignocellulosic Biomass using CRISPR/Cas9 Technology” (ICAR Genomic Research)

Xylitol, a high-value sugar alcohol with extensive applications in the food and pharmaceutical industries, can be sustainably produced from lignocellulosic biomass. This study aims to engineer yeast for enhanced xylitol production from cottonseed hull (CSH) biomass using CRISPR/Cas9 technology. Proximate analysis of CSH revealed its composition as 39% cellulose, 19% hemicellulose, 21% lignin, 9% moisture, 3% protein, 3% ash, and 6% extractives, indicating its potential as a xylose-rich feedstock. Pretreatment of CSH with dilute acid identified optimal conditions for maximum xylose release at 0.8% acid concentration, 100 minutes of incubation, and a 1:40 CSH-to-solvent ratio. Additionally, microbial pretreatment with *Bacillus pumilus* demonstrated that 0.7% NaOH-pretreated CSH (at 100°C) yielded 63.61 mg of xylose per gram of dry substrate after 24 hours of incubation. Yeast

strains SC36 and SC3156 were identified as *Saccharomyces cerevisiae* based on differential interference contrast (DIC) microscopy and ITS sequencing. The SC36 strain efficiently utilized xylose as a carbon source, producing 0.752 mg/mL xylitol, as confirmed by high-performance liquid chromatography (HPLC) analysis (Table 4.10.1 & Fig. 4.10.1). CRISPR/Cas9-mediated genetic modifications are being explored to enhance xylitol yield by optimizing key metabolic pathways in SC36. This approach aims to improve microbial efficiency in converting xylose into xylitol, reducing production costs and increasing industrial viability. The study provides a sustainable biotechnological strategy for value addition to cotton lignocellulosic biomass, promoting circular economy principles and reducing dependence on chemical synthesis for xylitol production.

Table. 4.10.1. Estimation of xylitol production in *S. cerevisiae* using HPLC technique

S. No.	Media	Xylose content at 48HAI	Xylitol at 48HAI	Efficiency
1	YPGX (initial xylose 20 mg/mL)	1.36 mg/mL	0.752 mg/mL	4%

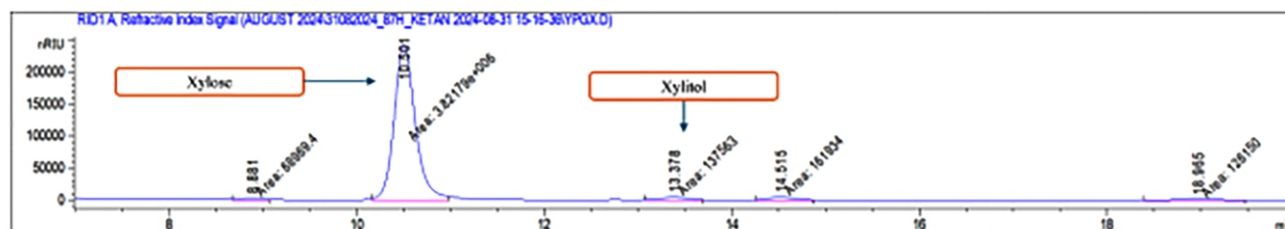


Fig. 4.10.1. HPLC analysis of xylose utilization and xylitol production using SC36 yeast strain

#### 4.11 Development and validation of test method for determination of index ingredient from plant-based indigo and textiles dyed with plant-based indigo by using Carbon-14 (C-14) analysis (TXD 0125)

Indigo is a widely used dye to obtain varying shades of blue on fabrics particularly denim. Indigo dyed textiles are highly valued for their unique, rich and fast colour. It was traditionally obtained from plants like *Indigofera* species, woad (*Isatis tinctoria*), Assam indigo (*Strobilanthes cusia*), and Japanese indigo (*Persicaria tinctoria*) and is now termed as plant based or natural indigo to differentiate it from the synthetic indigo derived from petroleum. It is the most important dye for producing blue, a primary colour in textiles dyed with natural dyes.

Indigotin is the molecule or the index ingredient responsible for the blue colour produced by both natural and synthetic indigo and for the same indigotin content, natural indigo is approximately 15-fold more expensive than synthetic indigo. This price differential provides a great economic incentive to sell blended synthetic indigo as natural indigo and similarly, textiles coloured with synthetic indigo may be sold as natural indigo dyed products. It is therefore

necessary to develop a reliable method for distinguishing natural and synthetic indigo to check this adulteration. As the index ingredient of both types of indigo is same, it is not possible to distinguish between the two by usual spectroscopic or chromatographic methods. The two may only be distinguished by their carbon isotopic signatures as the natural indigo derived from plant sources will have the modern-day Carbon-14 (C-14) content while the synthetic indigo on account of its petrochemical origin will not have any C14 content. This work was undertaken to develop a method for determination of C-14/ modern day carbon content of the indigotin present in an indigo dye sample to help in detecting any adulteration of plant-based indigo with synthetic indigo.

Two standard high purity (95-97%) synthetic indigo samples and two authentic natural indigo samples were obtained. Nine samples from six commercial natural indigo suppliers and users were procured.

##### *Characterisation and purification of natural indigo samples:*

As natural indigo samples have a lot of soil, dust and residual plant materials and lime etc. introduced from the harvesting and extraction processes, all indigo samples were analysed for ash and acid insoluble ash contents. A

spectrophotometric assay was also developed and employed to estimate the indigotin content of natural indigo. The results are presented in the Table 4.11.1 below:

Table 4.11.1: Ash and Acid Insoluble ash and indigotin contents of various indigo samples

Sr No.	Indigo Sample	Ash Content (%)	Acid Insoluble Ash Content (%)	Indigotin content (%)
1	Std TCI	0.08	0	100
2	Std Sigma	1.67	0.24	-
3	Natural Circot	37	28.5	24.9
4	BioDye	14.7	5.6	40.7
5	Supplier A	6	0.3	70
6	Supplier B	56.2	49.5	24.8
7	Supplier C	38.4	35.1	-
8	Supplier D1	47.0	5.63	9.5
9	Supplier D2	47.2	5.9	-
10	Supplier E2	30.1	26.4	26.4
11	Supplier E1	28.4	25.1	48.2
12	Supplier F1	20.1	11.1	54.4
13	Supplier F2	32.1	15.6	13.8

It can be seen from the Table 4.11.1 that with the exception of sample from supplier A, most natural indigo samples had high ash content. This sample

from supplier A also showed quite high indigotin content as compared to other natural indigo samples.

#### Thermo-gravimetric Analysis of Indigo samples:

Thermal behaviour of natural and synthetic indigo samples from ambient to 900C under nitrogen atmosphere was studied using the Thermo-gravimetric Analyser (TGA) TG209 Tarsus of NETZSCH available at the institute and is shown in Fig 4.11.1. The graph obtained of synthetic indigo sample (red line) showed a sharp

weight loss or degradation between 340- 430°C temperature whereas, the graph for natural indigo (green line) showed gradual degradation which can be attributed to the presence of organic impurities. This is in line with the observed stickiness in natural indigo samples.

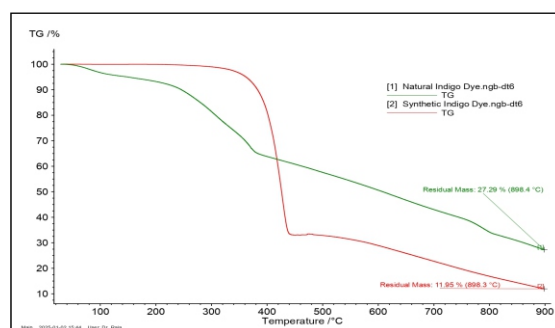


Fig 4.11.1. TGA graph of Natural and synthetic indigo

### *Purification of Indigo samples:*

In view of the large amount of impurities seen in natural indigo samples, it becomes necessary to purify indigo before submitting it for C14 analysis as the carbon containing impurities will interfere with the results. Direct sublimation was tried but the results were not satisfactory due to the charring and release of volatiles from the plant debris which made the sublimed indigo sticky and difficult to scrape out.

Reducing the indigo with alkaline dithionite to dissolve indigotin as leuco indigo, centrifuging to separate it from impurities and precipitating the purified indigo by air oxidation after acidification

was tried. Purified indigo thus obtained was further purified by sublimation. Purity of purified indigo and purified sublimed indigo was further checked by CHNSO analysis at SAIF, IIT, Bombay. Carbon content of purified sublimed samples was higher and closer to its theoretical carbon content of about 73%, hence this method was followed for purification of few commercial samples also. Later on, organic carbon content determined by using the solid module of the Total Organic Carbon Analyser available in-house was also found satisfactory as the results were comparable to the carbon content determined at IIT.

## CORE AREA V ENTREPRENEURSHIP & HUMAN RESOURCE DEVELOPMENT

### 5.1 Impact assessment of ICAR-CIRCOT Technologies (TT 12)

*The economic impact of the identified ICAR-CIRCOT technologies that were commercialized are:*

**ICAR-CIRCOT Bajaj Cotton Pre Cleaner:** The adoption of the CIRCOT-Bajaj cotton pre-cleaner in the ginning industry, comprising of over 3000 ginning factories, has grown from 12% in 2009 to around 32% in 2020. The incremental addition to the output due to technology adoption was estimated at 5% along with improvement in quality. The overall economic benefit assessed using the Economic Surplus Approach is estimated at Rs. 438 crores per annum.

**CIRCOT Calibration Cotton:** This is an in-house technology developed by the institute through a revolving fund project, since 1997. It is an import substitute for the USDA calibration cotton. The institute has sold around 12877 boxes (200g each) of the calibration cotton to the industrial

stakeholders since its development (on an average around 515 boxes per annum). The economic impact by means of saving of precious foreign exchange amounts to around Rs. 58 lakhs per annum. The cheaper alternative has also resulted in saving of up to 60% for the consumers on expenditure towards calibration cotton.

**Value addition to Cotton Stalks (Briquetting and Pelleting):** The impact of the commercial use of cotton stalks was ascertained with the case study of the Briquetting plant (20 TPD capacity) that utilized the cotton stalks. The venture has benefitted in creation of seasonal employment for 3 months in rural area and 8400 man-days of regular employment per annum. The farmers received Rs.1000 per acre for the cotton stalks. The overall economic benefit by means of value addition to 1% of cotton stalks was Rs 84 crores per annum. Besides the technology also has positive

environmental externalities of reducing carbon footprints.

Portable Ginning Machine: The technology licensed accounted for about 3% of the total production capacity of user industry with a turnover of about Rs. 52 lakhs in the last ten years

through sale of the portable ginning machine. The technology has created an employment opportunity of about 1500-man days per annum. On an average, the annual sales of the machine are around 22 machines.

## 5.2 Development of Project Profiles, Database and Entrepreneurship on Cotton Processing and Its Value Addition (TT- 14)

- Developed Project Profile on post-harvest processing technologies of Cotton and its by-products.
- Developed Excel based programme to calculate Cost benefit analysis of different bankable projects.
- Biomass briquetting DPR is prepared as model DPR.
- Developed Detailed project report for Establishment of 25,000 spindle spinning mill and Absorbent Cotton Production Plant having capacity of 2TPD.
- Cotton Processing Industries, related Plant and machinery supplier's database has been compiled.

## 5.3 Assessing the Stakeholders Perception on Traceability in Cotton Value Chain (TT 15)

The value chain mapping of the stakeholders involved in the implementation of traceability in the cotton value chain has been done. The questionnaire to understand the awareness of the stakeholders about the traceability concept and assess their perception has been developed using

the Likert scaling technique. The stakeholders identified for the survey include FPO's/Farmers group, NGO's involved in cotton value chain, ginners, spinners, textile organizations, public institution and policy makers.

## 5.4 Agri-business Incubation Centre at ICAR-CIRCOT (NAIF)

- Four new entrepreneurs admitted for incubation
- Twelve (12) in progress
- Fourteen (14) Agri-business Development/Awareness/seminar/workshop/exhibitions programmes were organized and attended
- Revenue generation through ABIC store (product sale): Rs. 10.60 Lakhs
- Revenue generation through professional services: Rs. 19.50 Lakhs
- 22 MoUs has been signed with different institutes/organizations for collaborative research, technology licensing, commercial services etc.
- 13 Consultancy projects undertaken during the financial year 2024-25

## 5.5 Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RAFTAAR) Agri Business Incubator (R-ABI) (DA&FW)

- The RKVY Division, DA & FW, has allocated Rs. 426 lakh to CIRCOT R-ABI under the Innovation and Agri-Entrepreneurship Programme of RKVY. The first instalment of Rs. 106.50 lakh was released on 28th October 2024
- The Centre of Excellence Incubation Committee (CIC) recommended 9 startups of 7th COHORT for Rs. 205 lakhs on 26th March 2024
- 8th COHORT UDAY and ANKUR incubation program conducted and 21 startups trained for one month from March 2024 to May 2024. Total 4 Expert session and 20 mentoring sessions were organized
- 9th COHORT UDAY and ANKUR incubation program conducted and 20 startups were trained for one month from December 2024 to February 2025. Total 8 Expert session and 44 mentoring sessions were organized
- CIRCOT R-ABI organized Agri startup conclave 2024 and Agri Startup Exhibition on December 3-4, 2024 as a part of ICAR CIRCOT Centenary Celebration. Thirty startups were actively involved. The conclave brought together innovators, investors, government representatives, and key stakeholders to foster collaboration and growth in the agricultural sector
- CIRCOTR-ABI startups interacted and showcased innovation to Shri Shivraj Singh Chouhan, Hon'ble Union Minister for Agriculture & Farmers Welfare, Government of India on 9th July 2024
- Knowledge partner KRISHIK ABI UAS Dharwad interaction meeting and monitoring the due diligence was held on 9th July 2024. The efforts of team CIRCOT-RABI was appreciated.
- On Site Interaction and Monitoring Visit of startups: Kaya Enterprise, Siddaganga Bio Products, Alunt Agro Products Pvt. Ltd., Prafulla Winery & Hospitality Pvt. Ltd., Setu Agrobiotech and Textile Industry Pvt. Ltd., Green Prosperity Innovations, Ramiz Agro Food Industries, SR Food and Brewers, Energy Chakra, Veganscare Pvt. Ltd., Kapra Enterprises, Tejasvi Agro Industry, Techo expert Solutions, VRSS Agro Engineering LLP, Varadvishwa Automation LLP, Kannalware Products.

## 3. Linkages & Collaboration

ICAR-CIRCOT has a good linkage with International organizations, National institutions, public & private sector organizations, Universities, Engineering & Technology hubs and start-ups for collaborative research, commercial testing benefitting all stakeholders. Further, ICAR-CIRCOT has its Regional Quality Evaluation (QE) units strategically located within the premises of other ICAR institutes and agricultural universities in the major cotton growing areas of the country. These units function as extension wings of the Institute and also facilitate linkages and collaboration.

The network with various organizations at national and international level are in the domains of research, education, skill development, incubation, extension and commercial services. These linkages help to foster research, enhance technology assessment and refinement, capacity building and eases the transfer of technology from lab to the land.

### 3.1 R&D Linkage

#### *Cotton Breeding Programme:*

ICAR-CIRCOT is an integral part of the All India Coordinated Research Programme (AICRP) on Cotton, functioning as Principal Investigator of Quality Research. The institute is linked to ICAR institutions and State Agricultural Universities involved in cotton breeding programmes and is part of the Central Variety Release Committee. Adhering to ICAR-CIRCOT quality norms is a pre requisite for release of the cotton varieties. The quality evaluation of the Bt cotton trials of both public institutions and private sector seed companies for variety release are carried out at the Institute.

#### *Contract Research:*

The Institute's initiative to include industrial stakeholders at the project initiation stage has led to development of linkages with industrial stakeholders through signing of Memorandum of Understanding (MoU) for carrying out collaborative research in Public Private Partnership (PPP) mode.

#### *CRP on Natural Fibres:*

The institute is the nodal agency for implementation of the Consortia Research Platform project on Natural Fibres. The other institutions linked under this umbrella are ICAR-CSWRI, ICAR-NINFET & TNAU, Coimbatore.

### 3.2 Platform for Cotton Quality Evaluation:

Institute also participates regularly in the Round Robin tests for evaluation of cotton fibre quality conducted by Bremen Institute and USDA. 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).

#### *ICAR-CIRCOT Protocol for Promotion of Indian Cotton as Kasturi*

India, till date, has lacked a distinct branding for its cotton, on the lines of the USA (Pima) and Egypt (Giza) cottons which have established branding for their cotton

Therefore, identifying the need to have an Indian cotton brand, Govt. of India has launched the brand "Kasturi Cotton Bharat" for Indian cotton.



The Cotton Textiles Export Promotion Council (TEXPROCIL) an organization that promotes the export of Indian cotton textile products, have been authorized to grant 'Kasturi Cotton Bharat' brand certificate in India by the government.

ICAR-CIRCOT has been identified as empaneled laboratory for testing and conformity assessment of Kasturi Cotton and plays vital role in fixing the quality norms for different parameters.

The protocol provided by ICAR-CIRCOT for "Kasturi cotton" branding is, Length: 29+ & 30+ mm, Rd: 76+, MIC: 3.7-4.2, Trash <2%.

#### *ICAR-CIRCOT linkage with MCXCCL*

ICAR-CIRCOT has become Approved Assayer of Multi Commodity Exchange Clearing Corporation Ltd (MCXCCL) for Quality Analysis of Cotton Bales.

### **3.3 Commercial Testing Services**

ICAR-CIRCOT is an acclaimed NABL accredited cotton testing laboratory in India. The Institute has facilities for conducting more than 197 tests on different textile materials and cotton by-products, for its stakeholders. Besides regular tests, special tests were also carried out as per demand from the stakeholders.

During the year 2024-25 a total number of 54,514 samples were tested at headquarters in Mumbai, GTC, Nagpur and quality evaluation units at Coimbatore, Dharwad, Guntur, Sirsa and Surat. Total revenue generated through commercial testing during the year 2024 was Rs. 214.31 Lakhs.

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.



*ICAR-CIRCOT linkage with MCXCCL*

**Table 3.1 Number of Paid Samples Tested and Revenue Generated (January to December 2024)**

Test Centre	No. of Samples Tested
Mumbai	8586
Nagpur	15775
Coimbatore	5410
Sirsa	4514
Guntur	384
Surat	1453
Dharwad	1007
<b>Total</b>	<b>37129</b>

**Table 3.2 Clientele for different testing services**

Test	Clientele
Fibre testing	<ul style="list-style-type: none"> <li>The Cotton Textiles Export Promotion Council (TEXPROCIL), Mumbai ( Kasturi Cotton Testing )</li> <li>M/s Cotton Association Of India, Mumbai</li> <li>M/s Mahyco Private Limited, Jalna.</li> <li>The Cotton Corporation Of India Ltd ( All Branches)</li> <li>M/s Rallis India Ltd, Hyderabad</li> <li>M/s Pancha Ganga Seeds Pvt. Ltd., Aurangabad</li> <li>M/s Nath Bio-genes (india) Limited, Hyderabad</li> <li>All India Network Project On Soil Biodiversity-biofertilizer, Parbhani.</li> <li>M/s Krishidhan Seeds Pvt. Ltd., Jalna</li> </ul>
School bag testing (full test )	<ul style="list-style-type: none"> <li>Municipal Corporation of Greater Mumbai</li> </ul>
Cotton picking bag testing	<ul style="list-style-type: none"> <li>Hon. Balasaheb Thackeray Agri-Business &amp; Rural Transformation Project (SMART Project)</li> </ul>
Kawabata Test	<ul style="list-style-type: none"> <li>Central Silk Technological Research Institute, Bengaluru</li> <li>ICAR-Central Sheep and Wool Research Institute, Avikanagar</li> <li>Wool Research Association, Thane</li> <li>Thangjam Roshini, Vadodara</li> <li>M/s Global Textile Alliance India Pvt Ltd, Coimbatore</li> <li>Institute of Engineering &amp; Technology, Yavatmal</li> <li>PSG College of Technology, Coimbatore</li> <li>DJFT, University of Calcutta</li> </ul>

Test	Clientele
Thermal Conductivity by Constant Heat Flow Method	<ul style="list-style-type: none"> <li>• Govt. S.K.S.J.T. Institute, Bengaluru</li> <li>• VJTI, Mumbai</li> <li>• D.K.T.E.S, Textile &amp; Engineering Institute, Kolhapur</li> <li>• ICAR-NINFET, Kolkata</li> <li>• ICAR-CSWRI, Avikanagar</li> <li>• The Bombay Textile Research Association, Mumbai</li> <li>• Central Silk Technological Research Institute, Bengaluru</li> </ul>
Q-max	<ul style="list-style-type: none"> <li>• T.C.L. Dept., College of Home science, CSAUA &amp; T, Kanpur</li> <li>• M/s Global Textile Alliance India Pvt Ltd, Coimbatore</li> <li>• M/s CMC Textile Pvt Ltd, Silvassa</li> <li>• M/s Sleep Management Pvt Ltd, Rajasthan</li> <li>• M/s Jacquard Fabrics India Pvt Ltd, Coimbatore</li> </ul>
Lignin Content	<ul style="list-style-type: none"> <li>• M/s Eskay Dyestuffs &amp; Organic Chemicals Pvt. Ltd., Mumbai</li> </ul>
WVTR	<ul style="list-style-type: none"> <li>• Sigachi Industries Limited, Hyderabad</li> </ul>
UPF	<ul style="list-style-type: none"> <li>• Shweta Mugutrao Pawar, Kolhapur</li> <li>• ICAR-NINFET, Kolkata</li> <li>• J. D. Birla Institute, Kolkata</li> <li>• Gokak Textiles Limited, Belagavi</li> <li>• Bornali Kachari, Assam</li> <li>• Meenakshi Sammal, Assam</li> <li>• Anima Mandal, Assam</li> </ul>
SEM	<ul style="list-style-type: none"> <li>• M/s Watson Pharma Pvt Limited, Mumbai</li> <li>• Institute of Bioresources and Sustainable Development, Manipur</li> <li>• ICAR-NINFET, Kolkata</li> <li>• M/s TUV SUD South Asia Pvt. Ltd., Mumbai</li> <li>• M/s Novo Excipients Pvt. Ltd., Navi Mumbai</li> <li>• Vijay Kiran Goregaonkar, Mumbai</li> <li>• Kirsten Lobo, Mumbai</li> <li>• Vignan's Lara Institute of Technology &amp; Science, Vadlamudi, Guntur</li> <li>• Jindal Poly Films Ltd (Division Global Nonwovens), Nashik</li> <li>• M/s Reliance Industries Ltd., Navi Mumbai</li> <li>• ICAR-CIAE, Bhopal</li> <li>• ICAR-CIFE, Mumbai</li> </ul>

Test	Clientele
ICP-MS	<ul style="list-style-type: none"> <li>Swami Vivekanand College, Chembur</li> </ul>
AFM	<ul style="list-style-type: none"> <li>ICAR-NINFET, Kolkata</li> <li>Institute of Chemical Technology, Mumbai</li> </ul>
UPF	<ul style="list-style-type: none"> <li>D.K.T.E., Ichalkaranji</li> <li>College of Community Science, Assam Agricultural University, Jorhat - 13</li> <li>K.S. Rangasamy College of Technology, Tiruchengode</li> <li>V.J.T.I Textile Department, Mumbai</li> <li>ICAR-CIFE, Mumbai</li> <li>Banashree Handique, Jorhat</li> <li>J.D Birla Institute, Kolkata</li> <li>Colorband Dyestuff (P) Ltd., Navi Mumbai</li> <li>Smita Bhuyan, Assam</li> <li>Manashree Saikia, Assam</li> </ul>
FTIR	<ul style="list-style-type: none"> <li>Yamini Dhanania, Kolkata</li> <li>Surya Teja Samanthula, Mumbai</li> <li>Eco Vegan Leather Private Limited, Kolkata</li> <li>Mugdha Dongre, Mumbai</li> <li>The Synthetic &amp; Art Silk Mills Research Association (SASMIRA), Mumbai</li> </ul>
Free and Total Gossypol Content	<ul style="list-style-type: none"> <li>Thakurji Solvex Pvt. Ltd., Jalna</li> </ul>
Bandage testing	<ul style="list-style-type: none"> <li>Medii Heal Solutions, Nagpur</li> </ul>
Paper testing	<ul style="list-style-type: none"> <li>Murbadkar Business Industries, Kalyan</li> <li>Lords Wear Pvt Ltd, Nagpur</li> <li>RITES Limited, Mumbai</li> </ul>
Limiting Oxygen Index	<ul style="list-style-type: none"> <li>Abdullah Al Rakib Shikder, Chennai</li> </ul>
Absorbent Cotton test	<ul style="list-style-type: none"> <li>Mateshwari Enterprises, Aurangabad</li> <li>Dr. Trust Medicative Cottons Absorbent Agro Cotton wool, Jalgaon</li> <li>M/S, Alphra Surgical LLP, Sangli</li> </ul>
Linters test	<ul style="list-style-type: none"> <li>Milan Ginning Pressing Pvt.Ltd, Gujarat</li> <li>Tirumala Cotton &amp; Agro Products Pvt. Ltd., Guntur</li> <li>Shankar Cotton Industries, Rajasthan</li> </ul>

Test	Clientele
Particle Size Analysis	<ul style="list-style-type: none"> <li>• SKUAST-K, Jammu and Kashmir</li> <li>• Mumbai Veterinary College, Parel, Mumbai</li> <li>• Rashtriya Chemicals and Fertilizers Ltd, Mumbai</li> <li>• ICAR-NINFET, Kolkata</li> </ul>

### MoUs signed

Sr. No.	Name of Organisation	Title of Project/ particular of MoU	Date of MoU Signing
1.	M/s. Relegare Agro Life Bio Science Pvt Ltd, Ahmednagar	Development of microbial inoculum for in situ degradation of agricultural waste	21-03-2024
2.	Multi Commodity Exchange Clearing Corporation Limited, Mumbai	Quality Analysis of Cotton Bales	18-04-2024
3.	M/s Precision Tooling Engineers, Nagpur	Gin Cotton Lint Opener	22-04-2024
4.	M/s. Vidarbha Sales, Nagpur	ICAR-CIRCOT Continuous Pellet Feeding Stove (CFPS)	22-04-2024
5.	M/s. Vidarbha Sales, Nagpur	Ecofriendly, Efficient and rapid burning crematorium using cotton stalk/biomass briquettes	22-04-2024
6.	M/s. Bajaj Steel Industries Limited, Nagpur	Gin Trash Handling System to Destroy Pink Bollworm from Ginneries	22-04-2024
7.	M/s. Bajaj Steel Industries Limited, Nagpur	One time deep-grooved (pre-grooved) chrome leather rollers	22-04-2024
8.	M/s Logic 1 Technologies and M/s. Bajaj Steel Industries Limited, Nagpur	Development of Compact Standalone Cotton Colour and Micronaire Measurement Instrument	22-04-2024
9.	RPG Foundation, Mumbai	Yarn preparation & woven fabric development	11-06-2024
10.	M/s. Bajaj Steel Industries Limited, Nagpur	Refinement in heating and cottonseed conveying system of continuous flow cottonseed dryer	22-07-2024
11.	Grevis Healthcare Pvt Ltd., New Delhi	Providing technical knowledge for establishing surgical cotton production unit	14-08-2024

Sr. No.	Name of Organisation	Title of Project/ particular of MoU	Date of MoU Signing
12.	M/s. Dhanaaj Agri Tech Pvt Ltd, Parbhani, M/s. Bajaj Steel Industries Ltd., Nagpur	Refinement and adoption of novel seed cotton compacting machine	27-09-2024
13.	RUIA College	Creation of a framework for collaboration between ICAR-CIRCOT and RUIA College	27-09-2024
14.	Non-Conventional Fibres Association (NCFA)	Collaborative research of mutual interest, Entrepreneurship development and Agri startup incubation, Knowledge/Information sharing, Joint Seminars/Conferences, training programmes and make available the facilities of laboratory	08-10-2024
15.	Vicram Yarns	Optimization of cotton linter processing for producing nitrocellulose grade linters	03-12-2024



*MOU with RPG Foundation, Mumbai*



*MOU with Non-Conventional Fibres Association (NCFA)*

## 4. Skill Development and Capacity Building

### 4.1 Capacity building of Staff

Institute staff are trained as per the devised training needs assessment plans, 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. The percent realization of trainings

planned during the financial year 2024-25 was 98% & for the financial year 2023-24 was 109%. Scientists underwent training in diversified fields like Statistical techniques, NABL Laboratory Assessor's, Executive development programme on Leadership Development, Capacity building programme for Technical, Administrative and skilled staff members include stress management, positive thinking and team building.

**Table 4.1 Skill Development of Institute Staff during 2024**

<i>Programme Title</i>	<i>Duration</i>	<i>Venue</i>	<i>Name(s)</i>
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#### *Scientific Staff*

Training organised by International Cotton Association, England on the subject Quality & Trade Matters	March 06-07, 2024	Cotton Association of India, Mumbai.	Dr. A.S.M.Raja
Refresher training by NABL on Good Assessment practices	March 15, 2024	NABL, New Delhi	Dr. A.S.M.Raja
Laboratory Management System	June 25-28, 2024	IRMRA, Thane	Dr. T. Senthilkumar Dr. GTV Prabu Dr. Manojkumar Mahawar Dr. Kirti Jalgaonkar Dr. Ajinath Dukare Dr. Kanika Sharma
online Training programme on multivariate Data Analysis using R	July 22-27, 2024	ICAR-NAARM, Hyderabad	Dr. Kirti Jalgaonkar Dr. Sharmila Patil

<i>Programme Title</i>	<i>Duration</i>	<i>Venue</i>	<i>Name(s)</i>
National Workshop (online) on “How to write a Research Paper”	October 18, 2024	Training and Education Centre, ICAR-Indian Veterinary Research Institute, Pune and Indian Society for Veterinary Surgery (ISVS)	Dr. GTV Prabu

### *Technical Staff*

Training (online mode) on “E-Governance tools and applications in ICAR”	February 08-14, 2024	ICAR-IASRI, New Delhi	Shri R. S. Prabhudesai Shri S. Banerjee Smt. Parvati Nirhali Smt. Medha Kamble Shri Anand Jadhav Shri Yogesh Nagpure
Training on physical and mental health management	March 26-27, 2024	ICAR-CIRCOT, Mumbai	Smt Bindu Venugopal Shri S.K. Parab Kum Newali Pathare Shri M.G. Sosa Shri D.J.Dhodiya
Laboratory Management System	June 25-28, 2024	IRMRA, Thane	Er. Chandrika Ram
Editor’s Workshop-Enabling a Research Ecosystem, (Online mode)	September 24, 2024	ICAR, New Delhi	Smt. Medha Kamble

### *Administrative Staff*

Training on physical and mental health management	March 26-27, 2024	ICAR-CIRCOT, Mumbai	Smt. J. R. Chavkute Shri T. D. Dhamange Shri S. N. Bandre Shri R. D. Shambarkar Shri R.G.Matel Shri Gorkha Thapa
e-HRMS training	May 21, 2024	ICAR-CIFE, Mumbai	Smt. Trupti Mokal

<i>Programme Title</i>	<i>Duration</i>	<i>Venue</i>	<i>Name(s)</i>
The Induction training programme for newly recruited Assistant Finance & Accounts Officer	September 17, to October 04, 2024	Arun Jaitley National Institute of Financial Management (AJNIFM), Faridabad and NASC, Pusa, New Delhi,	Shri Sainath N. Sahane

### *Skilled Support Staff*

Training on physical and mental health management	March 26-27, 2024	ICAR-CIRCOT, Mumbai	Shri M. K. Prabulkar Shri V. Subbaiah Shri V.B. Poojari Shri M.N. Kamble Shri S.S. Surkule Shri M.C. Solanki Shri R. P. Karkate
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### **HRD Achievements**

#### *HRD Targets & Achievements for April 2023 to March 2024*

<i>Category</i>	<i>Total No. of Employees</i>	<i>No. of training planned for each category during 2023-24 as per ATP</i>	<i>No. of employees undergone training during April 2023 to March 2024</i>	<i>% realization of training planned during 2023-24</i>
<i>Scientist</i>	28	8	11	137
<i>Technical</i>	54	13	13	100
<i>Admn. &amp; Finance</i>	19	7	7	100
<i>SSS</i>	24	7	7	100
<i>Total</i>	125	35	38	109

### HRD Targets & Achievements for April 2024 to December 2024

Category	Total No. of Employees	No. of training planned for each category during 2023-24 as per ATP	No. of employees undergone training during April-Dec 2023-24	% realization of training planned during 2023-24
Scientist	29	8	12	150
Technical	59	14	20	143
Admn. & Finance	19	5	5	100
SSS	21	6	0	0
<b>Total</b>	<b>144</b>	<b>33</b>	<b>37</b>	<b>98</b>

#### 4.2 Achievements: iGOT Karmayogi Training

In line with the directives issued by the ADG (HRM), ICAR, and the Department of Personnel and Training (DoPT), Government of India, it has been mandated that all regular employees of ICAR institutes must complete relevant training courses available on the iGOT Karmayogi platform. The initiative aims to build institutional capacity by equipping staff with the latest knowledge, digital competencies, and best practices required for the effective and efficient discharge of their duties.

In this regard, the scientific, technical, and administrative staff of the institute have proactively participated in various online training courses offered through the iGOT Karmayogi portal. These courses have been designed to support continuous learning and skill enhancement across disciplines.

Some of the popular training modules completed by staff members include:

- ChatGPT and General AI Tools for Government Officials
- Introduction to Emerging Technologies

- AI-Led Digital Transformation in Agriculture
- Government e-Marketplace (GeM)
- Basic Computer Troubleshooting
- Yoga Breaks at the Workplace
- Stress Management
- Code of Conduct for Government Employees
- Meditation: Principles and Practice

Through these training programmes, staff have gained valuable knowledge and practical skills that enable them to adapt to technological advances, adhere to best practices, and contribute more effectively towards the objectives of the institute and the nation. This initiative has not only strengthened institutional human resource capacity but also enhanced the overall quality of service delivery within the organization.

### 4.3. Skill Development Programmes organised for Stakeholders—Year 2024

S. No.	Programme Title	Conducted at	Conducted on	No. of participants	Participant's profile
<b>Trainings under CCI-CICR Pilot Project "Awareness and Extension Services on Best Farm Practices for Cotton Farmers to Improve Quality, Yield and Sustainability"</b>					
1.	Cotton Quality, Clean Picking and Crop Residue Management	Cotton Farm, Regional Station of ICAR-CICR, Farm, Coimbatore.	On January 08, 2024 (One day)	12 (including 3 women)	Farmers
2.	Cotton Fibre Quality, Clean Cotton Picking and Crop Residue Management	Vellamadai Village, Coimbatore (T.N.)	January 09, 2024 (One day)	80 (including 16 women)	Farmers
3.	Cotton Fiber Quality, Clean Cotton Picking and Crop Residue Management	Vadapudur Village, Coimbatore (T.N.)	January 10, 2024 (One day)	100 (including about 20 women)	Farmers
4.	Best Management Practices to Prevent Cotton Contamination and Preserve Fiber Quality	M/s. Shantalaxmi Ginning Mills (I) Pvt. Ltd., Pollachi. (T.	January 12, 2024 (One day)	60 (including 25 women)	Personnel from Ginning Industry
<b>Trainings under SMART COTTON Project</b>					
5.	Best Post-harvest management practices for production of world class bales from Indian Cotton	Ginning Training Centre (GTC), Nagpur	January 17-19, 2024,	06 (all male)	LRP Farmer
6.	Best Post-harvest management practices for production of world class bales from Indian Cotton	GTC, Nagpur	January 29-31, 2024.	11 (all male)	LRP Farmer
7.	Cotton Value Chain for Officers under the SMART Cotton Project	GTC, Nagpur	May 20-24, 2024 (5 days)	24 (including 4 women)	Agri-cultural Officers
8.	Cotton Value Chain	GTC, Nagpur	June 03-07, 2024 (5 days)	19 officers (including one woman)	Agri-cultural Officers

S. No.	Programme Title	Conducted at	Conducted on	No. of participants	Participant's profile
9.	Cotton Value Chain	GTC, Nagpur	July 01 – 05, 2024	20 officers (including 3 women)	Agri-cultural Officers
10.	Cotton Value Chain	GTC, Nagpur	July 08 – 12, 2024	18 officers (all male)	Agri-cultural Officers
<b>Trainings under Agricultural Technology Management Agency (ATMA) Project</b>					
11.	Cotton Quality Parameters and Value Addition to its By-produce	GTC, Nagpur	April 04, 2024 (One day)	32 (all male)	Farmers from ATMA, Wardha
13.	Post-Harvest Management of Cotton & Value Addition to its By-produce	GTC, Nagpur	May 17, 2024 (One day)	25 (all male)	Farmers from ATMA, Wardha
14.	Post-Harvest Management of Cotton & Value Addition to its By-produce	GTC, Nagpur	September 12-13, 2024 (2 days)	25 (all male)	ATMA farmers of Akot, Dist. Akola, Maharashtra
<b>Trainings under SCSP Scheme</b>					
15.	Double Roller Gin Settings and its Maintenance	GTC, Nagpur	March 11-13, 2024 (3 days)	40 (including 15 women)	Ginning industry
16.	Gin Settings and its Maintenance	GTC, Nagpur	March 19-20, 2024 (2 days)	41 (including 14 women)	Ginning Industry
17.	Smart Textiles and its Evaluation	ICAR-CIRCOT, Mumbai	March 18-20, 2024 (3 days)	13 (including 10 women)	Students
18.	Double Roller Ginning Technology and Basics of Cotton Grading	GTC, Nagpur	December 18-20, 2024	40 (including 23 women)	Ginning Industry

S. No.	Programme Title	Conducted at	Conducted on	No. of participants	Participant's profile
<b>FPO and State Agriculture Department Training</b>					
19.	Orientation training of activities at Ginning Training Centre for trainees from Vasant Rao Naik State Agriculture Extension Management Training Institute, (VANAMATI), Nagpur	GTC, Nagpur	February 08, 2024 (One day)	28 (including 2 women)	State Agriculture Department Trainees
20.	Orientation training of activities at Ginning Training Centre for trainees from VANAMATI, Nagpur	GTC, Nagpur	February 22, 2024 (One day)	27 (including 4 women)	State Agriculture Department Trainees
21.	Training on "Post-Harvest Management of Cotton and value addition to its by-produce"	GTC, Nagpur	February 27-29, 2024 (One day)	23 (including one woman)	Trainees from FPO, Wardha Dist.
22.	Orientation training of activities at Ginning Training Centre for trainees from VANAMATI, Nagpur	GTC, Nagpur	March 06, 2024 (One day)	26 (including 4 women) & two staff members	State Agriculture Department
<b>Specialised Programme</b>					
23.	ICAR Short Course on "Advances in Applications of Nanotechnology in Agriculture"	ICAR-CIRCOT, Mumbai	January 29 to February 08, 2024	18 (including 10 women)	Personnel from ICAR institutes and other Agricultural universities/colleges

S. No.	Programme Title	Conducted at	Conducted on	No. of participants	Participant's profile
24.	Composite Materials and its Applications	ICAR-CIRCOT, Mumbai	March 06-08, 2024	10 (including 4 women)	Personnel from ICAR institutes, Agri-cultural university, college students.
25.	Clean cotton-picking habits	KVK, ICAR-CICR, Nagpur	August 11, 2024 (One day)	37 (including 21 women)	Farmers
26.	Basics of Cotton Grading & Double Roller Ginning Technology	GTC, Nagpur	August 26-31, 2024	15 (all male)	Ginning Industry personnel
27.	Cotton Grading, Procurement and Marketing, for new recruits of Trident Group of Companies	ICAR-CIRCOT, Mumbai	First batch-- September 02-13, 2024 (12 days)	17 (including one woman)	Field officers (trainee) for cotton procurement
28.	Cotton Grading, Procurement and Marketing	GTC, Nagpur	September 23-27, 2024 (5 days)	38 (including 4 women)	Junior Commercial Executives of CCI
29.	Grading, Procurement & Processing of Cotton for new recruits of Trident Group of Companies	ICAR-CIRCOT, Mumbai	Second batch - September 16-27, 2024 (12 days)	17 (including one woman)	Field officers (trainee) for cotton procurement

S. No.	Programme Title	Conducted at	Conducted on	No. of participants	Participant's profile
30.	Cotton Grading, Procurement and Marketing	ICAR-CIRCOT, Mumbai	September 30 to October 04, 2024 (5 days)	Ten (all male)	CCI officers of various CCI units from all over India
31.	Nano-Finishing of Textile Fabrics with Particular Emphasis on wool	ICAR-CIRCOT, Mumbai	October 14 to 23, 2024	04 (including one woman)	Academia /Students
32.	Best Cotton Picking and Post-harvest Practices for The Production of Kasturi Quality Cotton	GTC Nagpur in association with TEXPROCIL and CITI-CDRA	October 18, 2025	125 (including 02 women)	Farmers
33.	Advances in Applications of Nanotechnology	ICAR-CIRCOT, Mumbai	November 04-08, 2024 (5 days)	14 (including 03 women)	Academia /Students
34.	Best Cotton Picking and Post-harvest Management Practices for the Production of Kasturi Quality Cotton (Organised by GTC in association with CITI-CDRA, Mumbai and The Cotton Textiles Export Promotion Council (TEXPROCIL), Mumbai.	Onsite at village Seloo, Wardha Dist.	November 28, 2024 (One day)	150 (including 15 women)	Farmers
35.	Electrospinning for Nanofibre Production	ICAR-CIRCOT, Mumbai	December 18-20, 2024 (3 days)	08 (all women)	Personnel from academia and research institutes

#### 4.4 Education

The Institute is affiliated to Mumbai University for offering Ph.D. programme in Microbiology. At present, for the academic year 2024-25 three students are registered/admitted for undergoing the Ph. D. (Microbiology) at ICAR-CIRCOT.

The Ginning Training Centre (GTC) of the Institute at Nagpur is also part of ICAR-CICR, Nagpur Education Hub of IARI Mega University. Four students are registered for M. Sc. course and three students are admitted for Ph. D. programme for the academic year 2024-25.

S. No.	Programme Title	Conducted at	Duration	No. of participants	Participant's profile
<b>Internship</b>					
1.	In-plant training for students doing M.Sc (PHT-PHFPE), PGI-PHTM at Dr. BSKKV, Dapoli, Maharashtra Killa-Roha.	ICAR-CIRCOT, Mumbai	January 01-31, 2024 (One month)	05 (including 3 women)	Students
2.	In-plant training for B. Sc. (Hons.) students from Department of Textile and Apparel Designing, College of Community Science, Tura, West Garo Hills, Meghalaya	ICAR-CIRCOT, Mumbai	February 12, 2024 to April 22, 2024 (Two months approx.)	07 (all women)	Students
3.	AOP & SAIP programme under the 8th cohort of R-ABI of ICAR-CIRCOT	ICAR-CIRCOT, Mumbai	March 20, 2024 to June 06, 2024	27	Start-ups
4.	In-plant training for B.Tech (Agricultural Engg.) students from Dr. Budhajirao Mulik College of Agril. Engg. and Technology, Madki- Palwan affiliated to BSKKV, University, Dapoli.	ICAR-CIRCOT, Mumbai	July 01-31, 2024 (One-month)	08 (all male)	Students

#### Students – Ph.D Scholars

- Ms. Anagha Pawar, Registered for Ph.D (Science) in Microbiology with the research topic 'Biogenesis of Hydrogen Using Cotton Biomass by Dark Fermentation and Microbial Electrolysis Cell'
- Ms. Anam Shaikh, Registered for Ph.D (Science) in Microbiology with the research topic

'Innovative Approach for Carbon Sequestration Using Microbial Carbonic Anhydrases Immobilized on Nanocellulose'

- Ms. Amruta Vilas Gadade, Registered for Ph.D (Science) in Microbiology with the research topic 'Development and Evaluation of Herbal-Based Antimicrobial Nano-Coating Formulation for Cotton Textiles in Wound Healing Management'



*Short Course-Advances in Applications of Nanotechnology in Agriculture Jan 29 to Feb 08, 2024*



*Training on "Smart Textiles and its Evaluation " during March 18-20, 2024 at Mumbai*



*Trainee field officers from Trident group –1st batch*



*Trainee field officers from Trident group –2nd batch*



*Training on "Nano-Finishing of Textile Fabrics with Particular Emphasis on wool" during October 14-23, 2024*

## 5. Technology Management

### 5.1 Intellectual Property Management

Institute Technology Management Unit (ITMU) is entrusted with the responsibility of the protection of intellectual property of the technologies developed in the Institute. The ITMU is also accountable for the evaluation of commercial

values of different consultancy projects and also the licensing of technology. During this year, two patents were granted, Eight consultancy projects have been handled and processed through Institute Technology Management Unit (ITMU).

#### Patents Granted: (02)

Patent Number & Granted on	Technology/ Innovation	Inventor Name
526907, granted on March 15, 2024	Profiled Multi-Pin Electrospinning for Nanofibre Production and Encapsulation of Nanoparticle into Nanofibres	G. T. V. Prabu
553793, granted on November 01, 2024	Biodegradable polymeric nanofibre nutrient matrix for plants and method to prepare the same	G. T. V. Prabu

#### Copyright Granted: (02)

(i) Copyright grant for “Plant Patho Ppi: Plant Pathogen Protein-Protein Interaction Prediction Tool” 2024 (Himanshushekhhar Chaurasia as co-developer).

(ii) Copyright grant for, “ACRCASPPI: Anti Crispr and Crispr-Cas Protein-Protein Interaction Prediction Tool” 2024 (Himanshushekhhar Chaurasia as co-developer).

#### Copyright Applied: (01)

(i) Copyright titled “Program for mass modelling of fruits/vegetables based on physical properties”, has been filed (Request No. 154362) on 12-09-2024

(Manoj Kumar Mahawar as co-developer).

#### Contract Research Project: (02)

Title of Project	Name of Industry Partner
Development of microbial inoculum for in situ degradation of agricultural waste	M/s. Relegare Agro Life Bio Science Pvt Ltd, Ahmednagar
Production of Nano Cellulose from Algae.	M/s. Reliance Industries Limited, Mumbai

### Consultancy Project: (08)

Sr. No.	Title of Project	Name of Industry Partner
1.	Technical Guidance for Technical input on Quality analysis of cotton samples developed by climate-resilient agriculture, conversation of their cotton into yarn using miniature spinning and weaving using sample loom and the quality analysis of fabric	Materra India Pvt Ltd., Gujarat
2.	Moisture Meter calibration	The Cotton Corporation of India Ltd. (10 branches)
3.	Nano finishing of Nursing Pad and Their Characterization	Ms. Namratha NS
4.	Evaluation and Costing of Seed Cotton Storage Bags	Maharashtra State Powerlooms Corporation Ltd
5.	Providing Technical Knowledge for Establishing Surgical Cotton Production Unit	Grevis Health Care Pvt Ltd., Delhi
6.	Dyeability of Natural Extracts	Mrs. Anushka Joshi
7.	NABL Internal Audit	The Cotton Association of India., (3 branches)
8.	Optimization of Cotton Linter Processing for Producing Nitrocellulose Grade Linter	M/s. Vicram Yarns and Fibers

### 5. 2 Agri-Business Incubation Centre (ABIC)

Agri-Business Incubation (ABI) Centre funded under 12th Plan Scheme of National Agriculture Innovation Fund (NAIF) (Component II) –Incubation Fund is operational at the institute. The centre provides the platform for technological mentoring and other incubation support 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 also 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 year, Four new entrepreneurs were admitted for incubation, twelve incubatees graduated and six incubations are in progress.

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

CIRCOT RKVY RAFTAAR Agri Business Incubator (CIRCOT-R-ABI) funded by RKVY Division, Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Govt. of India, is functioning since 31st January 2019. During the reporting period, the AOP & SAIP programme of 8th COHORT of RKVY-RAFTAAR Agri Business incubation programme was started on March 20, 2024. Under the 8th Cohort, nine Seed-Stage Startups (ANKUR-SAIP) were recommended for grant-in-aid support of Rs. 1.85 cr. Further, one-month UDAY-AOP (Agripreneurship Orientation

Programme) and ANKUR-SAIP (Startup Agribusiness Incubation Programme) incubation program under the 9th COHORT of CIRCOT-RABI was started on December 12, 2024.

Since inception and till December 2024, ICAR-CIRCOT RAFTAAR-Agri Business Incubator has incubated 151 startups and has sanctioned fund of Rs. 10.33 Cr to 71 startups.

### 3.4 Technology Certification:

In the year 2024, under the Agricultural Engineering Division SMD, the following eight technologies from ICAR-CIRCOT were acknowledged and honoured with certificates, during the 96th Foundation Day of ICAR held at the National Agricultural Science Complex, New Delhi, during July 15-16, 2024.

During the same event of 96th Foundation Day of ICAR, one technology among the eight

technologies, viz., “One-time pre-grooved chrome leather rollers used for cotton ginning in Indian ginneries”, was ranked among the Top four technologies, developed under the Agricultural Engineering Division of ICAR and the CIRCOT technology titled, “Industrial multilayer woven cut-resistance gloves,” was released at the hands of Hon’ble Union Minister of Agriculture and Farmers Welfare (A&FW).

#### List of Technologies certified:

Sr. No.	Title	Category
1.	One-time pre-grooved chrome leather rollers used for cotton ginning in Indian ginneries	Technology
2.	Nanofibre Production through multi-phase electrospinning machine with rotating drum collector for aligned nanofibre production	Technology
3.	Digital Ginning Percentage Indicator (DGPI) for portable cotton gins	Technology
4.	Air cooling belt for PPE suit	Product
5.	Indigenous profiled multi-pin electro spinning nanofibre production machine for agriculture applications	Technology
6.	Nano fibre cartridge for filtration applications	Product
7.	Rotary-tubular drum dryer for quarantine of pink bollworm infested cottonseed in ginneries	Technology
8.	Process protocol for spinning of recycled cotton fibre extracted from pre-consumer knitted garment waste fabrics	Process

## 6. Awards & Recognition

1. Dr. Kanika Sharma, Dr. Sujata Saxena, Dr. Manoj Kumar got first prize in the Research category of N.K. Proteins Innovation Awards, presented during the 5th SEA AICOSCA Cottonseed, Oil and Meal Conclave - 2024, held during July 12-13, 2024 at Ahmedabad for research work titled “Blending as a strategy to improve the properties of cottonseed oil”.



2. Dr. Dattatraya M. Kadam, Miss. Shalaka Shirish Kalamnurikar, Dr. S. U. Khodke and Miss. Sayli S. Parab received second prize in the Research category of N.K. Proteins Innovation Awards, presented during the 5th SEA-AICOSCA Cottonseed, Oil and Meal Conclave - 2024, held during July 12-13, 2024 at Ahmedabad for research work titled, “Effect of Infrared Pre-treatment on Deoiled Cottonseed for Extraction of Protein to Develop *Nutri Bar*”.
3. Eight Technologies developed at ICAR CIRCOT, Mumbai, were acknowledged and honoured with certificates, during the 96th Foundation Day of ICAR held at the National Agricultural Science Complex, New Delhi, during July 15-16, 2024. The technology “One-time pre-grooved chrome leather rollers used for cotton

ginning in Indian ginneries”, was ranked among the Top four technologies, developed under the Agricultural Engineering Division of ICAR and honoured with certificate at the hands of Hon’ble Union Minister of Agriculture and Farmers Welfare during the 96th Foundation Day of ICAR on July 15-16, 2024,



4. CIRCOT technology titled, “Industrial multilayer woven cut-resistance gloves,” was released during the occasion of the 96th Foundation Day of ICAR on July 15-16, 2024, at the hands of Hon’ble Union Minister of Agriculture and Farmers Welfare and other dignitaries.



5. An Appreciation Certificate has been awarded to ICAR-CIRCOT under the Swachhata Pakhwada Award-2022, by the Council, dated July 16, 2024.



6. Dr. Ajinath Dukare joined as an editorial board member (Section: Applied life science) on the “Discover Applied Science (IF-2.8) journal, published by Springer.
7. Dr. S. K. Shukla was felicitated and bestowed with the Professional Excellence Award 2024, by Cotton Research and Development Association (CDRA), at the International Conference on Innovative Technologies for Research and Development for Sustainable Production of Cotton, Oilseeds and Fibre Crops, organized by CRDA and CCS Haryana Agricultural University at ICAR-CCARI, Ela, Old Goa on November 13, 2024.
8. Dr. Kirti Jalgaonkar, received “Young Woman Scientist Award” in “10th International Conference on “Recent Advances in Agriculture, Engineering, Applied and Life Sciences for Environmental Sustainability (RAEALSSES-2024)” organized by School of Agriculture, Uttaranchal University, Dehradun, Uttarakhand, India and Agro Environmental Development Society (AEDS), Majhra Ghat, Rampur, U.P., India,

held during October 23-25, 2024 at Uttaranchal University, Dehradun, Uttarakhand, India.

9. Dr. P. S. Deshmukh was awarded "Scientist of The Year Award 2024" by the Pragati International Scientific Research Foundation, Meerut, in the 3rd International Conference on Climate-Smart Nutri Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024), held during November 06-08, 2024 at ICAR CIWA, Bhubaneswar, India.
10. Dr. G. Krishna Prasad, received Best oral paper presentation Award for presenting paper at the International Conference on “Innovative Technologies for Research and Development for Sustainable Production of Cotton, Oilseeds and Fibre Crops”, held at ICAR-CCARI, Ela, Old Goa during November 13-15, 2024.
11. Dr. Sheshrao Kautkar received Best Oral presentation Award for presenting paper during 58th ISAE convention & International Symposium on Agricultural Engineering Education for aspiring youth in Transforming Agriculture” held during November 12-14, 2024 at VNMKV, Parbhani, Maharashtra.



## Recognition

Sl. No.	Expert Committee Meeting	Attended by
1.	The 34th meeting of Chemical methods of Tests Sectional committee TXD 08 on February 13, 2024.	Dr. Sujata Saxena, Head, CBPD
2.	ISO/TC38/ WG 31 meeting held on March 13, 2024 (online).	Dr. Sujata Saxena, Head, CBPD
3.	Expert member in the Research Evaluation Committee (REC) meeting of the BIS held on March 21, 2024 (online).	Dr. Sujata Saxena, Head, CBPD
4.	The Techno-Commercial Assessment and Expert Committee Meeting (online) was held on March 19, 2024, under Agriinnovate India Ltd. (AgIn), to assess the technical & commercial feasibility, hand holding requirement, and preferred modes of commercialization, and to develop standard terms for potential technologies of ICAR Institutes.	Dr. S. K. Shukla, Director, Dr. A. K. Bharimalla, Principal Scientist, Dr. N. Vigneshwaran, Principal Scientist, Dr. M. K. Mahawar, Senior Scientist
5.	The Board of studies meeting of the Department of Textile Science and Apparel design of the SNTD Women's University on April 19, 2024	Dr. Sujata Saxena, Head, CBPD
6.	The 32nd Meeting of Man-made Fibres, Cotton and their Products Sectional Committee (TXD 31) organized by BIS, New Delhi on April 23, 2024.	Dr. T. Senthilkumar, Senior Scientist
7.	The Textile Advisory Group (TAG) Meeting organized by Ministry of Textiles at Udyog Bhavan, New Delhi on May 13, 2024.	Dr. V. G. Arude, Principal Scientist
8.	The 9th Technical textiles for automobile application Sectional Committee (TXD 38) organized by BIS, New Delhi on May 22, 2024	Dr. G. Krishna Prasad, Senior Scientist
9.	Textile Division Council meeting of the BIS held online on June 04, 2024.	Dr. Sujata Saxena, Head, CBPD
10.	Chaired the 21st meeting of the Textiles Speciality Chemicals and Dyestuffs Sectional Committee of BIS, TXD 07 held (online) on June 11, 2024.	Dr. Sujata Saxena, Head, CBPD
11.	The 35th meeting of the Chemical Methods of Tests Sectional committee of BIS, TXD 05, held (online) on June 12, 2024.	Dr. Sujata Saxena, Head, CBPD

Sl. No.	Expert Committee Meeting On	Attended by
12.	The meeting of the Handloom and Khadi Sectional committee of BIS, TXD 08 held (online) on June 25, 2024.	Dr. Sujata Saxena, Head, CBPD
13.	The meeting of the ISO/TC38/ WG 31(Non fibrous bio-based materials) held (in online mode) on July 10, 2024.	Dr. Sujata Saxena, Head, CBPD
14.	The Textile Advisory Group meeting organized at Trident Hotel, Mumbai, on July 12, 2024, chaired by the Hon'ble Union Minister of Textiles, Shri Giriraj Singh.	Dr. S. K. Shukla Director and Dr. A. S. M. Raja, Head, QEID
15.	The BIS- TXD 01-Physical Methods of Test Sectional Committee meeting through Video Conferencing on August 13, 2024.	Dr. A S M Raja, Head, QEID, as Chairman and Dr. T. Senthilkumar, Senior Scientist as member
16.	The 8th meeting of Indian Grain Storage Working Group at NASC Complex, New Delhi on August 21, 2024.	Dr. V. G. Arude, Principal Scientist and Dr. Jyoti Dhakane-Lad, Scientist
17.	The meeting of TXD 35-Technical Textiles for Agrotech Applications Sectional Committee of BIS on August 29, 2024.	Dr. N. Vigneshwaran, Principal Scientist
18.	The TXD 38-Technical Textiles for Mobiltech Applications Meeting (attended online) on August 30, 2024 organized by BIS.	Dr. G. Krishna Prasad, Senior Scientist
19.	The 36th meeting of the TXD 05 Sectional committee of the BIS held in online mode on October 22, 2024.	Dr. Sujata Saxena Head, CBPD
20.	BIS TXD-01 Physical method of Testing Textiles Sectional Committee Meeting as Chairman on November 19, 2024.	Dr A S M Raja, Head, QEID
21.	Chaired the 22nd meeting of the Textiles Specialty Chemicals and Dyestuffs Sectional Committee of BIS, TXD 07, held online on November 12, 2024.	Dr. Sujata Saxena Head, CBPD

### *Participation in Meetings/Discussions/Events by Director Dr. S. K. Shukla*

1. On January 02, 2024, attended an Expert Committee meeting of strategic area "Precision agriculture and management of natural resources and application of sensors in crops, animals and fisheries", conducted under chairmanship of ADG, NASF.
2. Visited ICAR-NINFET, Kolkata as a Chief Guest to participate in the 86th Foundation 'Day celebration of ICAR-NINFET and presided over Entrepreneurs' Day during January 05-06, 2024.
3. Acted as chairperson of "Hackathon on the best application of natural fibres" organized by ICAR-NINFET during January 05-06, 2024.
4. Dr. Y.G. Prasad, Director, ICAR-CICR, Nagpur and Dr. S. K. Shukla, Director ICAR CIRCOT had an interactive meeting on January 24, 2024 at ICAR-CIRCOT, in the matter of attracting CSR funds for mechanization of cotton harvester and for collaborative research work.
5. Attended a meeting organized by the Textile Commissioner on January 24, 2024, for discussion with a team from Argentina about way to promote technological collaboration between Argentina and India in sustainable, environment friendly and innovative practices in cotton production and to discuss about mechanization in cotton harvester machines that can be tailor-made for Indian conditions.
6. On February 04, 2024, had a meeting with few industries at Nagpur for discussion and development of collaborative research work.
7. On February 06, 2024, participated in the Rasi Max Mechanical Cotton Picking Event and Demonstration on Mechanical Harvesting by Shaktiman Cotton Picker' conducted in farms at Village Malwada, Taluk-Balapur, District-Akola, Maharashtra, with Director, CICR, Nagpur, team from PDKV, faculties, representatives of seed companies and machinery manufacturers
8. Participated in stakeholders meet and program on Post Harvest Management of cotton stalks and Distribution of Chippers under SCSP program on February 07, 2024 at Ginning Training Centre, Nagpur.
9. On February 08, 2024 represented ICAR CIRCOT in a Video Conference session facilitated by the Textile Commissioner's Office, with Argentina's National Institute of Agricultural Technology (INTA) to explore technological collaboration between Argentina and India in sustainable, environment friendly and innovative practices in cotton production and processing.
10. On February 12-13, 2024, had a meeting with M/s Sanjeevani Agro for finalization of torrefaction plant and discussion with BSIL & Logic One technology for finalization of MOU for development of colour and micronaire testing equipment.
11. On February 15-17, 2024, visited Nuziveedu Seeds Ltd., Aurangabad for research collaboration discussion.
12. Participated in Director's Conference at ICAR, New Delhi during February 26-27, 2024.
13. Participated as an esteemed speaker of technical session in the Indian Seed Congress at Koregaon Park Pune on February 29, 2024 and presented on "Cotton fibre Quality Requirements for sustainable Growth of

- Indian textile Industry", at the 12th Indian Science Congress, organized by National Seed Association of India at Pune.
14. Invited as Guest speaker by Agriculture Information.com and delivered a talk (online) on the topic, "Value addition to cotton biomass and other agro-residues", on March 05, 2024.
  15. Participated in meeting convened by Director of Agriculture (ATMA) and Head of PIU Agriculture (SMART Project), at SMART project office at Gokhale Nagar, Pune on March 13, 2024, to discuss new cost norms, specifications and standard protocols submitted by CIRCOT for establishment of briquetting and pelleting plants, under contract research work.
  16. Visited Cotton seed delinting plant at Sambhajinagar, Maharashtra during March 15-17, 2024, for meeting and discussion on revision of BIS standards.
  17. On April 01, 2024, participated in brain storming meeting on topic cotton production & processing technologies in Vikshit Bharat @2047 at Nagpur under the chairmanship of Dr. R.S. Paroda, former D.G., ICAR, New Delhi.
  18. Attended the Foundation Day of ICAR-CICR Nagpur on April 01, 2024
  19. Attended the Annual Group Meeting of ICAR-AICRP on Cotton from April 05-06, 2024 at Vasanttrao Naik State Agriculture Extension Management Training Institute (VANAMATI), Nagpur.
  20. On April 08, 2024 had a discussion on role and importance of Secondary Agriculture by DG (online)
  21. On April 10, 2024, had a meeting to discuss on Technology Mission on Cotton (TMC) Phase II with Industrial stakeholders at ICAR CIRCOT, Mumbai.
  22. Visit to Multi Commodity Exchange Clearing Corporation Ltd. (MCXCCL) on April 18, 2024 to sign non-disclosure agreement for CIRCOT to become Approved Assayer for quality analysis and testing of cotton bales.
  23. On April 22, 2024, stakeholders meet at GTC, Nagpur, for signing MOU's for research collaborations with industry in the presence of Dr. K. Narsaiah ADG (PE) and visited Ginning Industries in and around Nagpur, during April 22-23, 2024.
  24. Meeting with TEXPROCIL Executive Director Dr. T. Rajagopal on April 29, 2024 to explore CSR funding for extension related activities.
  25. Attended meeting organized by SELU on May 12, 2024 for discussion related to development of machine related to cotton packing with M/s. Bihani Binayake Cotox Pvt. Ltd., Kanakashree Spinners Pvt. Ltd., (BBC Udyog).
  26. Visited Vasanttrao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani on May 13, 2024 and interacted with Hon'ble Vice Chancellor Dr. Indramani regarding collaborative work to be taken up in the pond liner project.
  27. On May 20, 2024, inaugurated the 5-day training programme on "Cotton Value Chain for Officers under the SMART Cotton Project" conducted at GTC, Nagpur during May 20-24, 2024 and delivered a lecture on 'Establishment of viable ginning plant under the SMART project'.

28. Visited CICR, Nagpur on May 20, 2024 and interacted with the Director regarding collaborative research project to be proposed under the Corpus Fund.
29. On June 12, 2024, had a meeting with M/s Geolife Agri Tech India Pvt. Ltd., Mumbai for discussion regarding possibility of collaborating in research programmes and transfer of CIRCOT technologies.
30. Attended the 'Narendra Sheth Memorial Cotton Lecture', arranged by C. A. Galiakotwala & Co. Pvt. Ltd., on the topic, "The Rapid Rise of Australia to the Top of the Cotton World", by Mr. James Kahl, a Second Generation Australian Cotton Farmer, on June 17, 2024 at Worli, Mumbai
31. Participated in the 56th Annual convocation of Acharya N. G. Ranga Agricultural University (ANGRAU), Guntur Andhra Pradesh on June 19, 2024.
32. Participated in a meeting with C-DAC officials on June 26, 2024, on possibility of collaboration on project of traceability of cotton fibres.
33. On July 03, 2024, participated in meeting for discussion on New Proposals by CIAE and CIPHET, under the project CRP on Natural Fibres.
34. Participated in the 96th Foundation & Technology Day of ICAR during July 15-16, 2024 at Bharat Ratna C. Subramaniam Auditorium, NASC Complex, Pusa, New Delhi.
35. Participated in online meeting on July 22, 2024, organized by CICR, Nagpur for discussion on research and extension proposals for TMC Phase
36. Participated in Sixth All India Cotton Conference -2024 organized by Indian Cotton Federation (ICF) with the theme "Cotton-The Sustainable Fibre for Future organized by Indian Cotton Federation (ICF) at Coimbatore during August 09-10, 2024. Also had discussion meeting with M/s. Nestling Technologies India Pvt. Ltd., regarding development of contamination detection system for ginneries, during the conference.
37. Interaction with senior representatives from Excel Industries Limited, Mumbai on August 12, 2024, regarding research collaborations.
38. Attended the 29th Scientific Advisory Committee Meeting organized by ICAR CICR, Nagpur on August 21, 2024.
39. Chaired the Cotton Assayers' Meet organised at ICAR-CIRCOT on August 26, 2024 with MCX-Clearing Corporation Limited which was also attended by stakeholders from Cotton Association of India (CAI), Wakefield Inspection Services and ATIRA.
40. Attended 8th Meeting of the Empowered Programme Committee (EPC) of National Technical Textiles Mission (NTTM) on August 27, 2024 at Udyog Bhawan, New Delhi.
41. Attended interview board meeting as nominee of Secretary (DARE) & Director General (ICAR) on September 03, 2024 at New Delhi.
42. Interaction meet with Mr. Delzaad Deolaliwala, Director, Bombay Hemp Company on September 19, 2024, to explore possibility of starting a collaborative research work on cotton/hemp blended textiles.

43. Participated in Centenary Celebration of ICAR-National Institute of Secondary Agriculture (ICAR-NISA), Ranchi on September 20, 2024
44. Had an Online meeting with M/s. Reliance Energy, Nagpur on September 23, 2024, for exploring possibilities of taking joint project for use of cotton stalk as alternative for biogas and pellet production.
45. Attended a meeting of the Sub-Committee on Quality Standards and Nomenclature for New Varieties of Extra Long Staple (ELS) Cotton under the "Kasturi Cotton Bharat" Program on October 11, 2024 and provided suitable recommendations for quality standards of new varieties of ELS cotton.
46. Participated in Oil Mill Conclave 2024, organized by Madhya Bharat Oil Mill Association on October 19, 2024 at Nagpur.
47. Attended the half-yearly meeting of Nagar Rajbhasha Karyanvayan Samiti at Western Railway Headquarters, Churchgate on October 24, 2024.
48. Participated and delivered lecture and provided guidance to farmers in Workshop for special project on Cotton Technology, organized by CITI CDRA and held at CICR, Nagpur, on October 30, 2024.
49. Visited a CIRCOT R-ABI supported start-up M/s Energy Chakra at Nashik, Maharashtra on November 16, 2024 and interacted with the entrepreneur and their clients.
50. Attended the Selection Committee Meeting at C.S. Azad University of Agriculture and Technology, Kanpur on December 17, 2024

## 7. Publications & Seminar/Conference

### RESEARCH PAPERS (38)

- Archana Mahapatra, Jyoti Dhakane-Lad, Sharmila Patil, Charlene D'Souza, Manoj Kumar, AK Bharimalla, & Sujata Saxena (2024). Amelioration of sodium alginate CNC edible coating with thyme and/or clove essential oil for post-harvest quality of guava. *Journal of Food Measurement and Characterization*, 18(7), 5281-5296 (NAAS:9.4)
- Chaurasia, H., Arora, A., Raju, D., Marwaha, S., Chinnusamy, V., Jain, R., Ray, M., Sahoo, R.N., (2024). Identification of Paddy Stages from Images using Deep Learning. *Journal of the Indian Society of Agricultural Statistics*, 78(1), 9-34. (NAAS: 4.85)
- Chaurasia, H., Arora, A., Raju, D., Marwaha, S., Chinnusamy, V., Jain, R., and Haque, M.A. (2024). PanicleDet: a deep learning based model for detection of panicle stages in paddy. *Neural Computing and Applications*. (NAAS: 10.5)
- Dhakane-Lad, J., Jalgaonkar, K., Bharimalla, A.K., Dukare A., A., Mahawar, MK., Jagajanantha, P and Ambare M (2024). Influence of beeswax-chitosan biocoatings on physical and barrier properties of kraft paper. *Cellulose* 31, 8235–8248. <https://doi.org/10.1007/s10570-024-06111-4> (NAAS: 10.9)
- Dukare, A., Prasad, K., Senthilkumar, G.T., Jalgaonkar, K., and Saxena, S. (2024). High Xylanase and Low Cellulase Producing Bacteria as a Whole Cell Biocatalyst for Eco Friendly Surface Modification of Banana Pseudostem Fibers. *Bioenerg. Res.* 17, 2190–2199. <https://doi.org/10.1007/s12155-024-10793-w>. (NAAS: 9.1)
- Fand, B.B., Shah, V., Nagrale, D.T., Mahule, D.J., Gawande, S.P., Thube, S.H., Pandiyan, K., Ramteke, I., Kumar R., Rameash, K., Prabhulinga, T., Nagrare, V.S., Behere, G.T., Prasad, Y.G. (2024). Field estimates of current and predicted cotton yield loss due to pink bollworm and boll rot in India. *Agricultural Systems* vol. 224: 104246 (<https://doi.org/10.1016/j.agsy.2024.104246>). (NAAS – 12.10)
- Goyal, P., Kadam, D.M., Kasara, A., and Parab, S. (2024). Extraction, characterization, and functional properties of ultra-low gossypol protein from cottonseed meal. *Journal of Applied and Natural Science*, 16(4), 1656 – 1661. <https://doi.org/10.31018/jans.v16i4.5918>. (NAAS: 5.42)
- Govindaraj, Oviya, Gopal Nellaiappan Olaganathan, Raja ASM, and Sivakumar Uthandi (2024). "An eco-friendly EnZolv pretreatment optimization in banana fiber biomass using response surface methodology (RSM) and its structural characterization." *Biomass Conversion and Biorefinery* 14, (1): 1329-1342. (NAAS: 10.00)
- Guruswamy Krishna Prasad, Nandan Kumar, Nachimuthu Shanmugam, A.S.M. Raja, Kasilingam Rajkumar, Anwar Hussian, Seema Patel (2024). Sustainable Approach for Development of cut-resistance seamless gloves using recycled para aramid/cotton blends. *Cleaner Engineering and Technology*. <https://doi.org/10.1016/j.clet.2024.100859>. (Impact Factor 5.3).
- Guruswamy, Krishna Prasad., Thambiannan, S., Anthonysamy, A., Jalgaonkar, K., Dukare, A. S., Pandiselvam, R., & Jha, N. (2024). Coir Fibre-Reinforced

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- Harshali N. Shende, Varsha Satankar, and Vellaichamy Mageshwaran, (2024). Bio chemical Preparation of Microcrystalline Cellulose Powder from Cotton Linters for Utilization as Tablet Excipients. *Microbiology Research Journal International*. 34(6),11-19 (NAAS:5.14)
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  - Kharbanda, A.K., Dasarathan, K.R., Sinha, S.K., Senthil Kumar, T. and Senthil Kumar, B. (2024), "Experimental investigation of mechanical and comfort properties of banana/cotton blended woven fabrics", *Research Journal of Textile and Apparel*. <https://doi.org/10.1108/RJTA-08-2023-0085> (Impact Factor: 1.94)
  - Kumar, R., Das, J., Puttaswamy, R. K., Kumar, M., Balasubramani, G., & Prasad, Y. G. (2024). Targeted genome editing for cotton improvement: prospects and challenges. *The Nucleus-India*, 1-23, (NAAS 7.80).
  - Murmu, S., Sinha, D., Chaurasia, H., Sharma, S., Das, R., Jha, G.K., & Archak, S. (2024). A Review of Artificial Intelligence Assisted Omics Techniques in Plant Defense: Current Trends and Future Directions. *Frontiers in Plant Science*, 15:1292054. (NAAS:10.1)
  - Pandey, R., Dubey, A., Krishna Prasad, G., Arputharaj, A., Raja, A. S. M., Dubey, R., Jose, S. (2024). Physico-Chemical Characterization of Lignocellulosic Seed Microfibers. *Journal of Natural Fibers*, 21(1). (NAAS:9.5)
  - Pandiselvam, R., Davison, S., Manikantan, M. R., Jacob, A., Ramesh, S. V., & Beegum, S. (2024). Comparative study on infrared radiation and hot air convective drying of coconut: Effect on oil quality features. *Thermal Science and Engineering Progress*, 55, 102950. (NAAS: 11.10)
  - Pandiselvam, R., Davison, S., Manikantan, M. R., Jeevarathinam, G., Jacob, A., Ramesh, S. V., & Shameena Beegum, P. P. (2024). Infrared-aided hot-air drying of coconut: impact on drying kinetics and quality metrics. *Journal of food process engineering*, 47(6), e14668. (NAAS:8.70)
  - Pandiselvam, R., Harikrishnan, M. P., Khanashyam, A. C., Basil, M., Anirudh, M., Manikantan, M. R., & Kothakota, A. (2024). Development and characterization of gelatinized starch doped microcellulose paper from tender coconut (*Cocos nucifera* L) husk. *Process Safety and Environmental Protection*, 184, 615-623. (NAAS:12.90)
  - Pandiselvam, R., Krishnan, R., Manikantan, M. R., Jacob, A., Ramesh, S. V., & Beegum, S. (2024). Comparative analysis of biochemical composition of fried coconut chips: influence of thickness and oil type on nutritional attributes.

- Journal of Food Measurement and Characterization, 1-7. (NAAS: 8.90)
- Pandiselvam R., Rupa Krishnan, M. R. Manikantan\*, Anjitha Jacob, S.V. Ramesh, Shameena Beegum (2024). Physicochemical Quality and Nutritional Properties of a Newly Developed Baked Coconut Chips, *Journal of Food Biochemistry*, (NAAS: 9.50), Doi: <https://doi.org/10.1155/2024/3272394>
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  - Roy, A., Chaurasia, H., Kumar, B., Kumari, N., Jaiswal, S., Srivastava, M., Iquebal, M.A., Angadi, U.B., and Kumar, D. (2024). FEAtl: a comprehensive web-based expression atlas for functional genomics in tropical and subtropical fruit crops. *BMC Plant Biology*, 24, 890. (NAAS 10.3)
  - S. K. Shukla and V. G. Arude, (2024). Design and development of rotary tubular drum dryer for quarantine of pink bollworm infested cottonseeds in Indian ginning industry. *Journal of Cotton Research and Development*. Vol. 38 (1): 118-124. (NAAS: 4.70)

- S. K. Shukla and V. G. Arude, (2024). Rotary Tubular Drum Dryer for Quarantine of Pink Bollworm Infested Cottonseeds in Indian Ginneries. Cotton Innovations, Published International Cotton Researchers Association (ICRA). Volume 4; Issue 6: 12-19.
- Samal, I., Bhoi, T.K., Mahanta, D.K., Komal, J., Majhi, P.K., Murmu, S., Pradhan, A.K., Chaurasia, H. (2024). Melatonin mediated abiotic stress mitigation in plants: A comprehensive study from biochemical to omics cascades. South African Journal of Botany, 170, 331-347. (NAAS: 8.7)
- Satankar, V., Jhodkar, D., Singh, M., Kumar, M., Mageshwaran, V., Palanisamy, S., ... & Khan, T. (2024). Two-step process for gossypol reduction and protein enhancement in cottonseed kernel powder. Biomass Conversion and Biorefinery, 1-14. (NAAS: 9.5).
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- Soni, S., Babel, R., Saxena, S., Arputharaj, A., Raja, A.S.M., & Srivastava, M. (2024). Enhancing Cotton Fabric Softness and Wrinkle Resistance through Optimized Formulation of Nano ZnO and Benzalkonium Chloride-Enriched Rinse Cycle Softener. Ecology, Environment. & Conservation., 30 (July Suppl. Issue), S431 S438. (NAAS: 5.05)
- Subramaniam, Santhoshkumar, Kumutha Karunanandham, A. S. M. Raja, S. K. Shukla, and Sivakumar Uthandi (2024). "EnZolv delignification of cotton spinning mill waste and optimization of process parameters using response surface methodology (RSM)." Biotechnology for Biofuels and Bioproducts 17, (1) : 37. (NAAS: 12.30)
- V. G. Arude, S. K. Shukla, P. S. Deshmukh, V. Satankar, R. R. Potdar, A. P. Pandirwar, T. Senthilkumar, G. I. Ramkrushn, G. Majumdar, and R. Raja. (2024). Validation of field performance of commercial hand held mechanical cotton picker at Nagpur region for assessing its effectiveness for smallholder farmers. Journal of Cotton Research and Development. Vol. 38 (2): 243 251. (July 2024) (NAAS: 4.70)

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- ICAR-CIRCOT's strategic role in improving Indian cotton quality through AICRP on cotton. 2024. pp. 1-143.
- Contribution of ICAR-CIRCOT in Nation Building. 2024. ISBN 978-81-984563-4-2. (Pages: 1-94).
- Cotton: Grading, Ginning, Marketing & By product utilization. 2024. pp. 1-171.
- Cotton in Indian Circular Economy: A Journey from Field to Fashion. 2024. pp. 1-176.
- Centenary Souvenir (2024). Published by Indian Fibre Society, Mumbai. 1-61.
- Technical Article Collection; Mechanization of Cotton Harvesting and Processing, (In Hindi). 2024. pp. 1-72.
- Training Manual on "Composite materials and its applications" Published by ICAR CIRCOT, 2024, Total pages 1-145.
- Training Manual on "Electrospinning for Nanofibre Production" Published by ICAR CIRCOT, 2024, Total pages 1-135.
- Training Manual on Smart Textiles and Its Evaluation, published by ICAR-CIRCOT.
- Oilseed Meal as a Sustainable Contributor to Plant-Based Protein. Springer International Publishing.
- Valorization of Fruit Seed Waste from Food Processing Industry. Academic Press.

**BOOK CHAPTERS (14)**

- Bagul, S.Y., Pandiyan, K., Khadke, G.N., Dhar, D.W. (2024). Role of Microalgae in Value addition and Bioremediation of Wastewater. Algal Biotechnology: Current

Trends, Challenges and Future Prospects for a Sustainable Environment, Sahu, N. and Sridhar, S. (Eds.), CRC Press, Taylor & Francis, ISBN: 978-1-032-11268-8. doi.: 10.1201/9781003219156

- Khanashyam, A. C., Shanker, M. A., Thorakkattu, P., Babu, K. S., Nasution, Z., & Pandiselvam, R. (2024). Role of Packaging in Preservation of Coconut Products. In Preservation and Authentication of Coconut Products: Recent Trends and Prospects (pp. 231-248). Cham: Springer International Publishing.
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- Kumar, M., Kumari, N., Prakash, S., Sharma, N., Radha, Sharma, K., Chandran, D., Raman, P. and Panesar, P.S., (2024). Cottonseed Meal: Eliminating Gossypol for Securing Another Source of Protein. In Oilseed Meal as a Sustainable Contributor to Plant-Based Protein: Paving the Way Towards Circular Economy and Nutritional Security (pp. 145-167). Cham: Springer International Publishing.
- Kumar, M., Kumari, N., Prakash, S., Sharma, N., Rajat, Radha, ... & Panesar, P. S. (2024). Oilseed meal as a source of protein: introductory remarks. In Oilseed meal as a sustainable contributor to plant-based protein: paving the way towards circular economy and nutritional security (pp. 1-29). Cham: Springer International Publishing.

- L. Ammayappan, G. Krishna Prasad, T.SenthilKumar and GTV Prabu (2024). Introduction to Wool Fibre Technology: A Brief Introduction and Its Processing Technology, in *The Wool Handbook*, released by Elsevier, pages 1-20, ISBN 9781003225577
- Mhatre, P.H., Thorat, Y.E, B. Manimaran, B. Divya, K. L. Bairwa, A., Chavan, S.N., Pokhare S.S., Dukare A.S. and Karthik C (2024). Nematicidal Activity of Secondary Metabolites from Soil Microbes. In: Chaudhary, K.K., Meghvansi, M.K., Siddiqui, S. (eds) *Sustainable Management of Nematodes in Agriculture, Vol.2: Role of Microbes-Assisted Strategies. Sustainability in Plant and Crop Protection*, vol 19. Springer, Cham. [https://doi.org/10.1007/978-3-031-52557-5\\_12](https://doi.org/10.1007/978-3-031-52557-5_12)
- Murmu, S., Chaurasia, H., Samal, I., Bhoi, T. K., & Pradhan, A. K. (2024). Bioinformatics Approaches for Unraveling the Complexities of Plant Stress Physiology. In: Chen, J (Eds). *Bioinformatics for Plant Research and Crop Breeding*. Wiley, pp. 209-231, ISBN: 978-139-42-0993-4.
- Pandiselvam, R., Jacob, A., & Manikantan, M. R. (2024). Coconut Based Food Products: Repertoire and Biochemical Features. In *Coconut-Based Nutrition and Nutraceutical Perspectives* (pp. 203-220). Singapore: Springer Nature Singapore.
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- Pradhan, A.K., Kumar, D., Chaurasia, H., Murmu, S., Samal, I., Bhoi, T.K., Kumar, G.A.K. and Mondal, B. (2024). Crop Monitoring System Integrating with Internet of Things and Artificial Intelligence. In: Pandey, K., Kushwaha, N.L., Pande, C.B., and Singh, K.G. (Eds). *Artificial Intelligence and Smart Agriculture. Advances in Geographical and Environmental Sciences*. Springer, Singapore, pp. 192-208, ISBN: 978-981-970340-1.
- Ramesh, S. V., Pandiselvam, R., Shameena Beegum, P. P., Manikantan, M. R., Gopal, M., & Hebbbar, K. B. (2024). Coconut Inflorescence Sap (Neera): Nutritive Potential and Health Conferring Products. In *Coconut-Based Nutrition and Nutraceutical Perspectives* (pp. 169-185). Singapore: Springer Nature Singapore.
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- Sivasubramanian, P., Deshmukh, G.S., Senthilkumar, T., Mageshwaran, V., Nagaraju, Y. (2025). Cellulose-Based Rubber Nanocomposites. In: Visakh, P.M. (eds) *Rubber Based Bionanocomposites. Advanced Structured Materials*, vol 227. Springer, Cham. [https://doi.org/10.1007/978-3-031-78557-3\\_2](https://doi.org/10.1007/978-3-031-78557-3_2)

#### BOOKLET

- ICAR-CIRCOT: A Glimpse - A Centenary of dedicated Research & Development (1924-2024).

- E-Booklet- A glimpse of Funding Avenues for startups. 2024

### E-NEWSLETTER

- Udaan: CIRCOT R-ABI e-newsletter. Jan-Jun 2024, CIRCOT RKVY RAFTAAR Agri Business Incubator
- ICAR-CIRCOT e-News Monthly Bulletin, January to December 2024 Vol 1- 12

### LEAFLETS

- ICAR-CIRCOT Bajaj Automatic Deep Groove Forming Machine for One-Time Grooving of Ginning Rollers, ICAR CIRCOT, Mumbai.
- Achieving Kasturi Branding of Indian Cotton: Ginners' Perspective
- Achieving Kasturi Branding of Indian Cotton: Farmers' Perspective.

### OTHER PUBLICATIONS

- Brochure-Agri Startup Conclave 2024, Fuelling Agri-Innovation: Empowering Entrepreneurial Passion for Sustainable Future.
- Technical Bulletin- DPR for Establishment of Agro/Biomass Briquette Plant

### TECHNICAL/POPULAR ARTICLE (23)

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- Sharma, K., Thappa, C., Kumar, M., Vigneshwaran, N., Dukare, A., Pandiyan, K., Saxena, S. 2024. Revealing Cotton Plants' Phytochemical Marvels: Beyond Fiber and Nutrition to Therapeutic Potential. Agri Articles, Volume: 04, Issue: 02.

- Dr. Dattatreya M. Kadam (2024). Youth in Agricultural Engineering - Potential & Opportunities, Agricultural Engineering Today. 48(2): 37-40
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- Jalgaonkar K, Mahawar MK, Patil S, Dhakane-Lad J, Jagajanantha P, Kautkar S (2024). Prospects of application of image processing techniques in cotton processing. Agriculture & Food: E-News letter 6(8): 84-86.
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- Jagajanantha P, Jalgaonkar K, Patil S, Dhakane-Lad J, Kautkar S, Mahawar MK (2024). Sensors and their applications in Smart Textiles using Arduino. Agri Articles. 4 ( 4 ) : 1 3 3 - 1 3 6 <https://agriarticles.com/volume-04-issue-04-july-aug-2024/>

In the book, तकनीकी लेख संग्रह: कपास चुनाई और प्रसंस्करण का यंत्रिकरण (Technical Article Collection; Mechanization of Cotton Harvesting and Processing). (2024) 1-72, published by ICAR CIRCOT, Mumbai during the National Seminar in Hindi on "Challenges and Strategies for the Successful Adoption of Mechanization of Cotton Harvesting in India" on September 27, 2024 at ICAR CIRCOT,

- कनिका शर्मा, मनोज कुमार और अजीनाथ डुकारे (2024). यांत्रिक चुनाई से पहले विभिन्न देशों में अपनाई जाने वाली डिफोलीएशन प्रथाएँ. पृष्ठ संख्या 10.

- गौतम मजूमदार, एस.के. शुक्ला, आशुतोष पंढीरवार, वी. जी. आरुडे और रामकृष्ण जी.आई. (2024). प्री क्लीनर अटैचमेंट के साथ स्ट्रिपर हार्वेस्टर के विकास में कुछ अनुभव. पृष्ठ संख्या 20.
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- वी. जी. आरुडे (2024). भारतीय परिस्थितियों के अनुसार कपास की चुनाई के सफलतम यंत्रिकरण के लिए व्यापक रणनीतियाँ. पृष्ठ संख्या 34.
- वर्षा सातनकर, एस. के. शुक्ला, एस. वी. घाडगे, वी. जी. आरुडे, के. पांडियन और धीरज पाटिल (2024). मशीन द्वारा चुनी गई कपास के प्रसंस्करण में सुरवाने का महत्व. पृष्ठ संख्या 38.
- किर्ती जलगांवकर, ज्योती ढाकणे- लाड, शर्मिला पाटील, शेषराव काऊतकर और पी. जगजानंथा (2024). मशीन से चुनी गई कपास की सफाई हेतु स्टिक रिमूवल मशीन की उपयोगिता. पृष्ठ संख्या 41.
- मनोज कुमार महावर, ज्योती ढाकणे- लाड, ए. अरपुथराज, पी. जगजानंथा और मेधा कांबले (2024). मशीन से चुनी गई कपास की सफाई के लिए इम्पैक्ट क्लीनर का महत्व. पृष्ठ संख्या 45.
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- रवि पांडिसेल्वम, शेषराव काऊतकर और एस. के. शुक्ला (2024). मशीन से चुनी हुई कपास की सफाई के लिए सॉ बैट टाइप लिंट क्लीनर का महत्व. पृष्ठ संख्या 52.
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- एस. के. शुक्ला, एस. वी. घाडगे, वी. जी. आरुडे और धीरज पाटिल (2024). न्यूमेटिक फ्रैक्शनेटर पद्धति पर आधारित कपास कचरा विश्लेषक. पृष्ठ संख्या 68.
- Dukare A., Yadav, R., Kautkar, S., Kuppusamy, P., Sharma, K., Shaikh, A., Pawar, A., Vigneshwaran, N., Saxena S., Shukla, SK (2024). Waste to wealth: Microbial-based sustainable valorization of cotton biomass, processing waste and by products for bioenergy and other value added products to promote circular economy. Waste Management Bulletin 2(4): <https://doi.org/10.1016/j.wmb.2024.11.011>.
- Dattatreya M. Kadam, Sayali S. Parab, Akansha Kasara (2024). Evaluation of Surface Characterization and Qualitative

Parameters of Cottonseed Meal and Extracted Protein. Research Square, DOI: <https://doi.org/10.21203/rs.3.rs-4747495/v1>.

### PAPERS PRESENTED IN CONFERENCES SEMINARS (23):

- Dr GTV Prabu, presented a paper on "Development of Electrospun Nanofibre based Micronutrient Sachet for Agriculture Applications" at the National Conference on "Technical Textiles": Policy Pathways for Advancing Technical Textiles" held on January 29, 2024, organized by the Ministry of Textiles and Department of Handloom & Textiles, Govt. of Andhra Pradesh, at Vijayawada, Andhra Pradesh.
  - S K Shukla & A S M Raja presented a paper "Cotton fibre Quality Requirements for sustainable Growth of Indian textile Industry", at the 12th Indian Science Congress, organized by National Seed Association of India on February 29, 2024 at Pune.
  - Dr. T. Senthilkumar, presented a paper titled "Basic information about BIS cotton bale Quality Standards" in a National workshop on the "Branding of the Vidarbha cotton as Kasturi" jointly organized by ICAR CIRCOT, The Cotton Textiles Export Promotion Council (TEXPROCIL), Mumbai and Vidarbha Cotton Association, Nagpur on May 16, 2024 at ICAR-CIRCOT-Ginning Training Centre (GTC), Nagpur.
  - Dr. Jyoti Dhakane-Lad, presented a paper on "Role of ICAR-CIRCOT R-ABI Centre in Fostering Indian Startups in Digital Horticulture, AI and IoT Sector" during the National Conference on "Paradigm and Dynamics of Digital Horticulture for Food, Nutrition, and Entrepreneurship" organized by Junagad Agricultural University during May 28-31, 2024
  - A paper on "Inherent Challenges, Technologies, and their limitations of prototype torrefaction unit", was presented by Dr. T. Senthilkumar, at the workshop on "Addressing Technological Challenges an Establishing Standards for Pelletization & Torrefaction" organized by CPRI, Bengaluru, at NETRA-NTPC, Ecotech II, Gr. Noida, U.P on September 18, 2024.
- National Seminar on 'Challenges and Strategies for the Successful Adoption of Mechanization of Cotton Harvesting in India' (in Hindi) (भारत में कपास चुनाई के यंत्रीकरण को सफलतापूर्वक अपनाने के लिए चुनौतियाँ और रणनीतियाँ), held at ICAR-CIRCOT, Mumbai on September 27, 2024, the following two invited papers were presented by,
- Dr. S. K. Shukla on, 'Cotton Mechanization Issues and Challenges'.
  - Dr. V. G. Arude on, 'Comprehensive Strategies for Successful Complete Mechanization of Cotton Harvesting to Indian Conditions' (भारतीय परिस्थितियों के अनुसार कपास की चुनाई के सफलतम यंत्रीकरण के लिए व्यापक रणनीतियाँ [In Hindi])
  - Dr. Manoj Kumar presented the research work on "Production of furfural from cottonseed hulls: A sustainable approach for cotton by-product utilization", at the World Cotton Research Conference - 8 (WCR - 8) at Tashkent, Uzbekistan held during October 4 to 10, 2024.

International Conference on 'Innovative Technologies for Research and Development for Sustainable Production of Cotton, Oilseeds and Fibre Crops', organized by CRDA, CCS Haryana Agricultural University, ICAR CICR and ICAR-IIOR at ICAR-CCARI, Ela, Old Goa, from November 13-15, 2024, the following papers were presented,

- Dr. A. Arputharaj presented on the topic "Comparison of different traceability technologies for cotton value chain in India"
  - Dr. K. Pandiyan, presented a paper titled, "Bio prospecting *Streptomyces* spp. For biocontrol potential against major phytopathogens in cotton"
  - Dr. G. Krishna Prasad, presented paper on "Development of cotton-based cut resistance glove using Multilayer Weaving Technique"
  - Dr. T. Senthilkumar, presented paper on "Cotton/Hemp blended yarn: An innovative and sustainable Textiles"
  - Dr. Ajinath Dukare, presented the research on "Fermentative production of bacterial xylanase using cotton biomass as lignocellulosic feedstock and its application for bio-bleaching of cotton stalk-based paper pulp"
  - Dr. Manoj Kumar, presented the research on "Pre-treatment of cottonseed hulls for enhanced xylose release: A microbial substrate for xylitol production"
  - Dr. Kanika Sharma, presented the research on "Improvement in the fatty acid composition and oxidative stability of cottonseed oil by blending with other cooking oils"
- 58th ISAE Annual Convention on "Engineering innovations for Next-gen Digital Agriculture" and International Symposium on "Agricultural Engineering Education for Aspiring Youth in Transforming Agriculture" held at Vasantrya Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani during November 12-14, 2024, the following papers were presented,
- Jalgaonkar K, Jagajanantha P, Mahawar MK, Dhakane-Lad J, Patil S, Raja ASM, Senthilkumar T (2024). Development of air purifying curtain using activated charcoal embedded multilayer fabric for effective indoor air filtration.
  - Patil S, Bharimalla AK, Mohanty S, Dhakane Lad J, Jalgaonkar K, Mahawar MK, Raja ASM (2024). Chemo-mechanical synthesis of nanocellulose from cotton linters and its application in biocomposites.
  - Jyoti Dhakane-Lad presented paper on "Effect of cottonseed moisture content on oil recovery using screw expeller"
  - Kautkar S, Shukla SK, Arude VG and Patil DU (2024). Development & Evaluation of Pre-grooved Chrome Leather Rollers for Indian Ginneries.
  - Bharimalla AK, Kore U, Mahawar MK, Jalgaonkar K, Patil S, Kautkar S, Dhakane Lad J (2024). ICAR-CIRCOT Agri Business Incubator: Driving Innovation and Growth in Agricultural Engineering Startups
  - Mahawar MK, Kautkar S, Dhakane-Lad J, Arude VG, Sundaramoorthy C (2024). Evaluation and quantification of processing losses in the Indian ginning industries.
  - Kadam DM, Parab SS, Saroj PC, Shrisha, Mahawar MK, Dhakane-Lad J (2024). Effects of electron beam (e beam) irradiation on total and free gossypol of cottonseed cake.
  - Dr. P. S. Deshmukh presented (in online mode) paper titled "On the go instrumental

evaluation of Agricultural commodities with special reference to cotton and other natural fibres” in 3rd International Conference on “Climate-Smart Nutri Sensitive Integrated Farming System for Gender-equitable Sustainable Agriculture: Prospects and Challenges (ICNSFS-2024)” held during November 06-08, 2024 at ICAR CIWA, Bhubaneswar, Orissa, India.

#### **SEMINAR/CONFERENCE/WORKSHOP/ WEBINAR PARTICIPATED (20):**

- Dr Sujata Saxena, Head, CBPD, Dr. A. S. M. Raja, Head, QEID, Dr. A. Arputharaj, Dr. T. Senthilkumar and Dr. G. Krishna Prasad attended the “International Conference on Sustainability and Circularity - The New Challenges for the Textile Value Chain” organised by the Textile Association of India on January 31, 2024 at Hotel The Lalit, Mumbai.
- Dr. K. Pandiyan, Dr. Varsha Satankar, Er. D.U. Patil and Er. Paresh Thakur, from GTC, Nagpur attended a seminar on “Achieving consistent quality with optimum performance”, organized by USTER on February 19, 2024 at Nagpur
- CIRCOT R-ABI team participated in the “SAMARTH” workshop related to mentoring and empowering the incubators, organized by PUSA KRISHI at NASC New Delhi from February, 20-22, 2024.
- On May 17, 2024, Dr. R. Pandiselvam participated as a resource person to provide guidance on scientific writing aspects related to Agricultural Structure and Process Engineering, at the workshop on Technical Subjects and Scientific Writing, conducted by Department of Food Processing Engineering, AEC & RI at TNAU, Coimbatore
- Dr. Sujata Saxena, Dr. V.G. Arude, Dr. A. Arputharaj, Dr. Manoj Kumar, Dr. Jyoti Dhakane-Lad, and Dr. Kanika Sharma attended the 5th SEA -AICOSCA Cottonseed, Oil and Meal Conclave - 2024, held during July 12-13, 2024 at Ahmedabad on the theme “Harvesting Sustainability: Nurturing Growth in Cottonseed, Oil & Meal.”
- Dr. Ajinath Dukare attended 1st international workshop cum webinar (virtual mode) on “CRISPR GENOME EDITING-Basic to advanced applications in agriculture, pharma and health sectors” organized by Glostem Private Limited during July 22-26, 2024.
- Dr A S M Raja attended Sixth All India Cotton Conference -2024 organized by Indian Cotton Federation (ICF) with the theme “Cotton-The Sustainable Fibre for Future organized by Indian Cotton Federation (ICF) at Coimbatore during August 09-10, 2024.
- Dr. G. T. V. Prabu, attended a one-day online seminar on “Lab to Market: Leveraging IP” organised by National IPR Awareness Mission (NIPAM 2.0) at National Research Centre for Grapes, Pune on August 09, 2024.
- Dr. D. M. Kadam, Dr. Manoj Kumar Mahawar and Ms. Sayali Parab attended the National symposium on “Electron, Beam Technology and Applications” (SEBTA-2024), organized by the Department of Atomic Energy (DAE)-Board of Research in Nuclear Sciences (BRNS) at the DAE Convention Centre at Anushaktinagar, Mumbai during August 22-24, 2024.
- All scientist and technical officers attended the National Seminar in Hindi on “Challenges and Strategies for the Successful

Adoption of Mechanization of Cotton Harvesting in India" on September 27, 2024 at ICAR-CIRCOT, Mumbai.

- Dr. Manoj Kumar participated in World Cotton Research Conference - 8 (WCRC - 8) at Tashkent, Uzbekistan from October 4 to 10, 2024.
- Dr. K. Pandiyan and Dr. Varsha Satankar participated in Oil Mill Conclave 2024, organized by Madhya Bharat Oil Mill Association on October 19, 2024 at Nagpur.
- Dr. S. K. Shukla, Dr. A. S. M. Raja, Dr. V. G. Arude, participated in the International Conference on Innovative Technologies for Research and Development for Sustainable Production of Cotton, Oilseeds and Fibre Crops, organized by CRDA and CCS Haryana Agricultural University at ICAR CCARI, Ela, Old Goa during November 13-15, 2024.
- Dr. D. M. Kadam, Dr. Manoj Kumar Mahawar, Dr. Kirti Jalgaonkar, Dr. Sheshrao Kautkar, Dr. Sharmila Patil, Dr. Jyoti Dhakane-Lad participated in the 58th Annual Convention of Indian Society of Agricultural Engineers (ISAE) on Engineering innovations for Next-gen Digital Agriculture and International Symposium on Agricultural Engineering Education for Aspiring Youth in Transforming Agriculture held at Vasant Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani during November 12-14, 2024.
- Dr. Sujata Saxena, Dr. N. Shanmugam, Dr. GTV Prabu and Dr. H. Chaurasia participated in the International Conference on "Automation and Robotics in the Textile and Apparel Industry," organized by the Textile Association of India on November 15, 2024.
- Dr. Sujata Saxena, Head, CBPD attended webinar on Circular Economy Action Plan and Personal Protective Equipment, delivered by Dr. Edith Classen, Hohenstein Institute and organized by the Textile Engineering Department, Dokuz Eylül University, Turkey and the European Society of Protective Clothing on November 15, 2024.
- Mrs. Medha P. Kamble attended the International Conference of Agricultural Librarians & Users Community (ICALUC 2024), organized by Karnataka Veterinary, Animal & Fisheries Sciences University (KVAFSU) & Association of Agricultural Librarians and Documentation of India (AALDI) on theme, "Technological Transformations in Agricultural Library and Information Systems and Services in the AI era", on November 22-23, 2024 at University Auditorium, KVAFSU, Bidar, Karnataka.
- Dr. A. S. M. Raja, Dr. Kirti Jalgaonkar, Dr. G. Krishnaprasad and Dr. T. Senthilkumar attended (in virtual mode) National Workshop on "Development of Building Materials Utilizing Agricultural Biomass" under Consortium Research Platform on Natural Fibres on December 09, 2024 at ICAR-NINFET, Kolkata.
- Dr. Sujata Saxena attended the 77th Accelerator Users' Workshop organized on December 15, 2024 at Inter University Accelerator Centre (IUAC), New Delhi and held discussion in connection with utilizing their Accelerator Mass Spectrometry (AMS) facility for differentiation of natural and synthetic indigo samples by C14 analysis.

- Dr. Sujata Saxena, Head, CBPD attended the webinar on Personal Protective Equipment and the proposed PFAS restriction by Henk Vanhoutte of European Safety Federation & Eric van Wely of DuPont Personal Protection being organized by the Textile Engineering Department, Dokuz Eylül University, Turkey and the European Society of Protective Clothing on December 19, 2024.

#### POSTER PRESENTED (06):

The following posters were presented in National Seminar in Hindi on "Challenges and Strategies for the Successful Adoption of Mechanization of Cotton Harvesting in India" on September 27, 2024 at ICAR-CIRCOT,

- “ब्यूमेटिक फ़ैवशनेटर पद्धति पर आधारित कपास कचरा विश्लेषक”, by S.K. Shukla, S. V. Ghadge, V.G.Arude & D.U. Patil.
- Robotic cotton harvesting: Recent advances and challenges “रोबोटिक कपास चुनाई: हालिया प्रगति एवं चुनौतियाँ”, by Sharmila Patil.
- Defoliation practices in different countries” by Kanika Sharma, Manoj Kumar and Ajinath Dukare
- "Challenges in Determining the Trash Content in Mechanically Harvested Cotton" by Himanshushekhar Chaurasia.
- Stick removal machine for cleaning of mechanically harvested cotton (मशीन से चुनी गई कपास की सफाई हेतु स्टिक रिमूवल मशीन की उपयोगिता), by Kirti Jalgaonkar, Jyoti Dhakane Lad, Sharmila Patil, Sheshrao Kautkar, P. Jagajanantha.
- Cleaning machinery required for processing of mechanically harvested cotton (यांत्रिक रूप से कटाई किए गए कपास की प्रभावी सफाई के लिए आवश्यक मशीनें), by Sheshrao Kautkar, H. Chaurasia, Sharmila Patil and Kirti Jalgaonkar.

## 8. IRC, RAC and IMC Meetings

### Institute Research Committee (IRC) Meeting

The 124th Institute Research Committee (Annual) meeting was held during April 02-03, 2024. Dr. S. Sreenivasan, Former Director, ICAR-CIRCOT was invited as subject expert during the Annual IRC. Director CIRCOT reviewed the progress of all projects. The Director and

Dr. Sreenivasan provided suggestions and inputs for further improvement of project work. New areas of research were also discussed and the scientists were encouraged to take up projects in those areas.



*124th Annual IRC*

### Research Advisory Committee (RAC) Meeting

The 30th Research Advisory Committee (RAC) meeting of the Institute was held during May 09-10, 2024. Dr. S. K. Shukla, Director, ICAR-CIRCOT, presented the Institute's achievements over the one year period, highlighting major

research accomplishments and other activities, viz. technologies developed and commercialized, skill development programmes, commercial services provided, and the revenue generated by the Institute.



On the occasion, four publications were released at the hands of Chairman and Members of the RAC, namely; Booklet: Status Paper on 'Cotton Stalk Biomass Utilization in India: Past, Present and Future Scenario', Brochure: Training Programme on Cotton Value Chain (For Officers

of SMART Cotton Project of Government of Maharashtra), Leaflet: Achieving Kasturi Branding of Indian Cotton: Ginners' Perspective, Leaflet: Achieving Kasturi Branding of Indian Cotton: Farmers' Perspective.



On the second day, May 10, 2024, a lecture was organized on the topic 'Production of Edible Starch from Non-Food Low Value Cellulose',

delivered by Dr. S. Sreenivasan, RAC Member & Former Director, ICAR-CIRCOT, Mumbai.



**Institute Management Committee (IMC) Meeting**

82nd IMC meeting of the institute was conducted on July 05, 2024 in hybrid mode.

**IMC-QRT Interface Meeting**

An IMC-QRT interface meeting was conducted during July 05-06, 2024. The deliberations of the

CIRCOT Quinquennial Research Team (QRT) for year 2017-22 were reviewed and discussed with the IMC during the meeting. Recommendations and suggestions were given by both the teams for improvements.



### CIRCOT QRT (2017-22)

#### The following Quinquennial Review Team (QRT) meetings/visits were conducted in 2024

The First five QRT meetings of the institute took place in the year 2023.

In 2024,

1. Sixth QRT visit/meeting: At Quality Evaluation Unit (QEU) of CIRCOT, Coimbatore and stakeholders meeting during January 17-19, 2024.
2. Seventh QRT visit/meeting: At QEU of CIRCOT, Surat on April 24, 2024.
3. Eighth QRT visit/meeting: At QEU of CIRCOT at Dharwad, Karnataka on June 14-15, 2024.
4. Ninth QRT meeting : QRT-IMC interface meeting at ICAR-CIRCOT, Mumbai during July 5-6, 2024

5. Final QRT report (2017-2022) of ICAR CIRCOT was presented before the Secretary, DARE and DG, ICAR, New Delhi on September 18, 2024, by Dr. K. K. Singh, Chairman and Dr. A. S. M. Raja, Member Secretary, of the QRT team in presence of Dr. K. Narsaiah, ADG (PE), from the Agricultural Engg.SMD.

#### NABL external audit:

- The NABL external audit for the renewal of the institute's accreditation for mechanical and physical tests was conducted on January 27-28, 2024. The audit was satisfactory and the institute accreditation was renewed for one year.

### ISO Audit : The ISO surveillance audit of the institute was conducted on June 13-14, 2024.



### ICAR-CIRCOT Website GIGW Compliance

The ICAR-CIRCOT website was evaluated and certified as per GIGW 3.0 under the Website Quality Certification Scheme (WQCS) of STQC Directorate for compliance with extant guidelines to be secure, accessible, and available for Citizens. It is stated that the website conforms and complies with all 88 quality requirements of "Guidelines for Indian Government Websites 3.0", as on date May 02, 2024.



## 9. Outreach Activities

### *Awareness/Demonstrations:*

1. Three awareness cum demonstration programme on 'Cotton Quality, Clean Cotton Picking and Crop Residue Management' were conducted during January 08 to 10, 2024 at Cotton Farm, Regional Station of ICAR CICR, Vellamadai Village and Vadapudur Village, all at Coimbatore (T.N.). 192 farmers participated in these three demonstrations.
2. Distributed clean cotton-picking kit comprising of a cotton picking bag made of cotton cloth, a bag for filling the picked cotton and a cotton cloth for unloading the cotton. Clean cotton-picking kits were distributed to 12 project farmers.
3. A programme on 'Best Management Practices to Prevent Cotton Contamination and Preserve Fibre Quality' was conducted at M/s. Shantalaxmi Ginning Mills (I) Pvt. Ltd., Pollachi. (T. N.) on January 12, 2024.
4. A group of trainees from RAMETI, Nagpur visited GTC, ICAR-CIRCOT, Nagpur on January 23, 2024. They were demonstrated the facilities of the centre.
5. GTC, Nagpur in association with Confederation of Indian Textile Industry Cotton Development Research Association (CITI-CDRA), Mumbai conducted an awareness cum demonstration program at Village Savandri, Taluka Kalmeshwar, Nagpur on February 03, 2024 on 'Post Harvest Management Practices for Clean Cotton Production and Value addition to its By-produce', attended by about 100 farmers.
6. An awareness cum field demonstration programme was conducted on February 15, 2024 at Village Lava, Nagpur on 'Utilization of Green Cotton Biomass', 25 farmers participated.
7. GTC, Nagpur in association with ICAR CICR, Nagpur organized a training cum awareness programme for ginning industry and farmers on 'Best Management Practices to Prevent Cotton Contamination and Preserve Fibre Quality', on March 05, 2024 at M/s Shivam Ginning and Pressing Factory, Village Gondimohgaon, Katol, Nagpur. About 75 farmers and personnel (including 5 females) from ginning and pressing industry participated in the programme.
8. A group of 35 trainees (including 10 female) from Regional Agriculture Management & Extension Institute, (RAMETI), Nagpur visited Ginning Training Centre, Nagpur on August 09, 2024.
9. A group of 30 participants (12 female) from Regional Centre of Organic Farming, Gondkhairi, Nagpur visited Ginning Training Centre, Nagpur on August 09, 2024.
10. A group of 24 farmers (all male) from ATMA, Narsinghpur, Madhya Pradesh, visited Ginning Training Centre, ICAR-CIRCOT, Nagpur on October 16, 2024, under the ATMA scheme.
11. A group of 18 individuals (all male), including 3 representatives from the State Agriculture Department and the remaining farmers, from Taluka-Pathriya, District Mungeli, Chhattisgarh, visited the Ginning Training Centre, Nagpur, on October 17, 2024.

12. A group of 40 farmers including four females from ATMA, Seoni, Madhya Pradesh, visited Ginning Training Centre (GTC), Nagpur on October 25, 2024. They were demonstrated the facilities available at the centre.
  13. A group of 17 trainees, including four women, accompanied by a faculty member from the Directorate of Marketing & Inspection (Agmark), Head Office, Nagpur, visited GTC, Nagpur, on November 18, 2024.
  14. GTC, Nagpur in association with Confederation of Indian Textile Industry (CITI) -Cotton Development and Research Association (CDRA), Mumbai organized an awareness programme for farmers under MGMG at village Khumari, Kalmeshwar (Taluka), Nagpur on Kisan Divas (National Farmers Day) on December 23, 2024. About 40 farmers participated including seven women
  15. An awareness programme on "Clean Cotton Picking and Biomass Utilization" was conducted, about 40 Farmers including 10 females participated in the programme.
  16. Ginning Training Centre (GTC), Nagpur conducted an awareness programme for the farmers in the village Mohapa, Nagpur about cultivation practices and post-harvest management practices of cotton under MGMG programme on June 21, 2024.
  17. Ginning Training Centre (GTC), Nagpur conducted an awareness programme for the farmers in the village Masepathar, Nagpur about cultivation practices and post-harvest management practices of cotton under MGMG programme on July 19, 2024. About 25 farmers participated, of which 4 were females.
  18. Ginning Training Centre, organized an awareness programme for farmers at Village Sawangi (Tomar), Taluka Kalmeshwar, Dist. Nagpur on September 09, 2024 under Mera Gaon Mera Gourav (MGMG). Total 50 participants (all male) attended the program.
- Stakeholders Meet:**
- Ginning Training Centre (GTC), Nagpur organized a stakeholders meet on "Post Harvest Management of cotton stalks and Distribution of Chippers" under Schedule Caste Sub Plan (SCSP) program on February 07, 2024. About 25 farmers and stakeholders including 2 females attended the programme.
  - Dr. S.K. Shukla, Director ICAR-CIRCOT, Mumbai along with the team of Scientists and Technical officers attended the Annual Group Meeting 2024, of ICAR-All India Coordinated Research Project (AICRP) on Cotton organized by Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola and ICAR Central Institute for Cotton Research, Nagpur on April 05, 2024. CIRCOT technologies were displayed in the exhibition during the event.
  - GTC, Nagpur organized stakeholders meet on April 22, 2024. Dr. K. Narsaiah ADG (PE) was the chief guest in the programme. About 22 stakeholders participated.
  - A stakeholder's meet was held at the Quality Evaluation Unit of ICAR CIRCOT, Dharwad on June 15, 2024, chaired by the Director, Dr. S. K. Shukla.
  - Cotton Assayers' Meet was organised at ICAR-CIRCOT on August 26, 2024 under the chairmanship of Dr. S. K. Shukla, Director, CIRCOT with representatives

from MCX-Clearing Corporation Limited. The meet was also attended by stakeholders from Cotton Association of India (CAI), Wakefield Inspection Services and Ahmedabad Textile Industry's Research Association (ATIRA)



*Cotton Assayer's meet on 26.08.2024*

### Industry Interface:

1. Dr. K. Narsaiah, ADG, PE alongwith CIRCOT scientists' team, visited Ginning Industries in and around Nagpur, namely Shri Krishna Cotton Company, Saoner, P.N. Gawande Ginning and Pressing Industry, Bajargaon, and GimaTex Industry, Hinganghat, M/s Bajaj Steel Industries, Nagpur, Precision Tooling Engineers, Nagpur and M/s Vidarbha Sales, MIDC, Nagpur, on April 22, 2024.
2. Dr. A. S. M. Raja & Dr. A. Arputharaj attended two meetings of the Sub-Committee on Quality Standards and Nomenclature for New Varieties of Extra Long Staple (ELS) Cotton under the "Kasturi Cotton Bharat" Programme organized by TEXPROCIL on September 27, 2024 and on October 11, 2024, in Mumbai.
3. Dr. N. Vigneshwaran, participated in the industry interface meet on "ICAR Technologies for Textile Industry - Cotton

and Other Natural Fibres" at IIFA-2024 held at ICAR-CIPHET Ludhiana on October 04, 2024 and made a presentation on "ICAR-CIRCOT technologies for nanofinishing of cotton textiles".

4. The CIRCOT RABI facilitated an expert session on December 19, 2024 on "Introduction to banking schemes in agriculture sector", which was conducted by Mr. Anuj Malvia, Branch head of SBI start-up branch at BKC, Mumbai, for twenty-three incubates of the 9th Cohort one-month UDAY-AOP and ANKUR-Saip incubation programmes of CIRCOT R-ABI.
5. Dr. S. K. Shukla, Director had an online discussion regarding 'Development of cotton testing instrument for farm level use', with Dr. M. K. Sharma, Whole time director and CEO M/s Bajaj Steel Industries Limited, Mr. Ram Ghate from M/s Logic1 technologies, Nagpur and Mr. V. R. Ramesh and Mr. Sundaram from M/s Step Knowledge Services Pvt. Ltd., Coimbatore, on December 21, 2024.

### Agri Startup Conclave 2024:

ICAR-CIRCOT RAFTAAR Agri Business Incubator hosted the Agri Startup Conclave 2024 during December 03-04, 2024, under the theme "Fueling Agri-Innovation: Empowering Entrepreneurial Passion for a Sustainable Future", at ICAR-CIRCOT, Mumbai. Thirty Start-ups participated.

### Exhibition/Event Participated:

1. CIRCOT R-ABI exhibited its technologies on the Entrepreneurs' Day organized during the 86th Foundation Day celebration of ICAR NINFET, Kolkata, during January 05-06, 2024.



*ICAR-CIRCOT stall at ICAR-NINFET exhibition on 05-01-2024*

2. National Startup Day 2024 was celebrated on January 16, 2024, by organizing "PRAYAS Pune Agri Startups Conclave 2024", at NRCG Pune, jointly by ABI Draksh (the ABI Centre of ICAR-NRCG) Pune, ICAR-NRCG, Pune, ICAR-DOGR and ICAR-CIRCOT R-ABI team in association with Society for Advancement of Viticulture and Enology (SAVE), Pune.
3. Dr. A.K. Bharimalla, Principal Investigator, CIRCOT ABIC and Chief Executive Officer, CIRCOT R-ABI attended SRIJAN: Orientation programme for ICAR ZTMCs/ITMUs' held during January 17-19, 2024 at New Delhi.



4. ICAR-CIRCOT/ R-ABI also participated in the "Bharat Tex" Global Textile Expo 2024, organized by Ministry of Textiles at New

Delhi, from February 26–29, 2024. Dr. G. Krishna Prasad & Shri. Anwar Hussian participated in "Bharat Tex" Global Textile Expo 2024, and exhibited the cut resistance gloves technology.

5. ICAR-CIRCOT R-ABI participated in Agro Organic MSME Swadeshi Expo at NESCO, Goregaon, Mumbai during March 13-15, 2024.
6. Dr. Ajinath Dukare and Dr. Manoj Kumar Puniya participated in the Analytica anacon India Lab Expo 2024 exhibition cum "International trade fair for laboratory technology, analysis, biotechnology and diagnostics" held at Goregaon, Mumbai from April 15-17, 2024.
7. ICAR-CIRCOT participated in the 96th Foundation and Technology Day exhibition at the Bharat Ratna C. Subramaniam Auditorium, NASC Complex, Pusa during July 15-16, 2024 and displayed various research technologies and novel products developed by the institute and startups.



*Dignitaries, visitors, students visiting CIRCOT stall during 96th ICAR Foundation Day at New Delhi*

8. ICAR-CIRCOT and CIRCOT RABI Startup's namely M/s Vasundhara Shashwat Shetimaal Utpadak and Prakriya Sanstha, Sangli, Maharashtra, M/s Arde Patil Pharma Pvt Ltd., Kolhapur, Maharashtra, and M/s. Aamrut Foods & Herbs (I) Pvt. Ltd., Pune, Maharashtra participated in the Krishi Mela 2024, under the 'Startup Pavilion', organized by CIRCOT RABI knowledge partner KRISHAK at University of Agricultural Sciences (UAS), Dharwad during September 21-24, 2024.



ICAR-CIRCOT stall at the Techno Food Hackathon and Exhibition (2024) at ICAR-CIPHET, Ludhiana, Punjab

10. The institute participated in the World Cotton Day 2024 event & exhibition, hosted by the Confederation of Indian Textile Industry (CITI) organized by the Ministry of Textile, CCI, and CITI, in New Delhi on October 7, 2024.



Visitors at CIRCOT RABI stall during Krishi Mela 2024 at UAS, Dharwad

9. ICAR-CIRCOT participated in the ICAR CIPHET Techno Food Hackathon and Exhibition programme at ICAR-Central Institute of Post-Harvest Engineering and Technology (ICAR-CIPHET), Ludhiana, Punjab as part of their Foundation Day celebration from October 03-05, 2024.



ICAR-CIRCOT participation in exhibition during World Cotton Day 2024 at New Delhi

11. Participated in Global Soils Conference 2024 Caring Soils Beyond Food Security: Climate Change Mitigation & Ecosystem Services, during November 19-22, 2024 at NASC Complex, New Delhi and exhibited technologies of ICAR-CIRCOT.



12. Exhibition was organized as part of Agri Startup Conclave 2024 on December 03-04, 2024, on the theme "Fueling Agri-Innovation: Empowering Entrepreneurial Passion for a Sustainable Future", by ICAR-CIRCOT R-ABI.



13. Personnel from the Ginning Training Centre, ICAR-CIRCOT, Nagpur, participated in Agrovision, being held from November 22-25, 2024, at the PDKV grounds, Dabha, Nagpur.

### Expert/Invited Talks/Guest Lecture by CIRCOT Scientists:

1. Dr. N. Vigneshwaran, delivered a lecture on "Nanotechnology for Business development in medicinal and aromatic plants" on February 09, 2024 in the Entrepreneurship

Orientation Program on Medicinal and Aromatic Plants-VIII (EOPMAP-VIII) (online mode), and again on August 09, 2024 during EOPMAP-IX, organized by ICAR-DMAPR with its Medi-Hub Technology Business Incubator (TBI).

2. Dr. N. Shanmugam, Head, MPD participated as a subject expert in the Banana-Turmeric festival 2024, organized by District Administration of Burhanpur, Madhya Pradesh during February 20-21, 2024.
3. Dr A S M Raja, Head, QEID was Lead speaker at workshop on "Cotton and Other Agro Based Livelihood Activities for NER", organized on February 23, 2024, by College of Community Science, Central Agricultural University, Tura. Meghalaya and spoke on "Scope for Comilla Cotton for Surgical Products".
4. Dr. A. K. Bharimalla presented (online) on, 'ICAR-CIRCOT: Fostering Innovation through R-ABI Incubation', for CSWRI startups on March 08, 2024, during CHETNA 2024.



**CHETNA**  
Igniting Agri-Entrepreneurial Spirit

**CHETNA 2024**  
AGRI-BUSINESS INCUBATION  
PROGRAM FOR START-UPS  
चेतना 2024

ICAR-CIRCOT: Fostering innovation through R-ABI Incubation  
08 March 2024  
04:00 PM

To Join the Lecture on ZOOM  
Click Here

Speaker  
Dr. A.K. Bharimalla  
Principal Scientist  
ICAR-CIRCOT, Mumbai

### Lecture during CHETNA 2024

5. Dr. A.K. Bharimalla delivered two talks (online) on "Role of ICAR-CIRCOT R-ABI Entrepreneurship Development during ICAR- DFR training on "Skill for Entrepreneurship Development in Floriculture" on March 15, 2024 and on November 16, 2024.

6. Dr. R. Pandiselvam delivered a lecture on "Recent Advancements in Mechanization of Plantation Crops" on May 16, 2024, in a workshop on Technical Subjects and Scientific Writing conducted by Department of Food Processing Engineering, AEC & RI at TNAU, Coimbatore.
7. Dr. Sujata Saxena, Head, CBPD was a panelist in the session on, Cottonseed and its by-products with focus on cottonseed meal and rice bran extraction and DDGS, during the 5th SEA- AICOSCA Cottonseed, Oil and Meal Conclave 2024 held at Ahmedabad during July 12-13, 2024.
8. Dr. A. Arputharaj, was a panelist in session on, Cottonseed and its By Products, and discussed on the topic "Value addition to Cotton Linters- New Development". during the 5th SEA AICOSCA Cottonseed, Oil and Meal Conclave 2024 held at Ahmedabad on during July 12-13, 2024.
9. Dr A S M Raja delivered an invited talk (online) on topic "Sustainability of Cotton for Fashion and Textile Industries" on July 18, 2024, during the Eight-Day Professional Development Programme on Sustainable Approaches in Fashion and Textile Systems, organized by Amity School of Fashion Technology, Amity University Chhattisgarh held during July 15-22, 2024 in digital mode.
10. Dr. P. Jagajanantha delivered a guest lecture (online mode) on "Emerging Innovations in E-Textiles: Shaping the Future of Smart Fabrics" at K. S. Rangasamy College of Technology, Tiruchengode, Tamilnadu on August 23, 2024.
11. Dr. N. Shanmugam, Head, MPD participated as panelist in a discussion on, *Technology Gaps in Technical Textiles Machinery*, organized by Central Manufacturing Technological Institute (CMTI), along with the Bureau of Indian Standards (Textiles Division), at CMTI, Bengaluru on September 02, 2024. The event was also attended by industry experts, stakeholders, and representatives from various sectors of the textile machinery industry.
12. Dr. P. Jagajanantha delivered a guest lecture on topic "Valuable insights into the latest innovations and applications in smart textiles and product developments" to the final year students of Fashion Design Department, NIFT Mumbai on October 15, 2024.
13. Dr A. S. M. Raja presented a lead paper entitled "Cotton fibre quality requirements for the sustainability of Indian Textile Industry", and also acted as Co-Chairman for the Post harvest technology session in the International Conference on Innovative Technologies for Research and Development for Sustainable Production of Cotton, Oilseeds and Fibre Crops, organized by CRDA, CCS Haryana Agricultural University, ICAR-CICR and ICAR-IIOR at ICAR-CCARI, Ela, Old Goa from November 13-15, 2024,
14. Dr V. G. Arude presented an invited paper on "Technological Advancements and strategies for successful adoption of mechanization in cotton harvesting and processing in India"
15. Dr. A. S. M. Raja delivered a lead lecture on "Value chain management in cotton and by product utilization" on November 26, 2024, during the 'Training on Value Chain Management in Natural Fibres, sponsored by MANAGE and organized at ICAR NINFET, Kolkata, from November 25-29, 2024.

### Workshop:

- Workshop on post-harvest management of cotton was conducted at Vijalpur, Gujarat on October 23, 2024, for the farmers affiliated to M/s Materra India Ltd.

### Mass Media:

#### • Radio

Dr. Prashant Deshmukh gave a talk (in Marathi) on two topics in the Agriculture Programme segment 'Maze Awaar Maze Shivaar', as given below,

“Kapus Tantragyan Sanshodhan Sansthechi Shatabdi (1924 2024) Pahili Panchvees Varshe (1924 1949)” (in Marathi) which is a brief history of ICAR-CIRCOT during the initial 25 years (1924-1949) since its inception on February 06, 2024

“Kapus Tantragyan Sanshodhan Sansthechi Shatabdi- Paanchvees Varshanchi Vaatchaal (1949-1974), (in Marathi), which is a brief history of ICAR-CIRCOT during the 25 years (1949-1974) on July 17, 2024

The centenary celebration of ICAR CIRCOT, titled, “Bhartiya Arthvyavasthethil Kaapsache Arthakaran”, was broadcast by All India Radio on December 04, 2024, in programme Aakashwani Samachar, under the segment Arthavishesh (Pradeshik Vruttavibhag Aakashwani Mumbai).

#### • Television

Dr. Sheshrao Kautkar, delivered a TV talk for “Aamchi Maati Aamchi Mansa”, an agriculture related Marathi program of DD Sahyadri on the topic “Janavaransaathi Chara Tanchayichya Kaallat Upyogaat Yenaare Murghaas Tantragyan” (In Marathi), telecast on February 14, 2024.



*Dr. Sheshrao Kautkar  
during TV talk on 14-02-2024*

Dr. Prashant Deshmukh gave two TV talks on Doordarshan Sahyadri Vahini channel in the programme 'Aamchi Maati Aamchi Maanasa':

- “Kapus Tantragyan Sanshodhan Sansthechi Shatabdi (1924 2024) Suruvaatichhe 25 Varshe (1924 1949)” (in Marathi) which is a brief history of ICAR-CIRCOT during the initial 25 years (1924-1949) since its inception on January 01, 2024 and repeat telecast on January 02, 2024.
- “ K a p u s T a n t r a g y a n Sanshodhan Sansthechi Shatabdi (1924 2024)--Vaatchaal 1949-1974 hya 25 varshanchi” (in Marathi), which is a brief history of ICAR-CIRCOT during the 25 years (1949-1974) post India's independence on April 29, 2024 and repeat telecast on April 30, 2024
- A One-hour Five-minute duration segment covering in detail the Centenary celebration of ICAR-CIRCOT on December 03, 2024 titled, “Vice President Jagdeep Dhankar inaugurates Centenary Pillar at ICAR-CIRCOT”, was aired on Sansad TV.



**Dr. Deshmukh on the TV talk on Doordarshan Sahyadri Vahini channel**

**Social Media posts:**

Information about few technologies such as Gin Trash Treatment System to Destroy Pink Bollworm from Cotton Ginneries, Conductive Yarn for Heat Generating Smart Textile Products, Augmented Process for Preparation of Bio-enriched Compost from Cotton Micro-dust, ICAR-CIRCOT Trapezoidal Shaped Low-cost Briquette-based Crematorium, Processing of Bleached Cotton Linters for Filter Making Applications, Compact and Energy Efficient Cottonseed Dryer, Biocide Formulation for Pulp and Paper Industry, Antimicrobial Paper Coating Technology for Cotton Paper and Kawadi Cotton Opener, developed and commercialized by the institute has been uploaded on various Social Media Platforms (Facebook/Instagram/Twitter) and on Institute Website for awareness among stakeholders.


**Outreach on social Media Handles and Website:**

Besides all the above, ICAR-CIRCOT showcases its activities, technologies, events etc. on the website page and also on social media handles such as YouTube, Facebook, X and Instagram for wider outreach.

On an average, per month, about 15 posts are published on social media handles and almost all activities are uploaded on the institute website. Besides, scientists also share research developments and activities on their Linked-In pages and social media handles.

Website & Social Media	Followers
Website	21477
Facebook	1989
X (Twitter)	667
YouTube	446
Instagram	104

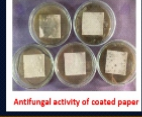
**Antimicrobial Paper Coating Technology for Cotton Paper**



**Technology Features:**

- Paper coating formulation for efficient control of microbial growth on the surface of the paper was developed.
- This formulation was demonstrated to be effective against the bacteria: *S. aureus*, and *K. pneumoniae* and fungi: *Aspergillus niger* and *Chaetomium globosum*.
- The technology has been commercialized.

**Antifungal activity of coated paper**

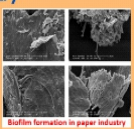


Developed by ICAR-Central Institute for Research on Cotton Technology, Mumbai

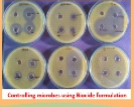
**Biocide Formulation for Pulp and Paper Industry**

**Technology Features:**

- Biocide formulation is developed for efficient control of biofilm formation in pulp and paper production lines.
- Average acceptance rate (of prepared paper) was more than 95%.
- The biocide formulation significantly reduced the number of wash-ups required, thereby reducing the total downtime of the machine to 730 min (from 590 min).
- The technology has been commercialized.



**Biofilm formation in paper industry**



**Controlled biofilm using biocide formulation**

Developed by ICAR-Central Institute for Research on Cotton Technology, Mumbai

**ICAR-CIRCOT TRAPEZOIDAL SHAPED LOW-COST BRIQUETTE-BASED CREMATORIUM**



**TECHNOLOGY FEATURES:**

- Crematorium consists of a compact trapezoidal shaped cage with forced draft combustion system for enhanced combustion process.
- Requires only 200 kg of biomass briquettes as against 300 kg of fire wood in traditional crematoriums.
- Use of less coke is completely eliminated.
- 90% reduction in complex use.
- Around 50% of cost saving per cremation is attained with ICAR-CIRCOT Green Crematorium which makes it economical.

DEVELOPED BY ICAR-Central Institute for Research on Cotton Technology, Mumbai

**AUGMENTED PROCESS FOR PREPARATION OF BIO-ENRICHED COMPOST FROM COTTON MICRO-DUST**



**Technology features:**

- Compost was prepared from cotton micro-dust by adding fresh cow dung 25% (w/w) and microbial inoculum 1% (w/w).
- Compost is ready in 45 days.
- C/N ratio is 18:1, Moisture: 35-40%.
- Compost is bio-enriched with cellulolytic microorganisms having the Phosphorus solubilizing trait.

DEVELOPED BY ICAR-Central Institute for Research on Cotton Technology, Mumbai

# 10. Events Organized

## National Days Celebration – National Pride

### Republic Day

The 75th Republic Day was celebrated at the institute on January 26, 2024, with the hoisting of the tricolour by the Director. Staff with their families, especially children participated.



### Independence Day

ICAR-CIRCOT, Mumbai celebrated the 78th Independence Day by hoisting the National flag on August 15, 2024. The National Flag was distributed to the staff and children by the Director and Patriotic songs were rendered.



### Remembering National Icons

- Chhatrapati Shivaji Maharaj Jayanti was celebrated on February 19, 2024.



- Dr. Babasaheb Ambedkar’s 133rd Jayanti was celebrated in the Institute on April 16, 2024.



- Dr. Babasaheb Ambedkar Mahaparinirvan day was solemnly remembered in the institute on December 06, 2024



## CENTENARY CELEBRATION

ICAR-CIRCOT, established in 1924, proudly celebrated 100 years of exceptional service to the nation on December 03, 2024.

- The year-long centenary celebration that started on December 03, 2023 culminated with a grand concluding ceremony on the 101st Foundation Day on December 03, 2024. To commemorate this

milestone, a grand concluding ceremony was organized, graced by Shri Jagdeep Dhankhar, Hon'ble Vice President of India, as the Chief Guest.

## GLIMPSES OF THE CENTENARY CELEBRATIONS

### CONCLUDING FUNCTION OF YEAR-LONG (2023-24) CENTENARY CELEBRATIONS

- ICAR-CIRCOT was honoured with the visit of the Shri Jagdeep Dhankhar, Hon'ble Vice President of India, as the

Chief Guest, during the concluding day function of the centenary celebration on December 03, 2024.



*Hon'ble Vice-President of India Shri Jagdeep Dhankhar at ICAR-CIRCOT during the centenary celebration on December 03, 2024*

- Other dignitaries who graced the event were Shri C.P. Radhakrishnan, Hon'ble Governor of Maharashtra, Shri Shivraj Singh Chouhan, Hon'ble Union Minister of Agriculture & Farmers' Welfare & Rural Development, Shri Ramnath Thakur, Hon'ble Minister of State for Agriculture & Farmers' Welfare, Dr. Himanshu Pathak, Secretary (DARE) and Director General (ICAR), New Delhi, Dr. S.N. Jha, Deputy Director General (Agricultural Engineering), ICAR, New Delhi, and Dr. K. Narsaiah, ADG (PE), ICAR, New Delhi
- Around 400 delegates from across the country, including Researchers, Students, Vice Chancellors of Agricultural Universities, Directors of ICAR Institutes, and representatives from ginning industries, seed industries, textile sectors, agri startups, and entrepreneurs, participated in the event.

- *Events during concluding function of Centenary Celebrations on December 03, 2024*

- (i) **Centenary Pillar Unveiling at ICAR CIRCOT, Mumbai:**

The ICAR-CIRCOT Centenary Pillar was unveiled by the Hon'ble Vice President of India, Shri Jagdeep Dhankhar.



The centenary pillar set in black granite has been erected in front of the main administrative building of CIRCOT and is prominently visible from the main gate of the institute. The centenary pillar, besides containing the details of its unveiling and commemoration is inscribed



**ICAR-CIRCOT Centenary Pillar 2024**

with the milestones of the institute on its sides and stands as a testament to the achievements of the institute during its 100 year journey.

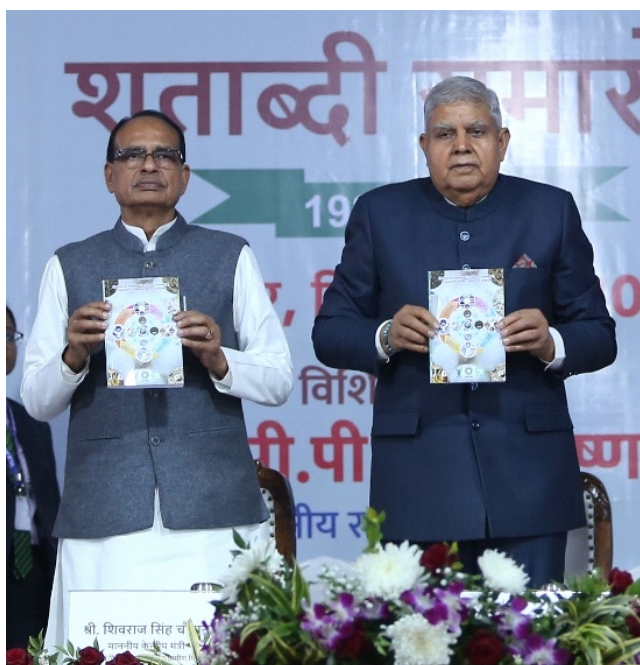
- (ii) **“Ek Ped Maa Ke Naam” at ICAR-CIRCOT Mumbai premises:**

The Hon'ble Vice President of India, along with Madam Dr. (Smt.) Sudesh Dhankhar, planted saplings as part of the 'Ek Ped Maa Ke Naam' initiative of GOI.



- (iii) **Announcements by the Hon'ble Union Minister for A&FW:**

During the centenary celebrations, the Hon'ble Union Agriculture Minister Shri Shivraj Singh Chouhan, while congratulating the institute for doing commendable work in the post-harvest processing of cotton, provided further roadmap by making the following announcements, (i) Establishing a pilot plant for processing of mechanically harvested cotton, (ii) International Research and Training center for Ginning, and (iii) creation of facility for traceability solution in cotton value chain.



#### (iv) Inauguration of research facilities:

On the occasion the Genome Editing and Biotransformation Centenary Laboratory and Cottonseed Meal Protein Extraction Pilot Plant were inaugurated at the hands of Dr. Himanshu Pathak, Secretary (DARE) and Director General (ICAR).



#### (v) Launch of Cotton Dashboard:

ICAR-CIRCOT has developed a brand new 'Cotton Dashboard', which was launched by Dr. S.N. Jha, DDG (Agricultural Engineering). The new ICAR-CIRCOT Cotton Dashboard is an advanced analytics tool designed to provide an in-depth overview of the cotton industry.



#### (vi) Panel Discussion on Post-Harvest Processing of Cotton in Amrit Kaal:

On December 03, 2024, a Panel Discussion on "Post-Harvest Processing of Cotton in Amrit Kaal" was organized by ICAR-CIRCOT jointly with the Indian Society for Cotton Improvement (ISCI) and Indian Fibre Society (IFS) at the Jubilee Hall of ICAR-CIRCOT. Dr. S. N. Jha, Deputy Director General (Agricultural Engineering) chaired the session and Dr. K. Narsaiah, Additional Director General (Agricultural Engineering) was a panel member. Besides, experts from research institutes, textile industry, academia, ginning industry and other stakeholders involved in the cotton processing sector participated in the panel discussion.



#### (vii) Centenary Foundation Day and Agricultural Education Day:

December 03, 2024 was also celebrated as Centenary Foundation Day and Agricultural Education Day. Dr. K. R. Krishna Iyer, Former Director of CIRCOT

during period 1995 - 2000, shared his views on the journey of the institute and also reminisced about his memories while serving at the institute. Many other retired staff members also shared their memories with the audience providing many nostalgic moments.

- Mr. Arnav Datta, Head-Warehousing Operations (Delivery & Spot) MCX Clearing Corporation Limited, delivered the second lecture on the topic, “Effective Risk Management Kapas & Cotton Contracts”, on February 24, 2024.



## EVENTS CONDUCTED DURING THE CENTENARY YEAR

### CENTENARY LECTURE SERIES

As part of activities under the Centenary Year of ICAR-CIRCOT, the Institute organized the “Centenary Lecture Series”, beginning in the month of January 2024. Seven such lectures were organized.

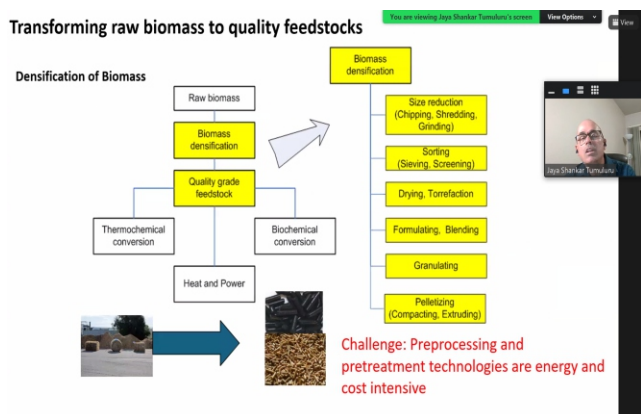
- First lecture was delivered by Dr. T. V. Sreekumar, Director, The Bombay Textile Research Association (BTRA) on the topic, “High Performance Fibres”, on January 30, 2024 at ICAR-CIRCOT, Mumbai

- The third lecture in the series was delivered by Mr. Jagadeesh Sunkad, Independent Consultant & Director, Kanakadhara Agri. Innovations Pvt. Ltd., on the topic, “Pragmatic Approaches to become a Successful Start-Up”, on March 14, 2024.



- An online lecture from overseas was the fourth in the series, delivered by Dr. Jaya Shankar Tumuluru, Research Agricultural Engineer, Southwestern Cotton Ginning Research Laboratory, USDA-ARS, Las Cruces, New Mexico, USA on the topic, “Novel Lint Cleaning Approaches to Improve the Upland cotton quality and Pre-Processing and Pre-Treatment technologies to upgrade the cotton gin by products for fuels and power”, on May 24, 2024.

- Sixth lecture was on the topic ‘Key takeaways from Australian Cotton Industry’, delivered by Dr. Y. G. Prasad, Director ICAR-CICR, Nagpur on August 28, 2024, based on his learnings and impressions from his visit to Eastern Australia (Queensland and NSW) cotton growing areas.



- Besides technical lectures, the fifth lecture touched on a spiritual note and was delivered on the topic “Essence of Spirituality”, by Brni Maitreyi Chaitanya from the Chinmaya Mission, Pune on June 05, 2024.

- Dr. R. P. Kachru, Former ADG (PE), ICAR, delivered the seventh lecture on September 30, 2024, on the topic ‘Paradigm Shift for R&D Programme in Agriculture using Matrix Approach’.



**In the centenary year, ICAR-CIRCOT was proud to host the visits of:**

- The Hon’ble Union Minister for Agriculture & Farmers’ Welfare, Government of India, Shri Shivraj Singh Chouhan:**

The Hon’ble Union Minister for A&FW, GOI, and President of the ICAR, Shri. Shivraj Singh Chouhan

visited ICAR-CIRCOT, Mumbai on July 09, 2024. During the visit, he interacted with all the CIRCOT staff and lauded the institute's work in contribution to cotton processing and value addition to cotton biomass and in developing innovative technologies and sustainable practices. He released a publication titled, "Glimpses of ICAR CIRCOT 2024". He also visited the institute's Mechanical Processing Division, Weaving Section, Nanocellulose Pilot Plant, Advanced Material Characterization Laboratory, ICP-MS laboratory and Kawabata Testing Laboratory. He interacted with agri-startups being supported by the institute under the RKVY-RAFTAAR programme of the Ministry. The Hon'ble Minister was accompanied by Dr. K. Narsaiah, ADG (PE), ICAR, New Delhi, Dr. C. N. Ravishankar, Director, ICAR-CIFE, Mumbai and Dr. P. L. Patil, Vice Chancellor, University of Agricultural Sciences, Dharwad.

- **The Hon'ble Union Minister of Textiles, Shri Giriraj Singh and Smt. Prajakta I. Verma, Joint Secretary (fibre), Ministry of Textiles, GOI:**

Both the above dignitaries from the Ministry of Textiles, GOI, visited GTC of ICAR-CIRCOT at Nagpur on September 25, 2024. During the visit the Hon'ble Minister was briefed about the institute activities by the Director and shown the laboratories and facilities at the GTC. The Hon'ble Minister appreciated the research work being done at ICAR-CIRCOT and desired the institute to develop advanced mechanization techniques and actively work on reducing contamination levels in Indian cotton. During the visit, he planted a sapling under the 'One tree for Mother' campaign launched by the GOI. The dignitaries were accompanied by, Dr. K. Narsaiah, ADG (PE), ICAR, New Delhi, Dr. Y. G. Prasad, Director, ICAR-CICR, Nagpur, Shri Lalit Kumar Gupta,



*Visit of The HAM for Agriculture & Farmers' Welfare, Government of India, Shri Shivraj Singh Chouhan*

CMD, CCI Ltd., Mumbai, Dr. C. D. Mayee, Former Chairman, ASRB, ICAR-New Delhi, Dr. A. L. Waghmare, Director, Directorate of Cotton Development, Nagpur, Dr. M. K. Sharma, CEO cum Director, M/s Bajaj Steel Industries Ltd., Shri Venkat Rao, COO, M/s Nuziveedu Seeds Ltd., Hyderabad, Shri Bhavesh Shah, President & Shri Irfan Khan, Secretary of Vidarbha Cotton Association and Shri Dilip Thakre, a progressive farmer from Akola.



#### OTHER CENTENARY ACTIVITIES:

- Intellectual Property Rights Workshop:** The ABIC and ITMU of ICAR-CIRCOT, Mumbai organised a Sensitization Workshop on “Role of Intellectual Property in Business: Patent, Trademark and Copyright” on March 11, 2024, by Mr. Ashutosh Prachand, IP Expert & Director, KnottyIP, at ICAR-CIRCOT, Mumbai.



- Intellectual Property related Seminar:** In the centenary year, ICAR-CIRCOT celebrated the World Intellectual Property Day 2024 by organizing Seminar on “Intellectual Property (IP) and the Sustainable Development Goals (SDGs): Building our Common Future with Innovation and Creativity in the Cotton Sector”, on April 29, 2024.



- National Workshop:** National Workshop on “Branding of the Vidarbha Cotton as Kasturi” in association with The Cotton Textiles Export Promotion Council (TEXPROCIL), Mumbai and Vidarbha Cotton Association, Nagpur was organized on May 16, 2024 at ICAR NBSS & LUP, Nagpur.



- National Seminar in Hindi:** A National Seminar (in hybrid mode) in Hindi on, "Bharat Mein Kapas Ki Chunayi Ke Yantrikaran Ko Safaltapurvak Apnane Ke Liye Chunaotiyaan Aur Ranneetiyan" [Challenges and Strategies for the Successful Adoption of Mechanization of Cotton Harvesting in India], was organized by CIRCOT at ICAR CIRCOT, Mumbai premises on September 27, 2024, jointly with the Indian Fibre Society (IFS). Four Technical sessions and one Poster session covering varied areas in connection to mechanization of cotton harvesting was conducted during the day-long seminar, attended by about 100 delegates.
- Skill Development Programme:** Ginning Training Centre (GTC), Nagpur of ICAR-CIRCOT, The Cotton Textiles Exports Promotion Council (TEXPROCIL) and Confederation of Indian Textile Industry (CITI)-Cotton Development and Research Association (CRDA) jointly organized a One day In-house Training Programme on "Best Cotton Picking & Post-Harvest Practices for

the Production of Kasturi Quality Cotton" on October 18, 2024 at the ICAR-NBSS & LUP Auditorium at Amravati Road, Nagpur. About 125 farmers, including 2 women attended the training program.



The Institute proudly enters its 101st year in 2025 with renewed vigour and commitment to continue its research and services for the benefit of the farmers and all its other stakeholders.

#### OTHER EVENTS:

**Round Table Discussion on Increasing Profitability in Maharashtra State through Improving Cotton Productivity and Quality Parameters:** ICAR-CIRCOT and Agrovision Foundation, Nagpur, in collaboration with the Indian Society for Cotton Improvement, (ISCI) Mumbai and ICAR-Central Institute for Cotton Research, Nagpur, organized a Round Table Discussion on 'Increasing Profitability in Maharashtra State through Improving Cotton Productivity and Quality Parameters' on May 28, 2024. About 35 distinguished stakeholders from the research organizations, cotton trade, and industry participated as a panelist.

Ms. Roop Rashi (IA&AS), Textile Commissioner, Govt. of India, Dr. K. Narsaiah, ADG, (PE) ICAR, New Delhi (in virtual mode), Dr. C.D. Mayee, Former Chairman, ASRB, President, ISCI and Advisor, Agrovision Foundation, Shri. Suresh Kotak, Chairman, TAG, Govt. of India, Dr. Y. G.

Prasad, Director, ICAR-CICR, Nagpur, Dr. S. R. Gadakh, Vice Chancellor, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Dr. S. Rajagopal, Executive Director, TEXPROCIL, Mumbai were some of the dignitaries who graced the occasion and gave their valuable inputs. The discussion aimed at developing practical strategies to boost farm income by enhancing cotton productivity and fibre quality parameters.



### Discussion during Agrovision Foundation Event

#### R-ABI Interaction Meeting:

- Interaction Meeting, between Knowledge Partner of CIRCOT R-ABI University of Agricultural Sciences, Dharwad, Karnataka and Startups of ICAR CIRCOT R-ABI, was held at the institute premises on July 09, 2024 to review the progress of the CIRCOT R-ABI project. Dr. P. L. Patil, the Vice Chancellor of UAS Dharwad, and a team comprising of Dr. S. S. Dolli, Professor & Head of the Department of Agricultural Extension and PI of R-ABI, Dharwad, Dr. Laxmi Tirapur, Manager of Marketing & Communication, and Dr. Suvinkumar, Manager of Finance & ICT of UAS Dharwad, visited CIRCOT R-ABI to review its progress and interacted with the CIRCOT team.

### Interaction Meet of Senior Management team from SLC Agricola, Brazil with ICAR CIRCOT team and other stakeholders

The senior management team comprising of the Mr. Aurelio Pavinato, CEO, Mr. Guilherme Heiden, Analyst, and Mr. Roberto Acauan, Chief Sales Officer of SLC, Agricola Brazil visited ICAR-CIRCOT on September 16, 2024, coordinated by Indian representative Mr. Sagar Kaushik, COO of UPL, Ltd. Stakeholders and industrialists such as Shri P. K. Agarwal, Former CMD, CCI, Dr. G. S. Nadiger, Research Advisor (SASMIRA) & Former Director of Laboratories (Textile Committee), Shri P. D. Mepani, from CAI, Shri Rishit Dholakia from Wakefield Inspection Service, Shri Nitesh Jangir, from Arvind Ltd., Bhopal and Shri Aniruddha Jain from M/s. Bajaj Steel Industries Ltd were also present. The CIRCOT team was led by the Director, Dr. S. K. Shukla and comprised of Heads of Division, Principal Scientists, Senior Scientists and Technical Officers.

Shri Luv Bajaj, MD, M/s Bajaj Steel Industries Ltd., Dr. M. K. Sharma, CEO & Whole time Director, M/s Bajaj Steel Industries Ltd., Nagpur and Shri Vineet Kumar Mohota, Director (Finance), Gimatex Industries Pvt. Ltd., Hinganghat, Nagpur attended the meeting in online mode.

The team also visited the Nanocellulose pilot plant and discussed about its special characteristics and various applications.





*Director, CIRCOT addressing SLC Agricola Team*



*SLC Agricola Team visiting the Nanocellulose Pilot Plant*

### **Tree Plantation Drive under Plant4Mother Campaign of GOI**

A Tree Plantation drive under “एक पेड़ मां के नाम” अभियान – “Plant4Mother” Campaign was organized at Ginning Training Centre (GTC), ICAR-CIRCOT, Nagpur on August 29, 2024. During the programme, the participants including trainees undergoing training at GTC, were also sensitized about importance of plants and trees in development of healthy environment.



*Ek Ped Maa Ke Naam Abhiyaan at GTC, Nagpur*

### **ICAR-CIRCOT hosts Foundation Day of Vivant Untamed Earth**

As an endeavour in its social outreach activity ICAR-CIRCOT hosted the Foundation Day of Vivant UntamedEarth, an organization actively working in the domain of conservation of Biodiversity, on May 25, 2024. Dr. Sanjeev Shevade, founder of Vivant UntamedEarth, explained about the organization's 6-year journey in conservation of biodiversity, through awareness and educational activities. The keynote address was by Shri Sanjay Patil, Chief Programme Executive - Agrobiodiversity at BAIF Development Research Foundation, titled, "Agrobiodiversity for Nutrition, Climate Change and Livelihood", which highlighted the importance of indigenous crops, traditional food systems, and future of millets.



The highlight was the exhibition which showcased over 250 varieties of indigenous crops, including rice, millets, sorghum, pulses, vegetables and native fruit varieties.

### International Yoga Day

The 10th International Yoga Day with the theme, "Yoga for Self and Society," highlighting the vital role of yoga in enhancing the well-being of self and society as a whole was celebrated at the institute on June 21, 2024. Team from Ambika Yoga Kutir (Ghatkopar branch) conducted a workshop about yoga practice. Director, CIRCOT led the staff members in this event.



*10th International Yoga Day, June 21, 2024*

### International Women's Day

The International Women's Day was celebrated in the Institute on March 08, 2024, on the theme, "Invest in women: Accelerate progress". The Director addressed the gathering and spoke about role of brave women in Indian history and about role of women in the freedom struggle of India. He also deliberated upon how women economic empowerment is vital to drive positive change and advancement in society, keeping in view the theme of the day for year 2024.



*Director addressing on International Women's Day, March 08, 2024*

### Hindi Workshop

Hindi workshop (in hybrid mode) on "Unicode Typing" was conducted on September 05, 2024, for all staff of the institute including regional stations.

### Hindi Chetna Maas and Hindi Pakhwada

The Hindi Chetana Maas was celebrated from September 01-30, 2024 and Hindi Pakhwada was from September 14-30, 2024 at Mumbai Headquarters.

The Hindi Saptah from September 14-20, 2024, was held at Ginning Training Centre, Nagpur.



Various activities, programmes, competitions were conducted as part of the Hindi Pakhwada.



*Hindi Pakhwada programmes at CIRCOT*



**Vigilance Awareness Campaign**

The institute conducted Vigilance Awareness week during October 28 to November 02, 2024. Staff members took the integrity pledge.



A lecture on the theme for the year 2024, “Culture of Integrity for Nation’s Prosperity”, was delivered by Shri Sudhir Dhanda, DSP on November 01, 2024.



**ISO Surveillance Audit**

- The Bureau of Indian Standards organized a two-day surveillance audit at the institute for the ISO 9001:2015 license on June 13-14, 2024, conducted by Dr. P.K. Kush, the auditor from BIS. The audit observed that the institute has satisfactorily implemented the ISO 9001:2015 standards, and therefore recommended the continuation of the license for another year.

## 11. Distinguished Visitors

### Visit of Padma Bhushan Dr. R. S. Paroda to GTC, Nagpur

Hon'ble Padma Bhushan Dr. R.S. Paroda, Former Secretary (DARE) and Director General (ICAR), visited Ginning Training Centre, Nagpur on April 1, 2024, accompanied by Dr. Y.G. Prasad, Director, ICAR-CICR, Nagpur and Dr. N.G. Patil, Director, ICAR-NBSS & LUP, Nagpur.



*Padma Bhushan Dr. R. S. Paroda being welcomed by Dr. S. K. Shukla, Director, CIRCOT*

Dr. Paroda & other dignitaries were shown the facilities at GTC, Nagpur and briefed about the research happening at the centre.



*The dignitaries visiting the laboratory at GTC*

Dr. Paroda also chaired a Brain storming session on topic 'Cotton production & processing technologies in Viksit Bharat @2047', held at Nagpur.

### Visit of Dr. Tejaswi Naik, IAS, Ministry for Agriculture & Farmers Welfare, GOI

Dr. Tejaswi S Naik, IAS, Private Secretary to the Hon'ble Minister for Agriculture & Farmers Welfare, Government of India, visited Mumbai HQs, Mumbai on February 17, 2024. He was presented an overview of the progress in research, technology licensing, training, incubation, and consultancy activities at the Institute, by the Director, Dr. S. K. Shukla.

Dr. Naik then visited various laboratories in the institute and emphasized the necessity to establish collaborative research with national and international organizations and secure project funding from external agencies. He also spoke about importance of adopting advanced technologies for the benefit of the farming community and emphasized the need to focus on strategies to increase revenue for self-sustainability.



*Visit of Dr. Tejaswi Naik to ICAR-CIRCOT on 17-02-2024*



**Visit of Dr. Himanshu Pathak, DG, ICAR to Guntur centre of ICAR-CIRCOT**

Dr. Himanshu Pathak, Secretary (DARE) and D.G., ICAR visited the Regional Quality Evaluation Unit of ICAR-CIRCOT at Guntur, Andhra Pradesh on June 20, 2024.

Other dignitaries present were Dr. M. Sheshu Madhav, Director, ICAR-Central Tobacco Research Institute, Rajahmundry, Andhra Pradesh; Dr. P V Satyanarayana, Director, Research, ANGRAU, Guntur and Dr. NVVS Durgaprasad, Associate Director Research, ANGRAU and Dr. S. K. Shukla, Director, ICAR-CIRCOT, Mumbai.



*Dr. Pathak, DG ICAR with the Staff of ICAR-CIRCOT, LAM Farm and ANGRAU, Guntur*

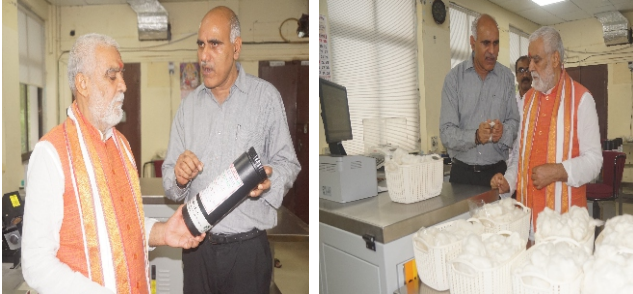


**Visit of Shri Ashwini Kumar Choubey, Hon'ble Former Union Minister of State**

On August 01, 2024, ICAR-CIRCOT hosted the visit of Shri Ashwini Kumar Choubey, Hon'ble Former Union Minister of State in the 17th Lok Sabha.

Shri Choubey visited all laboratories at CIRCOT and took a keen interest in the R&D activities at the institute.





*Hon'ble Former Minister Shri Ashwini Choubeyji visit to ICAR-CIRCOT*

Dr. Gedam was briefed about the R&D activities at GTC, awareness programmes for farmers, on best post-harvest management practices for clean cotton production, branding of Indian Cotton as “Kasturi Cotton Bharat” etc. Dr. Gedam appreciated the efforts taken by the centre. The team visited the demonstration plants at GTC viz. DR Ginning Plant, Particle Board Plant and Fibre Testing Laboratory.



*Dr. Praveen Gedam and team at GTC, Nagpur*

**Visit of Dr. Praveen Gedam, Hon'ble Agricultural Commissioner, Govt. of Maharashtra.**

Dr. Praveen Gedam, Hon'ble Agricultural Commissioner, Govt. of Maharashtra along with field officers of the Department of Agriculture, Government of Maharashtra visited Ginning Training Centre (GTC), of ICAR-CIRCOT, Nagpur on May 22, 2024.



## 12. Swachh Bharat Abhiyan 4.0

The institute implemented two major activities as directed by the Council/Ministry under the Swachh Bharat Abhiyan, viz., Swachhta Hi Sewa (with the theme of 'Swabhav Swachhata - Sanskaar Swachhata' (स्वभाव स्वच्छता - संस्कार स्वच्छता) from September 15 to October 01, 2024, culminating in the Swachh Bharat Diwas celebration on October 02, 2024.

The Swachhta Pakhawada was organized during December 16-31, 2024, with various activities conducted at Mumbai Headquarters and regional centres. Besides these, other Swachhata programmes were conducted during which old

physical files were identified, digitised and then weeded out and space was freed.

The institute also conducted cleanliness drive activities on daily basis including cleaning of offices and surrounding premises, cleanliness and sanitation drive in the village adopted under the Mera Gaon Mera Gaurav Programme, composting of kitchen and home waste materials, promoting clean & green technologies, cleaning of public places, nearby gardens and religious places, walkathons, street plays, preventive health checkups for Safai Mitras, felicitation of 'Safai Mitra' and expressed gratitude to them.

### Photo Gallery of Swachh Bharat Abhiyan 4.0 in 2024



*Swachha Bharat Abhiyan 4.0*



*Swachhata Shapath by staff*



*Tree plantation under Ek Ped Maa Ke Naam Abhiyan at GTC, Nagpur and Sirsa QEU Unit on 16-09-2024*



*Nukkad Natak and Swachhata Shapath on 18-09-2024*



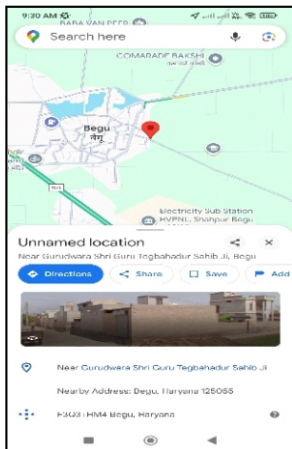
*Community engagement –waste into art on 19-09-2024*



*Human Chain on 20-09-2024*



*Cleanliness drive at GTC, Nagpur and QEUs at Sirsa and Guntur on 21-09-2024*



*Identifying difficult and dirty spots for cleaning and its transformation*



*Integrate citizens with Swachhata and local art*



*Preventive Health Checkup for Safai Mitras and their families*



*Distribution of PPE Kits to Safai Mitras*



*Registration of Safai Mitras for social welfare schemes*



*On 30-09-2024, Hon'ble Minister of textiles planted a sapling under Ek Ped Maa ke Naam*



*School children carrying out cleaning at religious places*



*Campaign on cleaning of sewer lines and drainage at Haryana village*



*Generation of compost from kitchen waste campaign*



*Farmers Day at GTC Nagpur*

# 13. Infrastructural Facilities

ICAR-CIRCOT is recognised as *Referral Laboratory* for cotton fibres and is an NABL accredited Laboratory for Mechanical and Chemical test. The Institute is equipped with state-of-the-art facilities for conducting research in post-harvest processing of cotton & allied fibres and value addition to crop residues and also provide commercial services to the stakeholders.

**New Facilities created in the institute during the current year**



*DR gin (Tejas)*



*Wet Opener*



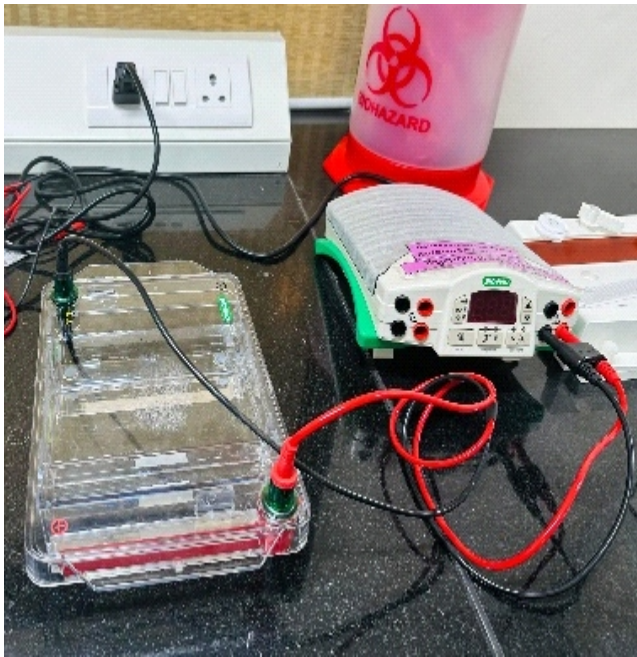
*Digital fineness meter for multifibre*



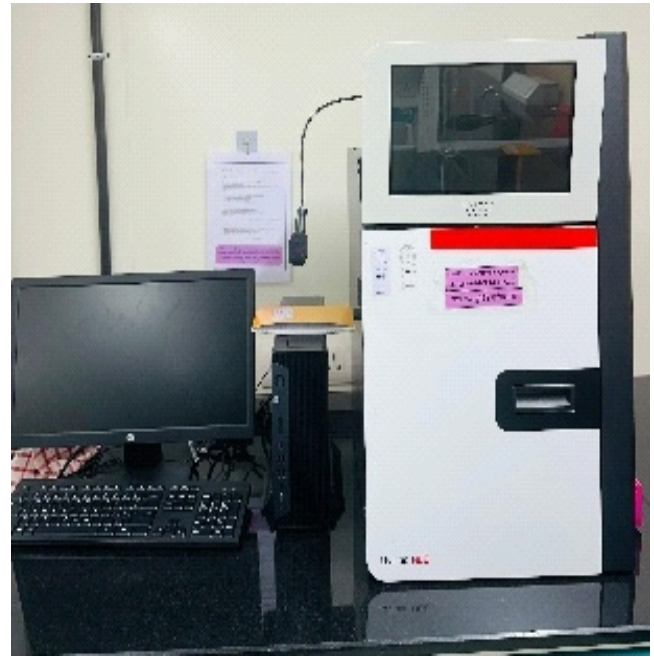
*Cottonseed Meal Protein Extraction Pilot Plant*



*UV – Visible Spectrophotometer*



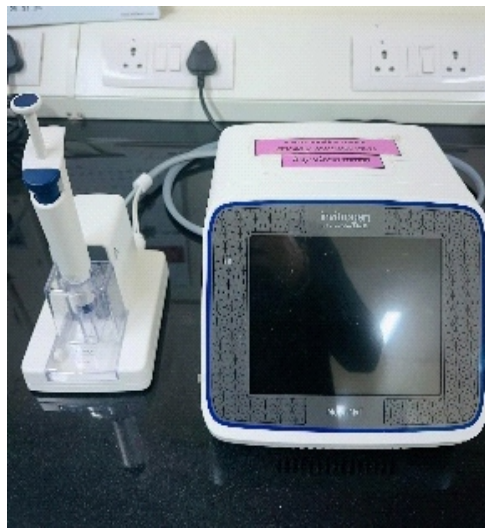
*Agarose gel electrophoresis*



*The Gel Documentation (Gel Doc) System*



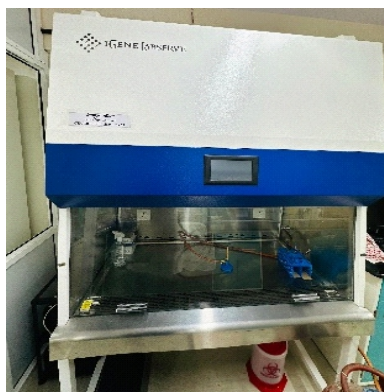
*Thermal cycler*



*Electroporator*



*Centrifuge*



*Biosafety cabinet*



*Steam sterilizer*



*Cone Winding machine with EYC, splicing and fault classification*

## Annexure I

**LIST OF ONGOING RESEARCH PROJECTS**

Pr. Code	Title	Investigators	Duration
<b>Core Area I: Pre-ginning And Ginning</b>			
MP 101	Evaluation, Optimization and Standardization of Different types of lint cleaners used in Gineries	Dr. Varsha Satankar (PI) Dr. S.K. Shukla Dr. S.V. Ghadge Dr. K. Pandiyan	2022-24 extended till 2025
MP 104	Development of Standard Protocol for determination of ginning percentage of seed cotton	Dr. Sharmila Patil (PI) Dr. V.G. Arude Dr. Kirti Jalgaonkar Dr. Varsha Satankar	2023-25
MP 105	Assessment of processing losses in Indian Cotton Ginning Industries	Dr. Manoj Kumar Mahawar (PI) Dr. V.G. Arude Dr. Sheshrao Kautkar Dr. C. Sundaramoorthy Dr. Jyoti Dhakane-Lad	2023-25
MP 106	Refinement of conveying and heating system of cottonseed dryer	Dr. Varsha Satankar (PI) Dr. S. K. Shukla Dr. K. Pandiyan Dr. S. V. Ghadge	2024-26
1014419 (CRP- CIRCOT-10)	Design & Development of High-Capacity Double Roller Gin to Enhance Ginning Efficiency	Dr. V.G. Arude (PI) Dr. S.K. Shukla Dr. Kirti Jalgaonkar Dr. Varsha Satankar	2023-26 * Project discontinued in October 2024. Project activity continued in new DST funded Project
CRG/2023/ 003974 (DST)	Design & Development of High-Capacity Double Roller Gin to Enhance Ginning Efficiency	Dr. V.G. Arude (PI) Dr. S.K. Shukla Dr. Kirti Jalgaonkar Dr. Varsha Satankar	2024-27
1014417 (CRP- CIRCOT-11)	Development & Evaluation of Pre-grooved Chrome Leather Roller and Automatic Deep- cut-grooving Machine for Double Roller Gin	Dr. Sheshrao Kautkar (PI) Dr. S.K. Shukla Dr. V.G. Arude	2023-25
II.07	Assessment of field performance and effectiveness of hand-held mechanical cotton picker [ICAR-CICR, Nagpur; ICAR-CIAE, Bhopal]	Dr. V.G. Arude (PI) Dr. S.K. Shukla Dr. P.S. Deshmukh Dr. Varsha Satankar	2022-24

Pr. Code	Title	Investigators	Duration
<b>Core Area II : Mechanical Processing, Technical Textiles And Composites</b>			
MP 99	Development of cut-resistant fabric using 3D weaving	Dr. Krishna Prasad (PI) Dr. T. Senthilkumar Dr. A.S.M. Raja	2021-24
MP 102	Evaluation of Electrospun nanofibre-based multi nutrient sachet for high-value crops	Dr. G.T.V. Prabu (PI) Dr. N. Shanmugam Dr. Kanika Sharma Dr. Sujata Saxena Dr. Manoj Kumar Mahawar	2023-26
MP 107	Evaluation and Improvement of Heat Generating Smart Textile Products	Dr. P. Jagajanantha (PI) Dr. A.S.M. Raja Dr. Krishna Prasad Dr. Sharmila Patil Dr. Sheshrao Kautkar	2024-25
II 04	Development of eco-friendly fruit protection bags for quality enhancement [ICAR-NRC for Grapes, Pune]	Dr. Jyoti Dhakane- Lad (PI) Dr. Manoj Kumar Mahawar Dr. P. Jagajanantha Dr. Kirti Jalgaonkar Dr. A.K. Bharimalla Dr. Ajinath Dukare	2021-23 extended till 2024
II 05	Development of bio nano composite films using extrusion process [CIPET:SARP-LARPM, Bhubaneswar]	Dr. Sharmila Patil (PI) Dr. A.K. Bharimalla Dr. Kirti Jalgaonkar Dr. Manoj Kumar Mahawar Dr. Jyoti Dahkane-Lad Dr. A.S.M. Raja Dr. Sujata Saxena Dr. Ajinath Dukare	2022-24
II 09	Development of nanofiber and Bio composite utilizing fish waste resources under circular economy [Collaborative Proposal from NBFGR]	Dr. G.T.V. Prabu (PI) Dr. T. Senthil Kumar	2024-26
1013337 (CRP NINFET 07)	Development of Building Materials using Natural fibres and other fibrous crop residues (CIRCOT Centre)	Dr. Krishna Prasad (PI) Dr. T. Senthilkumar Dr. Kirti Jalgaonkar Dr. Ajinath Dukare	2021-24
1014416 (CRP- CIRCOT 12)	Optimization of spinning process parameters for Cotton/Hemp blends and develop value added products	Dr. T. Senthilkumar (PI) Dr. N. Shanmugam Dr. A.S.M. Raja	2023-25

Pr. Code	Title	Investigators	Duration
NASF 1014584	Development of Smart Foods, bio-composites, green packaging and bio-energy from agro biomass	Dr. A. Arputhraj (PI) Dr. A.S.M. Raja Dr. N. Vigneshwaran Dr. T. Senthilkumar Dr. Sharmila Patil	2023-27
NTTM 1015052	Development of High Performance Woven Protective Gloves and seamless knitted gloves for Industrial uses	Dr. G. Krishana Prasad (PI) Dr. N. Shanmugam Dr. A.S.M. Raja	2024-26
Pr. Code	Title	Investigators	Duration
<b>Core Area III: Characterisation Of Cotton And Other Natural Fibres, Yarns And Textiles</b>			
1013896 A1	All India Coordinated Research Project on Cotton (Quality Research)	Dr. A.S.M. Raja (PI) Dr. A. Arputhraj Dr. P. Jagajanantha Dr. G.T.V. Prabu	2021-26
QE 113	Development of AI based prediction model for yarn quality characteristics	Dr. N. Shanmugam (PI) Dr. D.M. Kadam Dr. P. Jagajanantha Dr. G.T.V. Prabu Dr. Himanshushekhar Chaurasia	2022-25
QE 114	Development of viscose-based marker fibre for the traceability of cotton	Dr. A. Arputhraj (PI) Dr. A.S.M. Raja Dr. N. Vigneshwaran Dr. G.T.V. Prabu	2023-25
QE 115	Development of Portable instrument to measure the colour grade of cotton	Dr. P. Jagajanantha (PI) Dr. A.S.M. Raja Dr. Kirti Jalgaonkar Dr. Jyoti Dhakane-Lad Dr. Pandiselvam	2023-25
QE 116	Process protocol for ICAR-CIRCOT calibration cotton for standard reference material certification	Dr. Kirti Jalgaonkar (PI) Dr. A. S. Raja Dr. Sharmila Patil Dr. N. Shanmugam Dr. Krishna Prasad Dr. Sundaramoorthy	2024-27
QE 117	Development of Image based trash measuring device using artificial intelligence	Dr. Himanshu Chaurasia (PI) Dr. N. Shanmugam Dr. T. Senthilkumar	2024-27

Pr. Code	Title	Investigators	Duration
<b>Core Area IV: Chemical And Biochemical Processing And Biomass &amp; By-product Utilisation</b>			
CH 102	Isolation of Gossypol from cottonseed and its evaluation as a botanical fungicide	Dr. Kanika Sharma (PI) Dr. Manoj Kumar Puniya Dr. N. Vigneshwaran Dr. Ajinath Dukare Dr. Sujata Saxena Dr. K. Pandiyan	2022-24
CH 104	Effects of process parameters on cottonseed oil extraction	Dr. Jyoti Dhakane Lad (PI) Dr. Kirti Jalgaonkar Dr. Kanika Sharma Dr. Sujata Saxena	2023-25
CH 105	Evaluation of cottonseed hull for production of furfural	Dr. Manoj Kumar Puniya (PI) Dr. Kanika Sharma Dr. Sujata Saxena Dr. Ajinath Dukare	2023-25
CH 106	Development of Microbial enzyme-mediated delinting process from cottonseeds	Dr. K. Pandiyan (PI) Dr. Ajinath Dukare Dr. Sheshrao Kautkar Dr. A.S.M. Raja	2023-25
II.02	Efficacy Evaluation of ICAR-CIRCOT Nano-Zno as nano fertilizer in field crops [IIPR, Kanpur & IIHR, Bengaluru].	Dr. N. Vigneshwaran (PI) Dr. A.K. Bharimalla Dr. A. Arputhraj	2021-24
II.06	Efficacy evaluation of ICAR-CIRCOT Nano-Sulphur as fertilizer formulation for different field crops [ICAR-IISS, Bhopal, ICAR-NRC for Grapes, Pune, MPKV, Rahuri, VNMKV, Parbhani]	Dr. Manoj Mahawar (PI) Dr. A.K. Bharimalla Dr. N Vigneshwaran Dr. A. Arputhraj Dr. Jyoti Dhakane-Lad Dr. A.S.M. Raja Dr. Sujata Saxena	2021-24
II.10	Microbial electrolysis cell (MEC) for efficient production of hydrogen gas from cotton biomass	Dr. N. Vigneshwaran (PI) Dr. A. Arputhraj Dr. Ajinath Dukare Dr. Kanika Sharma Dr. A.K. Bharimalla Dr. P. Jagajanantha Dr. K. Pandiyan	2024-27

Pr. Code	Title	Investigators	Duration
II.11	Development of antimicrobial cotton textile for post-harvest packaging and handling of flowers	Dr. Ajinath Dukare (PI) Dr. N. Vigneshwaran Dr. A. Arputharaj Dr. Jyoti Dhakane-Lad Dr. Kanika Sharma	2024-25
DST-TDP) 1012858	Design and Development of Pilot Plant for Extraction of Protein from Deoiled Cotton Cake and Value Addition/by-product Utilization	Dr. D. M. Kadam (PI) Dr. V.G.Arude Dr. Manoj Kumar Puniya	2021-24
1013645 TPP	Characterization and utilization of paddy straw and other agro residues for conversion into pellets for co-firing in thermal power plants (TPP) (National Biomass Mission of Ministry of Power)	Dr. Sujata Saxena (PI) Dr. S.K. Shukla Dr. A.S.M. Raja Dr. A. Arputhraj Dr. T. Senthilkumar Dr. K. Pandiyan Dr. Varsha Satankar	2021-25
CRP- TNAU-02	Bioprocessing of Natural Fibres and Agro residues for production of Oligo-saccharides and lignin-derived aromatics	Dr. A.S.M. Raja (CCPI) Dr. K. Pandiyan	2021-25
ICAR- Genomic Research	Engineering microbial factories for enhanced xylitol production from cotton lignocellulosic biomass using CRISPR/Cas9 technology	Dr. Manoj Kumar Puniya Dr. Kanika Sharma Dr. Ajinath Dukare Dr. K. Pandian	2023-26
TXD 0125	Development and Validation of test method for determination of index ingredient from plant based indigo and textile dyed with plant-based indigo by using Carbon C-14 analysis	Dr. Sujata Saxena	2024-25
<b>Core Area V: Entrepreneurship And Human Resources Development</b>			
TT.12	Impact assessment of CIRCOT technologies	Dr. C. Sundaramoorthy (PI) Dr. A.K. Bharimalla Dr. Himanshushekhhar Chaurasia	2020-25

Pr. Code	Title	Investigators	Duration
TT.13	Study on Utilization of Green Cotton Biomass for Production of Silage as Livestock Feed	Dr. Sheshrao Kautkar (PI) Dr. Ajinath Dukare Dr. A.K. Bharimalla Dr. Varsha Satankar Dr. K. Pandiyan	2022-24
TT.14	Development of project profile, data bank and entrepreneurship in cotton processing	Dr. D.M. Kadam (PI) Dr. N. Shanmugam Dr. P.S. Deshmukh Dr. C. Sundaramoorthy Dr. A.S.M. Raja Dr. G.T.V. Prabu	2023-25
TT.15	Assessing the stakeholders perception on traceability in cotton value chain	Dr. C. Sundaramoorthy Dr. A. Arputharaj Dr. Himanshushekhar Chaurasia	2024-25
1007815 (NAIF)	Agri-Business Incubation Centre at ICAR-CIRCOT, Mumbai	Dr. A.K. Bharimalla (PI) Dr. C. Sundaramoorthy Dr. K. Pandiyan Dr. Sharmila Patil Dr. Krishana Prasad Dr. Jyoti Dhakane-Lad Dr. Manoj Mahawar Dr. Kirti Jalgaonkar Dr. Sheshrao Kautkar Dr. Ajinath Dukare	2019-26
1011105 (DA& FW)	Remunerative Approaches for Agriculture and Allied Sectors Rejuvenation (RAFTAAR) Agri Business Incubator (R-ABI)	Dr. A.K. Bharimalla (PI) Dr. P.S. Deshmukh Dr. C. Sundaramoorthy Dr. Sharmila Patil Dr. Sheshrao Kautkar Dr. Jyoti Dhakane-Lad Dr. Krishna Prasad Dr. Manoj Mahawar Dr. Kirti Jalgaonkar Dr. Ajinath Dukare Dr. K. Pandiyan	2019-26
1014502	CCI-CICR Pilot Project on Awareness and Extension Services on Best Farm Practices for Cotton Farmers to Improve Quality, Yield and Sustainability	Dr. V.G. Arude Dr. K. Pandiyan Dr. Varsha Satankar	2023-24

*Annexure II***PERSONNEL**

(As on December 31, 2024)

**DIRECTOR****Dr. S. K. Shukla**

M. Tech., Ph.D. (Agricultural Process Engineering)

**SCIENTIFIC STAFF HQ, MUMBAI****HEAD OF DIVISION**

- |   |  |
|---|--|
| 1. Dr. (Smt.) Sujata Saxena, M.Sc., Ph.D.<br>(Organic Chemistry) Chemical and<br>Biochemical Processing Division (CBPD)               | 3. Dr. N. Shanmugam, M. Tech., MIE, D.TT.,<br>Ph.D. (Textile Manufacture & Technology)<br>Mechanical Processing Division (MPD) |
| 2. Dr. Dattatreya M. Kadam, M. Tech, Ph.D<br>(Agricultural Process Engineering)<br>Engineering Technology Transfer Division<br>(ETTD) | 4. Dr. A. S. M. Raja, M. Sc., Ph.D.<br>(Textile Chemistry) Quality Evaluation and<br>Improvement Division (QEID)               |

**PRINCIPAL SCIENTIST**

- |   |  |
|---|--|
| 1. Dr. P. G. Patil, M. Tech. (P.H.E.),<br>Ph.D. (Engg.), F.T.A., FISAE., FIE<br>(on deputation as VC, MPKV, Rahuri) | 4. Dr. C. Sundaramoorthy, M.Sc., Ph.D.<br>(Agricultural Economics) |
| 2. Dr. N. Vigneshwaran, M.Sc.(Agri.)<br>M.B.A., Ph.D. (Agricultural Microbiology)                                   | 5. Dr. A. K. Bharimalla, M. Tech., Ph.D.<br>(Composite)            |
| 3. Dr. P. S. Deshmukh, M. Tech., Ph.D.,<br>LL.B., FIE. (Farm Machinery & Power)                                     | 6. Dr. V. G. Arude, M. Tech. Ph.D.<br>(Farm Machinery & Power)     |

### SENIOR SCIENTIST

1. Dr. Jyoti M. Nath, M.Sc., Ph.D. (Electronics & Instrumentation) (Scientist Resigned)
2. Dr. A. Arputharaj, M.Sc., M. Tech., Ph.D. (Textile Chemistry)
3. Dr. T. Senthilkumar, M. Tech., Ph.D. (Textile Manufacture)
4. Dr. G.T.V. Prabu, M.Tech.,M.B.A., Ph.D (Textile Manufacture)
5. Dr. G. Krishna Prasad, M. Tech., Ph.D. (Textile Manufacture)
6. Dr. Jalgaonkar Kirti Ramesh, M.Sc. (PHT), Ph.D., (Agricultural Structures and Process Engineering)
7. Dr. Manoj Kumar Mahawar, M.Tech. Ph.D. (Agricultural Structures and Process Engineering)
8. Dr. P. Jagajanantha, M. Tech., Ph.D. (Textile Chemistry)

### SCIENTIST

1. Dr. Dukare Ajinath Sridhar, M.Sc., PhD (Agricultural Microbiology)
2. Dr. R. Pandiselvam, M.Sc., PhD (Agricultural Structures & Process Engineering)
3. Dr. Kautkar Sheshrao Sakharam, M.Sc. Ph.D. (Agricultural Structures and Process Engineering)
4. Dr. Sharmila Patil, M.Sc. (P.H.T.), Ph.D. (Agricultural Process Engineering)
5. Dr. Manoj Kumar, M.Sc., Ph.D.(Plant Biochemistry)
6. Dr. Jyoti Dhakane- Lad, M. Tech., Ph.D. (Agricultural Process Engineering)
7. Dr. Kanika Sharma, M.Sc., Ph.D, (Plant Biochemistry)
8. Dr. Himanshushekhar Chaurasia, M.Sc., Ph.D. (Computer Application & IT)

### GTC, NAGPUR

#### OFFICER-IN-CHARGE

Dr. K. Pandiyan, Senior Scientist  
M.Sc. Ph.D. (Agricultural Microbiology)

#### PRINCIPAL SCIENTIST

1. Dr. S. V. Ghadge, M.E. (Ag.) M.B.A., Ph.D. (Farm Machinery & Power)

#### SENIOR SCIENTIST

1. Dr. (Ms.) Varsha Satankar, M.Tech. Ph.D (Agricultural Structures and Process Engineering)

## TECHNICAL STAFF

### HQ, MUMBAI

#### CHIEF TECHNICAL OFFICER

- |  |  |
|--|--|
| 1. Dr. (Smt.) Sheela Raj, M.Sc., Ph.D.   | 5. Shri R. R. Chhagani, M.Sc.                        |
| 2. Shri R. S. Prabhudesai, M.Sc., D.C.M. | 6. Dr. (Smt.) S. R. Kawlekar, M.Sc., P.I.M.R., Ph.D. |
| 3. Shri S. Banerjee, M.Sc.               | 7. Smt. P. S. Nirhali, M.Sc.                         |
| 4. Shri B. R. Pawar, M. Sc., LL.M.       | 8. Shri S. V. Kokane, M.A.                           |
|  | 9. Er. Chandrika Ram, M. Tech. (APFE)                |

#### ASSISTANT CHIEF TECHNICAL OFFICER

- |   |                                     |
|---|-------------------------------------|
| 1. Shri R. S. Narkar, M.Sc., D.C.I.A.     | 3. Smt. P. R. Mhatre, B.Sc., M.Lib. |
| 2. Dr. (Ms.) C. P. D' Souza, M.Sc., Ph.D. |                                     |

#### SENIOR TECHNICAL OFFICER

- |                                |                                   |
|--------------------------------|-----------------------------------|
| 1. Smt. Binu Sunil, M.Sc.      | 4. Dr. N. D. Kambli, M.Sc. Ph. D. |
| 2. Smt. Bindu Venugopal, M.Sc. | 5. Shri R. P. Kadam, M.Sc.        |
| 3. Shri M. G. Ambare, M.Sc.    |                                   |

#### TECHNICAL OFFICER

- |  |                                       |
|--|---------------------------------------|
| 1. Shri S. N. Patil, B.E. (Civil)                          | 4. Smt. M. P. Kamble, B.A., M. Lib.   |
| 2. Shri D. M. Correia, I.T.I., N.C.T.V.T.<br>(Mechanic)    | 5. Shri A. R. Jadhav, M.Sc. (Physics) |
| 3. Smt. H. R. Pednekar, M.A. (Economics),<br>M.Lib & I.Sc. | 6. Shri D. A. Salaskar, Driver        |

#### SENIOR TECHNICAL ASSISTANT

- |                              |  |
|------------------------------|--|
| 1. Shri S. V. Kokane, Driver | 2. Shri P. G. Gavhale, B.Sc. (Agri.), Dip. Agrl. Sci |
|------------------------------|--|

#### TECHNICAL ASSISTANT

- |                                       |                      |
|---------------------------------------|----------------------|
| 1. Shri S. K. Parab, Cert. Cot. Spin. | 3. Shri S. G. Phalke |
| 2. Shri M. M. Kadam                   | 4. Shri Mukesh Onkar |

**SENIOR TECHNICIAN**

1. Shri Yogesh Nagpure

**TECHNICIAN**

1. Kum. Nevali S. Pathare
2. Shri P. P. Patil
3. Shri D. G. Gole
4. Shri V. Murugan

**TECHNICAL TRAINEE**

1. Shri Sandeepkumar Yadav
2. Shri Abhishek Awasthi
3. Shri Vishal Malav
4. Shri Rameshwar Jakhar
5. Shri Amar Verma
6. Shri Bipin Kumar

**GTC, NAGPUR****CHIEF TECHNICAL OFFICER**

1. Er. D. U. Patil, B. Tech. (Agril. Engg.)
2. Shri U. D. Devikar, M.Sc.
3. Shri S. N. Hedau, B.Sc.

**TECHNICAL OFFICER**

1. Shri Anil Kumar Kulsange
2. Smt. Rohini T. Khobragade

**SENIOR TECHNICAL ASSISTANT**

1. Shri P. P. Thakur, B. Tech. (Agril. Engg.)

**TECHNICAL TRAINEE**

1. Shri Snehal Gajanan Lonare
2. Shri Ronal Tarachand Gajbhiye
3. Shri Amit Kumar

## QE UNIT, COIMBATORE

1. Shri K. Thiagarajan, M.Sc.,  
Chief Technical Officer
2. Shri M. Bhaskar, Dip. Ref. & Air-Cond.,  
Senior Technical Officer
3. Shri Sahil Acharekar, Technician

## QE UNIT, DHARWAD

1. Smt. V. G. Udikeri, M.Sc.,  
Sr. Technical Officer
2. Shri A. F. Gudadur, Technician

## QE UNIT, GUNTUR

1. Shri Bhaskara Rao Vazragiri ,  
Technical Assistant
2. Shri Sohel N. Shaikh, Technician

## QE UNIT, SIRSA

1. Dr. Hamid Hasan, M.Sc., Ph.D.,  
Chief Technical Officer
2. Shri Sunil Kumar, Technical Assistant
2. Shri Umrao Meena, Senior Technician

## QE UNIT, SURAT

1. Shri D. J. Dhodiya, Senior Technician
2. Shri M.G. Sosa, Technician

**ADMINISTRATIVE STAFF**  
**HQ, MUMBAI**

**SENIOR ADMINISTRATIVE OFFICER**

Shri Navin Kumar

**ADMINISTRATIVE OFFICER**

Smt. T. P. Mokal, M.A. (Hindi)

**FINANCE & ACCOUNTS OFFICER**

Shri Sumit Saurabh

**ASSISTANT FINANCE & ACCOUNTS OFFICER**

Shri Sainath Sahane

**ASSISTANT**

1. Smt. S. P. Paiyala
2. Shri T. D. Dhamange, B.Com.
3. Shri S. N. Bandre
5. Shri Siddhesh S. Divekar
6. Shri Md Aadil

**LOWER DIVISION CLERK**

1. Shri D. K. Kasar
2. Shri S. M. Chandanshive
3. Shri Thapa Gorkha Bahadur Ovilal

**PERSONAL ASSISTANT**

1. Smt. R. R. Tawde, B.Com
2. Smt. V. R. Naik, B.A

**GTC, NAGPUR**

**LOWER DIVISION CLERK:** Shri R. G. Matel

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

## SKILLED SUPPORT STAFF

### HQ, MUMBAI

1. Shri H. B. Vesmiya
2. Shri S. B. Worlikar
3. Shri M. K. Prabhulkar
4. Shri J. D. Sakpal
5. Shri S. D. Magar
6. Shri Sunil R. Tondse
7. Shri V. B. Poojari
8. Shri S. P. Naik
9. Shri M. N. Kamble
10. Shri Suhas R. Tondse
11. Shri S. S. Surkule
12. Smt. Kamala Murugan
13. Shri D. R. Gawade
14. Shri P. E. Gurav
15. Shri Mahesh C. Solanki

### GTC, NAGPUR

1. Shri R. S. Umare
2. Smt. M. M. Bhandakkar

### QE UNIT, COIMBATORE

1. Shri V. Subbaiah

**NEW JOINING**

Sr. No.	Name of Employee	Designation	Date of Joining
1.	Shri Sandeepkumar Yadav	Technical Trainee	19.04.2024
2.	Shri Sumit Saurabh	F&AO	22.04.2024
3.	Shri Snehal Gajanan Lonare	Technical Trainee (at GTC, Nagpur)	25.04.2024
4.	Shri Abhishek Awasthi	Technical Trainee	29.04.2024
5.	Shri Vishal Malav	Technical Trainee	29.04.2024
6.	Shri Rameshwar Jakhar	Technical Trainee	29.04.2024
7.	Shri Ronal Tarachand Gajbhiye	Technical Trainee (at GTC, Nagpur)	29.04.2024
8.	Shri Amar Verma	Technical trainee	30.04.2024
9.	Shri Amit Kumar	Technical trainee (at GTC, Nagpur)	02.05.2024
10.	Shri Bipin Kumar	Technical Trainee	08.05.2024
11.	Shri Sainath Sahane	Asst. F&AO	22.08.2024
12.	Shri Siddhesh S. Divekar	Assistant	27.09.2024
13.	Shri Md Aadil	Assistant	30.10.2024

**ASSESSMENT PROMOTIONS/DEPARTMENTAL PROMOTIONS**

Sr. No.	Name of Employee	Designation	Effective Date of Promotion
1.	Dr. T. Senthilkumar	Senior Scientist (Level 13A, RGP 9000)	15.09.2023
2.	Dr. Varsha Satankar	Senior Scientist (Level 12, RGP 8000)	01.01.2024
3.	Dr. Kanika Sharma	Scientist (Level 11, RGP 7000)	07.01.2024
4.	Shri Rajesh Kadam	Senior Technical Officer	20.06.2024
5.	Shri Mahavir Singh	Technical Officer	25.09.2023
6.	Shri P.G. Gawhale	Senior Technical Assistant	25.07.2023
7.	Shri D.A. Salaskar	Technical Officer	07.11.2023
8.	Shri P.P. Thakur	Senior Technical Assistant	05.07.2023
9.	Shri S.N. Hedau	Chief Technical Officer	23.03.2024
10.	Er. Chandrika Ram	Chief Technical Officer	28.02.2023
11.	Shri R.G. Dhakate	Asst. Chief Technical Officer	01.01.2024
12.	Shri S.V. Kokane	Chief Technical Officer	01.01.2023

### SUPERANNUATION

Sr. No.	Name of Employee	Designation	Date of Superannuation/Retirement
1.	Smt. Sujatha Koshy	S.A.O	31.01.2024
2.	Shri D.U. Kamble	A.C.T.O	31.03.2024
3.	Shri M.J. Sumra	S.S.S	31.03.2024
4.	Shri A.F. Gudadur	Technician	31.03.2024
5.	Shri C.V. Shivgan	T.O	30.04.2024
6.	Shri Kanti T. Mahida	S.S.S	30.04.2024
7.	Shri R.P. Karkate	S.S.S	31.05.2024
8.	Smt. U.N. Bhandari	P.A	30.06.2024
9.	Shri Santosh K. Bobate	S.S.S	31.07.2024
10.	Smt. V.N. Walzade	U.D.C	31.07.2024
11.	Shri Mahavir Singh	T.O	31.08.2024
12.	Shri R. G. Dhakate	C.T.O	31.08.2024
13.	Smt. J.R. Chavkute	Assistant	30.11.2024

### TRANSFER

Sr. No.	Name of Employee	Designation	Transfer From	Date of Joining
1.	Dr. R. Pandiselvam	Scientist	ICAR-CPCRI, Kasargod To ICAR-CIRCOT, Mumbai	04.04.2024
2	Smt. Rohini T. Khobragade	T.O	ICAR-VPKAS, Almora To ICAR-CIRCOT, GTC, Nagpur	23.04.2024
3..	Shri Mukesh Onkar	T.A	ICAR-NDRI, Karnal To ICAR-CIRCOT, Mumbai	23.04.2024

**TRANSFER**

Sr. No.	Name of Employee	Designation	Transfer From	Date of Joining
4.	Shri Bhaskara Rao Vazragiri	T.A	ICAR-CIFA, Bhubaneshwar To ICAR-CIRCOT, QEU, Guntur	30.04.2024
5	Shri Sunil Kumar	T.A	ICAR-CSWRI, Avikanagar To ICAR-CIRCOT, QEU, Sirsa	15.06.2024

**VOLUNTARY RETIREMENT**

Sr. No.	Name of Employee	Designation	Voluntary Retirement
1.	Shri P.N. Sahane	C.T.O	22.04.2024

**RESIGNATION**

Sr. No.	Name of Employee	Designation	Date of Resignation
1.	Miss. Himani Parmar Singh	Assistant	21.11.2024

**OBITUARY**

1. Smt. Bharti Kherodkar, Assistant expired on 15-07-2024 [In service]
2. Dr. S. Sreenivasan, Former Director expired on 04-11-2024 [Retired]
3. Shri G. G. Ambare, Technical Assistant T-2 expired on 11-12-2024 [Retired]

## Annexure III

## LIST OF COMMITTEES

**Institute Management Committee (IMC)**

Dr. S. K. Shukla <i>Director, ICAR-CIRCOT</i>	Chairman
Dr. A. K. Thakur, <i>ADG (PE), ICAR, New Delhi</i>	Member
D. P. Ray, <i>PS, ICAR-NINFET, Kolkata</i>	Member
Dr. Vinita Gotmare <i>PS, ICAR-CICR, Nagpur</i>	Member
Dr. R. K. Vishwakarma <i>PS, ICAR- CIPHET, Ludhiana</i>	Member
Dr. Blaise De'Souza <i>PS, ICAR-CICR, Nagpur</i>	Member
Dr. Sharad Gadakh, <i>DoR, MPKV, Rahuri</i>	Member
Shri M. M. Korde,	Member
Shri Sachin Kulkarni <i>Director of Agriculture Govt. of Maharashtra</i>	Member
<i>Director of Agriculture, Govt. of Karnataka</i>	Member
Shri R.K. Singh, Comptroller <i>ICAR-CIFE, Mumbai</i>	Member
Shri Navin Kumar <i>Sr. Administrative Officer</i>	Member Secretary

**Research Advisory Committee (RAC)**

Dr. S. M. Ilyas <i>Former Director, NAARM, Hyderabad</i>	Chairman
Dr. S. Sreenivasan <i>Former Director, ICAR-CIRCOT</i>	Member
Dr. Pitam Chandra <i>Former ADG (PE), ICAR, New Delhi</i>	Member
Dr. Gopal Agarwal <i>Prof. IIT, Delhi</i>	Member
Dr. S. P. Borkar <i>Professor, VJTI, Mumbai</i>	Member
Dr. R. V. Adivarekar <i>Prof. ICT, Mumbai</i>	Member
Dr. K. Narsaiah <i>ADG (PE), ICAR, New Delhi</i>	Member
Dr. S. K. Shukla <i>Director, ICAR-CIRCOT</i>	Member
Dr. V.G. Arude <i>Principal Scientist</i>	Member-Secretary

**Institute Technology Management Committee**

Dr. S. K. Shukla <i>Director, ICAR-CIRCOT</i>	Chairman
Dr. Sujata Saxena <i>Principal Scientist &amp; Head, CBPD</i>	Member
Dr. D.M. Kadam <i>Principal Scientist &amp; Head, ETTD</i>	Member
Dr. N. Shanmugam <i>Principal Scientist &amp; Head, MPD</i>	Member
Dr. A. S. M. Raja <i>Principal Scientist, &amp; Head QEID</i>	Member
Dr. N. Vigneshwaran <i>Principal Scientist</i>	Member
Dr. C. Sundaramoorthy <i>Principal Scientist, &amp; I/c PME</i>	Member
Dr. Swadesh Prakash <i>Principal Scientist, CIFE, Mumbai</i>	Member
Dr. K. Pandiyan <i>Senior Scientist, Officer I/c, GTC, Nagpur</i>	Member
Dr. A.K. Bharimalla <i>Principal Scientist, ETTD &amp;PI, ICAR-CIRCOT-ABI Centre</i>	Member Secretary

**Institute Joint Staff Council****Official Side**

Dr. S.K. Shukla, <i>Director</i>	Chairman
Dr. N. Shanmugam <i>Principal Scientist &amp; Head MPD</i>	Member
Shri Navin Kumar, <i>SAO</i>	Member
Shri Sumit Saurabh, <i>FAO</i>	Member
Shri R.R. Chhangani, <i>Chief Technical Officer</i>	Member
Shri Anand Jadhav, <i>TO Secretary Staff Side</i>	Member Secretary
Shri Sudhakar Chandanshive <i>Lower Division Clerk</i>	CJSC Member
Shri Surendra K. Parab <i>Tech. Assistant (Technical Cadre)</i>	Member
Shri M.M. Kadam <i>Tech. Assistant (Technical Cadre)</i>	Member
Shri Prakash Gurav <i>Skill Supporting Staff</i>	Member
Shri M.K. Prabhulkar <i>Skill Supporting Staff</i>	IJSC Member

**Internal Complaints Committee**

Dr. (Smt.) Sujata Saxena Principal Scientist & Head CBPD	Chairperson
Dr. Pratima Goyal, Head Department of Textile & Fashion Technology at College of Home Science Nirmala Niketan	External Member
Dr. T. Senthilkumar Senior Scientist, MPD	Member
Smt. Trupti Mokal Administrative Officer	Member
Dr. C.P.D. Souza Asst. Chief Technical Officer	Member Secretary

**ABI Advisory Committee**

Dr. S. K. Shukla Director, ICAR-CIRCOT	Chairman
Dr. R. P. Kachru Former ADG (PE), ICAR, New Delhi	Member
Dr. A. J. Shaikh Former Director, ICAR-CIRCOT, Mumbai	Member
Prof. Narendra G Shah CTARA, IIT, Mumbai	Member
Dr. M. K. Sharma Whole Time Director & CEO, BSIL	Member
Dr. A. K. Bharimalla, Principal Scientist, ETTD PI: ICAR-CIRCOT-ABI centre	Member-Secretary

**RAFTAAR-Incubation Committee (RIC) of CIRCOT RABI**

Dr. S. K. Shukla, Director	Chairman
Dr. P.U. Krishnaraj Associate Director of Research, Chairman CIC and PI-of Krishik- Agri Business Incubator, UAS, Dharwad	Member
Dr. G. R. Anap Former International Cotton Consultant, World Bank Project (Africa)	Member
Prof. (Dr.) V. D. Gotmare, Former HOD, Textile Manufacture	Member

Department, VJTI, Mumbai Shri. Abasaheb K. Haral Rtd. Joint Director Agriculture and chief coordinator (PPP-IAD), Dept. of Agriculture, Govt. of Maharashtra	Member
Mr. Vasant U. Mhaske Retired General Manager, Bank of Maharashtra	Member
Dr. Ashok K. Bharimalla, Principal Scientist, ETTD PI-CEO: ICAR-CIRCOT R-ABI Centre	Member Secretary

**QRT Committee**

Dr. K. K. Singh Vice Chancellor, SVP University of Agriculture and Technology, Modipuram, Meerut	Chairman
Dr. G. S. Nadiger Research Advisor, SASMIRA	Member
Dr. A. J. Shaikh Former Director, ICAR-CIRCOT	Member
Dr. Kanchan K. Singh Dean, School of Agriculture Sanskriti University, Mathura	Member
Dr. S. Patel Professor & Former Head, AP&EF, IGKV, Raipur	Member
Mr. Prashant Kumar Mohota Managing Director (MD), Gimatex Industries Pvt. Ltd, Wardha	Member
Dr. A. S. M. Raja PS & Head, QEID, ICAR-CIRCOT	Member Secretary



# CITIZEN'S/CLIENT'S CHARTER

ICAR – Central Institute for Research on Cotton Technology

Adenwala Road, Matunga, Mumbai – 400 019

Phone: (022) 2414 6002

Website: <https://circot.icar.gov.in>



## VISION

Global Excellence in Cotton Technology

## MISSION

To provide scientific and managerial interventions to post-harvest processing and value addition to cotton and utilization of its 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.	<b>Dr. A. Arputharaj</b> Senior Scientist In-charge, Test House Email: cottontest@rediffmail.com
2.	Imparting Training to Stakeholders	<b>Dr. A. K. Bharimalla</b> , Principal Scientist Engineering Technology Transfer Division Email: ashokbhari72@gmail.com  <b>Dr. K. Pandiyan</b> , Senior Scientist OIC, GTC, Nagpur Email: gtc_ngp@rediffmail.com
3.	Supply of Calibration Cotton	<b>Dr. A. S. M. Raja</b> , Principal Scientist & Head Quality Evaluation and Improvement Division Email: asmraja164751@gmail.com
4.	Agribusiness Incubation & Consultancy	<b>Dr. A. K. Bharimalla</b> , Principal Scientist In-Charge ITMU & PI, ABI Centre Email: abicircot@gmail.com
5.	Technology Transfer	<b>Dr. D. M. Kadam</b> , Principal Scientist & Head Engineering Technology Transfer Division Email: dmkadam11k@gmail.com

### Public Grievance Officer

Senior Administrative officer • E-mail: [circotadmn1@gmail.com](mailto:circotadmn1@gmail.com)

### For Further Information, Contact

Dr. S. K. Shukla, Director, ICAR-CIRCOT, Mumbai

Email: [director-circot@icar.org.in](mailto:director-circot@icar.org.in) / [director.circot1@gmail.com](mailto:director.circot1@gmail.com)



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 अपीलीय 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.

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अधिक जानकारी के लिए <https://circot.icar.gov.in> पर लॉग ऑन करें।

आदेशानुसार



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**Adenwala Road, Matunga (East), Mumbai - 400 019.**



*Agriculture with a human touch*

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एक कदम स्वच्छता की ओर