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A Monthly Insight into the ICAR-CIRCOT

e - News Letter

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Director's Desk...

Nanocellulose, a novel nano-sized cellulosic material exhibits very high strength, extremely large surface area, viscosity modifying capability and entirely different optical properties. It has proven applications as (a) reinforcing agents in biocomposites, (b) additives in high-end papers, (c) scratch resistant coating additives, (d) additives in paints, (e) transparent display for electronics and (f) drug delivery agents. With the generous support from National Agricultural Innovation Project (NAIP) of ICAR, in 2008, Institute ventured into the preparation of nanocellulose from cotton linters and cotton wastes. With four years of concerted efforts by multidisciplinary scientists, three novel energy-efficient protocols for production of nanocellulose namely, chemo-mechanical, bio-mechanical and microbial processes were evolved and patented. Throughout the World, only few pilot plants are engaged in production of nanocellulose from wood pulp- Innventia in Stockholm, Sweden (first plant established in Feb 2011); Forest Products Laboratory, USDA; Maine's Process Development Centre and Verso Paper, USA; CelluForce Inc. and FP Innovations, Canada; DaiCel and Nippon Paper, Japan; Stora Enso and UPM-Kymmene, Finland; Borregaard, Norway; and, J. Rettenmaier & Sohne Gmbh, Germany.

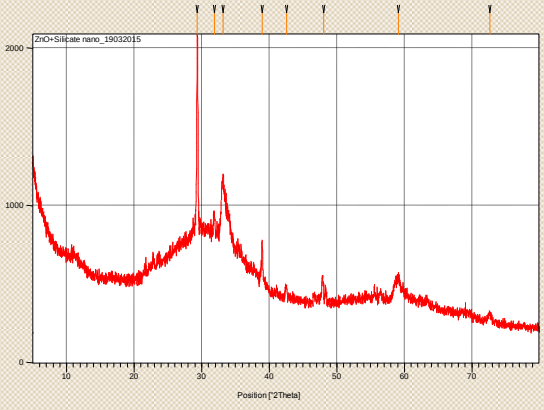
The ICAR-CIRCOT has established a first of its kind in India unique nanocellulose pilot plant that can produce nanocellulose from cotton linters, cotton wastes and bagasse at the rate of 10 kg per 8h shift. Besides the production system, safety aspects, material handling system and effluent handling are also taken care of in the pilot plant. For validation and commercialization of this technology, MoUs have been signed with M/s Avantha Centre for Industrial Research & Development [formerly Thapar], Yamuna Nagar, Haryana, M/s Godavari Biorefineries Ltd., Mumbai, M/s Clean Cotton Impex, Tirupur, Tamil Nadu and M/s Kanakadhara Agricultural Innovations Pvt Ltd., Bangaluru. These firms are evaluating the nanocellulose for their potential use as coating/additives in high-end paper, as rheology modifiers in paints and for pharmaceutical applications. This pilot plant is also established to demonstrate the nanocellulose production technology to various stakeholders and technology licensing; to act as an incubation unit for entrepreneurs/industrialists to develop efficient methodologies for custom-designed nanocellulose and to support researchers, entrepreneurs and industrialists for development of nanocellulose based products.

P.G. Patil

Technology Insight

Zinc Oxide based Hybrid Nano Particles

Zinc oxide-silicate hybrid nano particles were synthesized using zinc nitrate, sodium hydroxide and potassium silicate precursors through wet chemical method. XRD analysis showed that peaks at 29.29 angle which indicated presence of silicate and 31.83 angle which indicated presence of zinc oxide in the synthesized material. The nano hybrid particles were applied on cotton textile using pad-dry cure method to provide multi-functional properties. As a reslut, the UV protection Factor (UPF) of cotton fabric could be improved from 16 to 40, and flame retardant property of the fabric could be improved from one second of flame catching time to four seconds respectively. The treated fabric also exhibited antibacterial property as against control fabric which showed no inhibition towards bacterial growth.



XRD of ZnO-Silicate Hybrid Nano Particle

Nano-Cellulose Pilot Plant

The Nano-Cellulose Pilot Plant has been established at ICAR-CIRCOT with a capacity of 10 kg per 8 hrs shift. The protocol for production of nanocellulose / nanocrystalline cellulose (NCC) from microcrystalline cellulose (MCC) derived from cotton linters has been optimized. To reduce the energy consumption in mechanical process, a suitable pretreatment was carried out in the pulper. This was followed by high pressure homogenization process wherein the nanosize could be reached. In addition to reduced energy consumption (40%), pretreatment also avoided clogging in the orifice of the homogenizer. The dimension of the final product is less than 100 nm and consistency is 2%. This product is being evaluated for paper coating application on the clients' site.

Training

Training on Quality Evaluation of Cotton

Two training programmes were conducted on the quality evaluation of cotton during the month (July 6-10 and July 20-24, 2015). The participants included farmers from Akola, staff from Arvind Mills Ltd, Akola, employees of Cotton Association of India and entrepreneurs from Jalgaon, Surat and Gujarat. During the training period, participants were acquainted with every aspect of cotton testing through a series of lectures and demonstrations in various laboratories of the Institute. They were also taken to Cotton Association of India, Cotton Green, Mumbai to learn about international practices in cotton grading from expert cotton sworn surveyor.

Dr. P.G. Patil, Director, Dr. S. V. Ghadge and Er. A. K. Bharimalla along with trainees at the inaugural address

Group Photo: Quality Evaluation of Cotton (Batch I - July 6-10, 2015)

Group Photo: Quality Evaluation of Cotton (Batch II - July 20-24, 2015)

Training on Recent Advances in Cotton Ginning, Quality Evaluation and By-products Utilization

Ginning Training Center, Nagpur organized a six-day training program on "Recent Advances in Cotton Ginning, Quality Evaluation and By-products Utilization" during July 20 - 25, 2015. Six potential and budding entrepreneurs (one from Raichur, Karnataka and remaining five from M/s Gimatex Industries pvt. Ltd., Hinganghat, Wardha) attended the training program. The program modules dealt with fibre quality assessment, cotton grading, DR ginning technology, cotton export and cotton by-products utilization. The practical aspects including fiber quality assessment by HVI were covered in the training. The trainees were taught on ginning settings, automation and humidification in ginning industry. The functioning of particle board and scientific cottonseed processing units were also demonstrated. The trainees were taken for industrial visit to M/s Bajaj Steel Industry, Nagpur. Dr. M.S. Kairon, former Director, ICAR-CICR delivered a valedictory address and distributed certificates to the trainees upon successful completion of the training.

Group Photo: Recent Advances in Cotton Ginning at GTC, Nagpur

Deliberations on designing and development of cotton harvester with on-board pre-cleaner

Meetings

On July 9, 2015 was held a preliminary meeting for signing of MoU on "Designing and Development of cotton harvester with on-board pre-cleaner". Dr. P. G. Patil, Director, CIRCOT, Mumbai; Dr. K. R. Kranthi Director, CICR, Nagpur; representative of Mahindra & Mahindra, Mumbai; Dr. S. V. Ghadge, In-Charge, TTD, Er. A. K. Bharimalla, Sr. Scientist, TTD and Dr. A. J. Shaikh, Former Director, CIRCOT deliberated over the technology in developing stage and the terms and conditions of the agreement to be entered with M/s Mahindra and Mahindra.

Events

Exhibition

ICAR-CIRCOT, Coimbatore centre participated in the AGRI INTEX 2015 at CODISSIA Trade Fair Complex, Coimbatore during July 17-20, 2015. CIRCOT technologies displayed received overwhelming response from the participants, especially technologies on particle board and preparation of nanocellulose. Dr. Venkatkrishnan, In-charge QEU, Coimbatore & his team demonstrated the CIRCOT technologies and services to the delegates.

CIRCOT Stall at the AGRI INTEX 2015 at CODISSIA Trade Fair Complex, Coimbatore

Swachh Bharat Mission

On July 03, 2015, the staff of the Institute formed a human chain and removed old files, unwanted papers and scrap material for disposal from the Institute premises.

CIRCOT Staff Members at Cleaning Activity

Director's Visits

On July 16, 2015, Dr. P. G. Patil, Director, accompanied by Er. A. K. Bharimalla, Sr Scientist, TTD, visited Microspun Fabric Unit, Buldhana inspecting the feasibility of small scale ginning, press, spinning, winding, warping, weaving, dyeing and effluent treatment unit.

Microspun Fabric Unit, Buldhana

Power loom at Microspun Fabric Unit, Buldhana

Er. A. K. Bharimalla discussing with dyeing unit In-charge at Microspun Fabric Unit, Buldhana

On July 25, 2015, Dr. P.G. Patil, Director, attended the 87th foundation day and ICAR award ceremony at Patna, Bihar which was inaugurated by Hon'ble Prime Minister Shri Narendra Modi who appreciated agricultural scientists and farmers for their contributions and suggested identification of commodities having high potential of income from national and global markets.

Visit of Dignitaries

Dr. K. Alagusundaram, DDG (Engg), ICAR New Delhi

Dr. K. Alagusundaram, DDG (Engg) visited the Insitute on July 13, 2015 to review the progress of the activities in the Institute. He visited all the research facilities of the Institute and addressed the staff in the Jubilee Hall. Appreciating the work done at the Institute and the cleanliness maintained in various laboratories and Institute premises, he stressed upon the importance of team work for a healthy working environment. He cited instances from his experience on how scattered facilities could be pooled to make better working conditions and opined that the institute work needs to be oriented towards the farming community and their upliftment.

The DDG identified the following core areas to be addressed by the institute.

- *Farm to finished garment from cotton for development of village level entrepreneurship.*
- *Scientific extraction of oil from cottonseed to be promoted with the stake holders.*
- *Cotton stalk biomass utilization for pelleting and other products to enhance the income of cotton farmers.*
- *Strengthening of the regional units of CIRCOT into regional centre by providing infrastructure and manpower.*
- *To upgrade Coimbatore unit to regional centre should be taken up first due to its proximity to the textile industry.*

- *Scientists should strive for externally funded projects in view of the present fund situation in the council.*

Dr. K. Alagusundaram, DDG (Engg) at Nano-Cellulose Pilot Plant

Dr. K. Alagusundaram, DDG (Engg) in Chemical & Bio-chemical Processing Division, CIRCOT

Dr. K. Alagusundaram, DDG (Engg) visited at Quality Evaluation & Improvement Division, CIRCOT

Dr. K. Alagusundaram, DDG (Engg) in Mechanical Processing Division, CIRCOT

DEMONSTRATION/AWARENESS PROGRAMME

Gujarat Farmers visited to GTC, Nagpur

Inter- state farmers training programme organized by Agricultural Growth of Rural India (AGRI), ATMA, Junagadh, Gujarat was held at GTC, Nagpur on July 14, 2015. The farmers were given demonstration on the various aspects of cotton processing and by-products utilization.

Group photo: Junagadh Farmers at GTC, Nagpur

Accolades

1. *Annual achievements (Performance Evaluation) the total composite score and rating of ICAR-CIRCOT of RFD 2014-2015 is 97.94 and the rating 'Excellent'.*

2. *Germplasm CNA 405 of Cotton (INGR15005) developed by Punit Mohan, Rode, B.R., Kranthi, K.R., Sujata Saxena, Nagarkar, R., Santhy, V. has been registered by Plant Germplasm Registration committee (PGRC), ICAR on April 21, 2015.*

Upcoming Events

Training Course on "Quality Evaluation of Cotton" at ICAR-CIRCOT, Mumbai

Training Calendar for 2015 -16

No.	From	To
1.	10-08-2015	14-08-2015
2.	24-08-2015	28-08-2015
3.	07-09-2015	11-09-2015
4.	14-12-2015	18-12-2015
5.	11-01-2016	15-01-2016
6.	08-02-2016	12-02-2016

COURSE CONTENTS

- *Advances in Ginning Technologies*
- *Introduction and Practical in Cotton Grading*
- *Cotton Crop By-products*
- *Fiber Length Measurement using Conventional Instruments*
- *Demonstration in Fibre Fineness and Maturity*
- *Cotton fibre Testing using High Volume Instrument (HVI) and Advanced Fibre Information System (AFIS)*
- *Mechanical Processing of Cotton*
- *Contamination in Cotton and Marketing & Commercial aspect of Cotton*
- *Techno Entrepreneurial Activities and Business Planning Development*
- *Visit to Cotton Association of India, Cotton Green*

Course Fee: *Rs. 5618/- (Inclusive of taxes)*

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ICAR Short Course On

Fermentation Technology for value-addition to cotton by-products and biomass

September 07-16, 2015

Organized by

ICAR-Central Institute for Research on Cotton Technology (CIRCOT),
(Indian Council of Agricultural Research)
Adenwala Road, Matunga,
Mumbai – 400 019, Maharashtra, India

Sponsored by

Indian Council of Agricultural Research
New Delhi 110 012 (INDIA)

Introduction

Fermentation is the term derived from latin word "fervere" which means "to boil", describing the bubble like appearance produced during the anaerobic fermentation of sugars by yeast. Fermentation is an age old process which was primarily employed for preservation of fruits, vegetables, grains etc. and to improve its nutritional property. The fermentation process is also used for the production of enzymes, antibiotics and other bio-active compounds for medical and industrial applications. Now-a-days, the term fermentation is broadly used and defined as the production of food, chemical and fuel by micro-organisms for the welfare of human beings.

The annual production of agro-wastes in India is estimated to be 700 million tonnes. These wastes are other-wise called ligno-cellulosic wastes which mainly contains cellulose, hemicellulose and lignin in their chemical composition. These agro-wastes are viable substrate for fermentation process since they are renewable, produced annually and have application for bioconversion into useful products such as food, fuel and fine chemicals. In cotton, the cottonseed and cotton stalks are the two major by-products. In India, about 12 and 40 million tonnes of cottonseed and cotton stalks respectively are produced annually. The cottonseed produced in the country is mostly extracted for oil. The other products being produced during the processing are linters, hulls and meal. The value-addition to cottonseed by fermentation technology makes cottonseed processing more economical and viable. The applications of fermentation process in value-addition of cottonseed are efficient linter and oil recovery, degossypolization and nutritive quality improvement of cottonseed protein, industrial enzymes and peptone from cottonseed meal and bio-enrichment of cottonseed hulls. Except a small proportion has been used for domestic fuel, mostly the cotton stalks is burnt in the field itself.

Eligibility

Applicant should be a post-graduate in any discipline of agriculture or related basic science and working as Scientist in ICAR institutes or as Assistant Professor and above in any of SAUs/Central Agricultural University/Deemed University/General University with agriculture faculty. The total number of participants will be restricted to 25. Selection will be primarily based on the above said eligibility conditions and first-come-first-serve basis.

How to apply

Eligible and interested candidates can apply in the enclosed proforma or apply online. For online application, register at http:// www. Iasri.res.in/cbp/ and fill up the form, submit and take a printout and send the same duly forwarded by the competent authority to the Course Director on or before August 10, 2015. A non-refundable registration fee of Rs. 50/- (Rupees fifty only) in the form of an Indian Postal Order/Demand Draft drawn in favour of "Director, CIRCOT" payable at Mumbai should be sent along with the application form.

Boarding & Lodging

Participants will be paid travel fare of to and fro journey by rail or bus as per their entitlement, restricted to the maximum of AC II tier. TA will be paid on production of valid tickets. Free boarding will be provided during this training programme. Free lodging shall be provided on first-come-first-serve basis. Since the accommodation is very limited at this Institute, participants are requested to arrange for their stay, if possible. Cash allowance in lieu of boarding & lodging are not permitted.

The application of fermentation process in cotton stalks utilization finds industrial application, restores soil health, and avoids burning of cotton stalks in the field. The industrial micro-organisms such as yeast and filamentous fungi employed in fermentation process produces complex of enzymes and other metabolites that aids in conversion of biomass into useful products. The possible applications in cotton stalks utilization are production of high value compost, bio-ethanol, mushroom etc.

Objectives

The major objectives of the short course are

- To acquaint participants with the basics of fermentation technology
- To impart training on role of fermentation technology in biomass utilization
- To demonstrate the application of fermentation technology for value-addition to cottonseed and cotton stalks

Curriculum

A series of lectures and practical demonstrations will cover the basics of fermentation technology, role of fermentation technology in biomass utilization and its application in value-addition to cottonseed and cotton stalks. The Institute is well equipped with instruments for cultivation of micro-organisms (Laminar Air flow chamber, Incubator shaker and fermenter) and characterization (Automatic Nitrogen Analyzer, Fibre Analyzer, UV-Vis spectrophotometer, Fluorescent Microscope and Scanning Electron Microscope).

Application form for participation

ICAR short course on "Fermentation technology for value-addition to cotton by-products and biomass"
(At Central Institute for Research on Cotton Technology, Mumbai)

September 7-16, 2015

1. Full name (in block letters) :
2. Designation :
3. Present employer and address :
4. Address to which reply should be sent (including email, mobile and fax) :
5. Permanent Address :
6. Date of Birth :
7. Sex (M/F) :
8. Teaching/research/professional experience (mention post held during last five years and number of publications in refereed journals) :
9. Marital status: (Married/Unmarried) :
10. Mention if you have participated in any research seminar, Summer/Winter school/Short course :
11. Whether accommodation is required: Yes/No
12. Academic record

Examination passed	Subject Main/ Subsidiary	Year of passing	Class/Ranks/ Distinctions etc.	University/ Institution	Other information
Bachelor's					
Master's					
Ph.D					
Others					

Date _____
Place_____ Signature of the applicant

13. Recommendations of forwarding Institute

Certificate

It is certified that the information furnished above has been verified and found to be correct.

Signature
Director/Head of the organization

Date_____

Institution seal_____

About Mumbai

Mumbai, Capital city of Maharashtra known as Bombay until 1995, is a great port city, situated on the west coast of the Indian peninsula. The seven islands, that constituted Mumbai were home to communities of fishing colonies. Mumbai is the financial, commercial & entertainment capital of India. Important tourists places are Gateway of India, Elephanta Caves, Queen's Necklace, Jehangir Art Gallery, CST railway station, Sea link bridge, Mount Mary Church, Hanging garden, Siddhivinayak temple, Haji Ali etc.

How to reach CIRCOT, Mumbai

Distance from Airport (Domestic) : 10-12 km
Railway station (Dadar) : 2 km
Land mark : Five Gardens

Weather

September coincides with the end of monsoon. The weather will be pleasant with mean daily temperature approximately 25° C.

Important dates to remember

Last date for receipt of nomination : Aug 10, 2015
Intimation to selected participants : Aug 14, 2015
Course commencement : Sept 07, 2015

Organizers

Director, CIRCOT : Dr. P.G. Patil
Course Director :Dr. V. Mageshwaran, Scientist
Course co-ordinators :Dr. S. Saxena, Pr. Scientist &I/C CBPD
:Dr. S. V. Ghadge, Sr. Scientist & I/C TTD
: Er. A.K. Bharimalla, Sr. Scientist

Address for correspondence

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Updates are available at
www.circot.res.in

Shri Sharad Pawar, Former Agriculture Minister, Maharashtra, Inaugurating Quality Evaluation Unit of CIRCOT at Akola on April 6, 1976

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The 68th UN General Assembly declared 2015 as the International Year of Soils (IYS) and UN Slogan is ***"Healthy Soils for a Healthy Life".***