

# ICAR-CIRCOT e-Newsletter



## Director's Desk



ICAR-CIRCOT, established in 1924, has successfully completed 91 years and has celebrated the foundation day on Dec 3, 2014. The Institute has adapted itself over time by reorienting its priority to cater to the changing needs of its stakeholders.

ICAR-CIRCOT has been actively carrying out research in the field of nanotechnology for more than a decade with emphasis on nanofinishing of cotton textiles and use of nanocellulose from cotton linters for bio composite applications. Based on its expertise in the field of nanotechnology, ICAR-CIRCOT has organized six training programmes for various stakeholders. In line with that, a training programme on "Basics of Nanotechnology & its Application" was conducted during this month.

Wishing you all a **Happy New Year**

Dr. P.G. Patil  
Director

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## Technology Insight – Degossypolization of Cottonseed Cake

In India about ten million tonnes of cottonseed cake is available annually. Cottonseed cake contains about 20 – 25 % of protein. Gossypol, a yellow pigment and polyphenolic compound, present in cottonseed cake is toxic to animals causing reproductive disorders and in higher concentration may even cause death. Gossypol is present in two forms *viz.*, free and bound gossypol. Free gossypol is toxic in nature and gossypol binding with protein (bound gossypol) is non-toxic. The feeding of cottonseed cake containing gossypol is more toxic to non-ruminants than ruminants, as in case of ruminants the gossypol is converted into bound form in rumen. The present methods on gossypol detoxification will either inactivate free gossypol or convert into bound form thus affecting the nutritive value of the protein. Generally, epsilon group of lysine reacts with gossypol and thus makes lysine unavailable in the feed. Gossypol is highly toxic to mono gastric animals due to possible conversion of bound to free gossypol and absorption of free gossypol in the digestive system. Hence the issues such as gossypol toxicity, available lysine content and protein level need to be addressed before using it as protein supplement in non-ruminants feed ration.

An optimized solid state fermentation processes was developed using combination of *P. sajor caju* and *S. cerevisiae* 6933 and *S. cerevisiae* + *C. tropicalis* combinations. In *P. sajor caju* and *S. cerevisiae* 6933 combination, the maximum detoxification of free gossypol (%) (0.22 to 0.040) and total gossypol (%) (2.33 to 0.86) and improved lysine content % (1.0 to 1.2) in cottonseed cake was achieved within 36 to 48 hours. In *S. cerevisiae* + *C. tropicalis* combination, the maximum detoxification of free gossypol (%) (0.22 to 0.040) and total gossypol (%) (2.32 to 0.87) and improved lysine content % (1.0 to 1.3) in cottonseed cake was achieved within 24 hours (Table 1).

The toxicity experiments showed that the cultures used for solid state fermentation process, are non-toxic to broilers. The feed evaluation in broilers showed that 40 % replacement of soybean meal with fermented Cottonseed Cake (CSK) had better feed conversion ratio. The industrial trails on degossypolization of cottonseed meal/cake using the developed process showed that the treated CSK have 60 % reduced free gossypol, 50 % reduced total gossypol, 30 – 40 % improved lysine content and 10 – 15% increased protein content.

Soybean has been preferred protein supplement in non-ruminants feed ration owing to its protein content and better digestibility. However, its increased demand and high cost has led to the search for better alternatives for protein supplement in non-ruminants ration. The cost of soybean is minimum Rs. 25 - 30 per kg as against the cost of cottonseed cake of Rs. 15 - 20 per kg depending on the availability in market. Hence gossypol-reduced lysine content improved cottonseed cake/meal developed by CIRCOT process is a viable alternative protein supplement which could replace soybean meal extensively in feed ration for non-ruminants. The beneficiaries are cotton growing farmers, cottonseed industries and poultry feed industries etc.

**Table 1: Effect of Solid State Fermentation Process on Nutritive Parameters of Cottonseed Cake**

Process	Free Gossypol (%)	Total Gossypol (%)	Lysine content (%)	Crude protein (%)	Crude fibre content (%)
Control (untreated)	0.22	2.32	1.0	20.3	37.2
1 <sup>st</sup> Process ( <i>P. sajor caju</i> + <i>S. cerevisiae</i> 6933)	0.040	0.86	1.11	28.3	28.2
2 <sup>nd</sup> Process ( <i>C. tropicalis</i> + <i>S. cerevisiae</i> )	0.037	0.87	1.24	28.2	29.6

## Training Programme

A five day training programme on “Basics of Nanotechnology and its Application” was organized at CIRCOT, Mumbai from December 8 – 12, 2014. The programme was inaugurated by Shri R. Rajagopal (IAS), Additional Secretary (DARE) & Secretary (ICAR). Dr. N. Vigneshwaran and Er. Ashok Kumar, were the Course Coordinators.

The objectives of the training programme was to impart basic knowledge on nanotechnology, hands-on training in preparation and characterization of nanomaterials and demonstrate their application in textiles, composites and agriculture. Twelve participants from Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra attended this training programme. Dr. C.D. Mayee, Eminent Agricultural Scientist and Former Chairman, ASRB was the Chief Guest for the valedictory function held on 12<sup>th</sup> December 2014.



Shri R.Rajagopal (IAS), Addn. Secretary, DARE & Secretary, ICAR releasing the Training manual



Practical session in Nano Lab

## Events

### CIRCOT Foundation Day

The 91st foundation day of ICAR-CIRCOT was celebrated on December 3, 2014 in the Jubilee Hall. Dr. P.G Patil, Director inaugurated the function and highlighted the achievements of the institute in the recent past. Dr. A.V. Ukidve, former Principal Scientist and Head, QEID was the Chief Guest for the function. Other dignitaries viz. Dr. N.B. Patil, Dr. S. Sreenivasan and Dr.A.J.Shaikh, former Directors, Shri P.G. Oka, former Scientist and Dr. R.P. Nachane, former Head, QEID also graced the occasion. During the function, retired staff who have crossed 80 years of age were honoured with shawl, memento and bouquets. An infotainment program was organized in which Shri Ketan Gowand, Corporate Trainer enlightened the gathering on the topic Insights of Life.



*Dr. A.V. Ukidve, former Head of QEID, CIRCOT, Mumbai during worship*

### Half-yearly Institute Research Council (IRC)

A Half-yearly IRC meeting was held on December 22 and 23, 2014 to discuss the progress of research from April – September 2014. Dr. P.G. Patil, Director (Acting) was in the Chair and Dr. S. Sreenivasan and Dr. A.J. Shaikh former Directors were subject experts in the meeting. The meeting was attended by HOD's, Scientists and Asstt. Chief Technical Officers.

## ITMU Activity

Institute Technology Management Unit (ITMU) meeting was organized on 24<sup>th</sup> December, 2014. The deliberations of the meeting included a consultancy proposal to M/s. Suryavanshi Spinning Mills Ltd. and filing of application for new patent proposal titled “Friction Spinning Collector for Electrospinning” by Dr.N.Vigneshwaran, Sr.Scientist, CBPD.

## Innovation Cell Activity

### **Brainstorming on Innovative Approaches to Improve Administrative Efficiency in the Office**

A brainstorming session on **Innovative Approaches to Improve Administrative Efficiency in the Office** was organised on December 06, 2014 by the Innovation Cell of CIRCOT for the Administrative staff of the Institute. The brainstorming session was chaired by Dr.P.G.Patil, Director, CIRCOT and Guest lecture was delivered by Dr. V.H. Iyer, Dean, Management Development Programs, Welinkar Institute of Management Development and Research, Mumbai.



*Dr. V.H. Iyer on Approaches for Improved Administrative Efficiency*



## Dr.R.P. Kachru, Former ADG (PE), ICAR Interacted with CIRCOT Scientists

ICAR-CIRCOT, Mumbai had organized a meeting on 18.12.2014 to discuss the importance of institute-stakeholders' interface, exposure of institute to industry, and preparation of technology profiles of products/processes developed by the institute. Dr. R. P. Kachru, Former ADG (PE), ICAR, New Delhi chaired the meeting and interacted with the Director, Heads of divisions and Scientists of the institute.



## Swachh Bharat Mission

Under the "Swachh Bharat Mission", Nation-wide programme for cleaning launched by the Government of India, CIRCOT carried out cleaning of the Terrace and the basement corridor of the Dr.V.Sundaram building. Employees formed human chain and shifted the old unusable items from the identified locations for disposal.



## Review Committee Meeting – Nanocellulose Pilot Plant

The fifth review committee of the sub-committee on erection and commissioning of Nanocellulose Pilot plant was held on 29<sup>th</sup> December, 2014. The experts in the review committee included Dr. S.Sreenivasan, Former Director, CIRCOT; Dr.A.J.Shaikh, Former Director CIRCOT and Dr.S.P.Deshmukh, Associate Professor among others.



## Visits of Dignitaries

*Shri R. Rajagopal (IAS), Additional Secretary (DARE) & Secretary (ICAR), visited CIRCOT on December 8, 2014 and inaugurated the training programme on **Basics of Nanotechnology and its Application**. He also visited the Research laboratories and had interaction with the Scientists. He emphasized on future focus of the Institute, scope for industry related projects & technology transfer. He also launched the *ICAR-CIRCOT's renewed website* and released a book on *“Basics of Nanotechnology and its Application”*.*



*Dr. P.G. Patil, Director Explaining the Activities of the Institute at the Visitors Room*

*Dr. C.D. Mayee, Eminent Agricultural Scientist and Former Chairman, ASRB visited the Institute on December 12, 2014. He was the Chief Guest for the valedictory function for the Nanotechnology Training organized by ICAR-CIRCOT and distributed certificates to the delegates. Dr. Mayee emphasized the need for nano technological intervention in agriculture, nutrients and pesticide formulation to improve the input use efficiency and to reduce their requirements, so that the cost of production can be reduced by which farmers will be benefitted.*



*Dr. C.D. Mayee interacting with the participants during the Valedictory Function*

## Exhibitions Attended

CIRCOT participated in the 6<sup>th</sup> Agro Vision Exhibition organized at Nagpur during 3<sup>rd</sup> to 7<sup>th</sup> December, 2014. The exhibition was inaugurated by the Hon'ble Chief Minister of Maharashtra, Shri. Devendra Fadnavis. Cabinet Minister Shri. Nitin Jairam Gadkari (Road Transport and Highways, Shipping) visited the CIRCOT Stall and appreciated the work.



## Seminar/Conference/Workshop

- Dr. (Smt) Sujata Saxena and Dr. R. R. Mahangade attended the National Seminar *cum* Exhibition on December 5 to 7, 2014 at Solapur and presented a paper entitled “Utilization of Pomegranate by-products for Dying of Cotton Textiles”.
- Dr. S. K. Chattopadhyay, Dr. (Smt) Sujata Saxena and Dr. N. Shanmugam attended an International Conference on “India” Opportunities for Global Investment in Textiles organized by M/s. Diagonal Consulting at Gandhinagar, Ahmedabad on December 10-12, 2014.
- Dr. N. Vigneshwaran delivered an Invited talk entitled “Nanocellulose: Energy efficient production & its application” on 19th December 2014 in “Bioprocessing INDIA 2014 – Panacea to Bioenergy, Nutrition & Healthcare” held at Institute of Chemical Technology, Mumbai 400019 during December 17-20, 2014, jointly organized by ICT & IITB, Mumbai.



## Personnel

### Promotion

The following Technical personnel were promoted to the next higher grade.

Sl. No	Name	Post and Grade to which Promoted	Effective Date of Promotion
Workshop Staff including Engineering Workshop Staff Grade I and II			
1	Shri D.U. Kamble	Sr. Technical Officer (GP. 5400)	10-06-2013
2	Smt. Bindu Venugopal	Sr. Technical Officer (GP. 5400)	05-11-2013
3	Shri C.V. Shivgan	Technical Officer (GP. 4600)	16-01-2013
4	Shri S. K. Parab	Technical Assistant (GP. 2800)	01-10-2012
Laboratory Technicians Grade I and II			
1	Smt. N.A. Sonkusle	Sr. Technical Officer (GP. 5400)	15-06-2003
2	Shri C. L. Mundale	Technical Assistant (GP. 2800)	01-10-2012
3	Shri V. L. Rangari	Sr. Technical Officer (GP. 5400)	01-01-2010
4	Shri U.D. Devikar	Sr. Technical Officer (GP. 5400)	01-01-2010
5	Shri S.L. Bhanuse	Sr. Technical Officer (GP. 5400)	01-01-2010
Library Information and Documentation Grade II			
1	Smt. Hemangi R. Pednekar	Sr. Technical Assistant (GP. 4200)	14-06-2014
Press Editorial Staff Grade II			
1	Smt. K. R. Joshi	Sr. Technical Officer (GP. 5400)	29-06-2013

### Transfer

Dr. V. Mageswaran, Scientist, CBPD has been transferred to GTC, Nagpur w.e.f. December 23, 2014.

## Upcoming Events

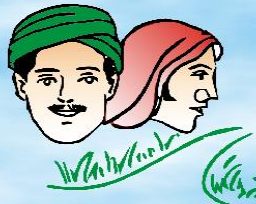
ICAR-CIRCOT is a pioneering R&D Institute on post-harvest technology of cotton and serving the stakeholders since 1924. The following specialized training programmes are scheduled during the financial year 2014-15.

<b>Training on Cotton Spinning</b>	<b>Jan 05-09, 2015</b>
<b>Advances in Microscopy (SEM, AFM, Fluorescent &amp; Polarized)</b>	<b>Jan 19-21, 2015</b>
<b>Chemical Characterization of Textile Materials &amp; Auxiliaries</b>	<b>Feb 02-06, 2015</b>

## Nomenclature of Institute Building

In commemoration of the significant contribution made by the past Directors Dr. V. Sundaram and Dr. R.L.N. Iyengar in expansion program for the laboratory and modernization of the institute, two buildings have been named after them. The Old Research Building has been named in the memory of Yashwantrao Chavan, first chief minister of Maharashtra.

Old Name	New Name
M.S. Building	Dr. V. Sundaram Building
N.R.L Building	Dr. R.L.N. Iyengar Building
O.R.L. Building	Yashwantrao Chavan Building



हर कदम, हर डगर

किसानों का हमसफर

भारतीय कृषि अनुसंधान परिषद

*AgriSearch with a human touch*

## Facilities available at ICAR-CIRCOT

The state of art GBX Tensiometer *cum* Goniometer is used to determine the surface tension of different liquids and surface energy of solids when employed as Tensiometer and as Goniometer, studies listed below can be carried out.

### **Fabrics:**

Analysis of the wetting of fabrics is usually treated differently than the analysis of the fibers of which they are composed. The most frequently used approach to finding contact angles for fabrics is to treat them as porous solids and use the Washburn method of analysis.

### **Soil-removing Efficiency of Surfactants:**

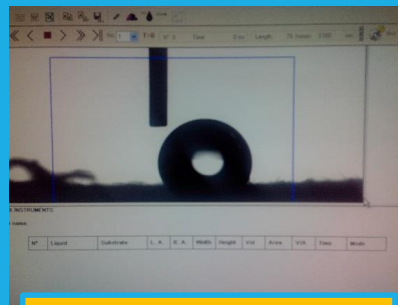
The contact angle can give insight into the performance of detergents on the particular fabric. Different cleaning potential of the surfactants gives rise to different contact angle for a fabric.

### **Adhesion Potential of the Material:**

Interest in the wetting characteristics of fibers has increased greatly in recent years. Much of this new interest involves the study of fiber reinforced composites. The successful use of fibers in composite materials depends on the adhesion of the fibers into the matrix material. The quality of the adhesion is in turn dependent on the wetting of the fibers by the matrix. Characterization of this wetting is done by contact angle determinations.



Tensiometer *cum*  
Goniometer



Screen Shot of Contact  
Angle Measurement