ICAR-CIRCOT e-News

Global Excellence in Cotton Technology Monthly Bulletin, Volume 8, August 2025

Process Protocol Developed

Predictive Modeling of Cotton Yarn Tenacity Using Automated Machine Learning

Resistance per Kilometre (RKM), also known as yarn tenacity (measured in grams/tex), is an essential factor in determining yarn strength. The precise forecasting of RKM enables the informed selection of cotton varieties for particular yarn counts, thereby optimising spinning processes. The Automated Machine Learning (AutoML) technique was employed to predict RKM based on the inherent properties of cotton fibres. The dataset utilised consisted of 176 samples covering a wide count range (12s to 100s Ne), including critical fibre characteristics such as Upper Half Mean Length (UHML), micronaire, bundle strength, uniformity index, and elongation. The AutoML model attained a normalised root mean squared error (NRMSE) of 0.10357, demonstrating significant decreases in mean absolute error (37.6%), mean absolute percentage error (38.1%), and root mean square error (53.8%). The analysis revealed that UHML is the most significant predictor of yarn tenacity. This model provides considerable advantages for the cotton spinning sector by allowing virtual simulations of fibre properties, thereby minimising the need for extensive physical sampling. Furthermore, High Volume Instrument (HVI) manufacturers can incorporate this predictive functionality into their systems to aid spinners in choosing cotton varieties that meet the desired yarn strength specifications.

Award & Recognition

The 6th SEA-AICOSCA Cottonseed, Oil and Meal Conclave – 2025, held in Vijayawada on August 02–03, 2025, a team from CIRCOT comprising Dr. A. Arputharaj, Dr. Pandiselvam, and Mr. Mukesh received the Second Prize in the Research Category of the N.K. Proteins Innovation Awards.

Edited by: S.K. Shukla, G.T.V. Prabu, C. Sundaramoorthy, Bindu Venugopal & Anand Jadhav

Dr. Manoj Kumar Mahawar was conferred the ‘Excellence in Research Award’ at the International Conference on Advances in Agricultural Sciences, Environmental Stewardship, Biological & Life Sciences. Organised by the Society of Agricultural Research, Applied Technology and Environmental Science, India, during August 16–17, 2025.

Skill Development Program

Five-day Training program on "Cotton Grading, Procurement and Marketing" was organised at CIRCOT HQs, Mumbai from August 4-8, 2025, for 12 newly appointed officials of the Cotton Corporation of India (CCI).

Five day training program on "Grading, Procurement and processing of Cotton" organised at Ginning Training Centre, Nagpur, from August 4-8, 2025. 29 participants attended the program.

Five-day training program was organised at GTC, Nagpur on "Grading, Procurement, and Processing of Cotton" for Junior Commercial Executives of the CCI from August 18-22, 2025. 29 participants attended.

A one day training program was organised at CIRCOT HQs on “Characterization Techniques of Cotton Textiles, Auxiliaries, Water & Effluent” on August 08, 2025. 11 participants attended from M/s. Gini Silk Mills, Boisar, Maharashtra.

Awareness Program

An awareness program for best farm practises was conducted along with web casting of “PM Kisan Samman Nidhi” was conducted by GTC, Nagpur at Village Seloo, District Wardha. on 2nd August 2025. 49 farmers participated.

Publications

RESEARCH PAPER

- S.V. Ghadge, V. Satankar, S.K. Shukla, and D.U. Patil (2025) "Cotton Boll Openers for Processing of Kawdi Cotton in Indian Double Roller Ginneries: A Review" Journal of Cotton Research and Development. 39(2), 239-247 (NAAS: 4.7).

- Nickhil, C., Mansuri, S. M., Saikumar, A., Junaid, P.., Nisha, R., Badwaik, L.S., & Kumar, S. (2025) " Estimation of mass and volume of freshly harvested Assam lemon (Citrus limon Burm L.) using computer vision: Exploring changes on different storage days. Applied Fruit Science, 67(3), 141 (NAAS: 7.3).

- Sharma, K., Pawar, A., Saxena, S., Kumar, M., Singanjude, A., Narkar, R., & Anabattula, V. (2025). "Frying Stability, Fatty Acid Composition, and Nutritional Evaluation of Cottonseed Oil, Sesame Oil, and Their Blend: A Comparative Study" Journal of the American Oil Chemists 'Society, 0:1–12. https://doi.org/10.1002/aocs.70010 (NAAS: 7.9).

- Kumar, M., Singh, J., Sharma, K., D'Souza, C. P., Dukare, A., Nehete, L., & Saxena, S. (2025). "Production of Furfural from Cottonseed Hulls: A Sustainable Approach for Cotton By-Product Utilization" WCRC-8 SPECIAL ISSUE ENGINEERING & GINNING. The Journal of Cotton Science, 29:64–76. https://doi.org/10.56454/RQFY8105. (NAAS: 6.4)/ (IF:0.4)

- Shakyawar, D. B., Kadam, V., Kumar, A., Raja, A. S. M., & Meena, N. L. (2025). "Low-stress mechanical properties of fine wool: Angora rabbit hair blended fabrics". The Journal of The Textile Institute, 1-10. DOI: 10.1080/00405000.2025.2541129. (NAAS: 7.5)

- Shanmugam, N., Prabhu, G. T. V., Jagajanantha, P., & Chaurasia, H. (2025). "Predicting cotton yarn tenacity (RKM) using automated machine learning models". Journal of Cotton Research and Development, 39 (2), 269–269. (NAAS 4.7)

- V. G. Arude, S. K. Shukla, Varsha Satankar & Kirti Jalgoankar, (2025). "Research and developments in double roller ginning - A review with a focus to enhance ginning efficiency". Journal of Cotton Research and Development. 39 (2): 248-264. (NAAS 4.7)

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- Gautam, P. V., Kushwaha, H. L., Singh, A. K., & Mansuri, S. M. (2025). Algorithm for electronic seed sowing module, No. SW-2025021436.

Employees Retired

- Dr. Hamid Hasan, Chief Technical Officer (QEU of CIRCOT, Sirsa) retired on 31.07.2025
- Shri S.B. Worlikar, S.S.S, (GTC Nagpur) taken voluntary retirement on 31.07.2025

Educational Visits

- A group of 21 students from the Rajiv Gandhi College of Arts, Commerce & Science, Vashi, Navi Mumbai, visited the institute on August 07, 2025.
- A group of 12 members from the Advisory Board on Ginning Technology Course visited the Ginning Training Centre, ICAR-CIRCOT, Nagpur, on August 12, 2025.

Participation in Events

- Dr. S. K. Shukla, Director, ICAR-CIRCOT participated as a panellist for the session "Cotton 360^0: Building a Sustainable and Resilient Cotton Ecosystem", at the 6th SEA-AICOSCA Cottonseed, Oil and Meal Conclave 2025 held at Vijayawada during August 02-03, 2025.

- Dr. A. Arputharaj participated as a panellist for a session "Diversification of cotton linters value addition: Current scenario and future prospects" at 6th SEA- AICOSCA Cottonseed, Oil and Meal Conclave 2025 held at Vijayawada during August 02-03, 2025.

- Dr. Kirti Jalgaonkar participated and presented a paper titled "Development of Filter Quality Testing Systems for Air Purification Techniques" during the 1st International Conference on Advances in Agricultural Sciences, Environmental Stewardship, Biological and Life Sciences (ICAASESBLS-2025), held in virtual mode on August 16–17, 2025.

- ICAR–CIRCOT, Mumbai, in collaboration with the Bureau of Indian Standards (BIS), New Delhi, organised an Awareness Seminar on "Standardisation in the Field of Physical Testing of Cotton" on August 20, 2025, at ICAR–CIRCOT, Mumbai.
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- Dr. N. Shanmugam, Dr. A. S. M. Raja, Dr. Ashok Kumar Bharimalla, Dr. A. Arputharaj, Dr. T. Senthilkumar, Dr. G. Krishna Prasad, and Dr. P. Jagajanantha participated in the Workshop for Technical Committee Members on XMLisation of Standards and Online Standards Development, organised on August 22, 2025, at BIS Western Regional Laboratory, Mumbai.

- Dr. GTV Prabu and Dr. Mansuri S. M participated one day national workshop on Charkha Development at MGIRI, Wardha, Maharastra. on August 29, 2025.

Institute Biosafety Committee (IBSC)

- The Institute Biosafety Committee was formed with the following members: Dr. N. Vigneshwaran, PS ICAR-CIRCOT, Dr. Shamlan M. S. Reshamwala, Assistant Professor ICT, Mumbai, Dr. Aparna Chaudhary, PS ICAR-CIFE, Mumbai, Dr. Rakesh Waghmare, Grant Medical College and Sir JJ Group of Hospitals, Mumbai (Biosafety Officer), and Dr. Manoj Kumar. Scientist, ICAR-CIRCOT. The inaugural meeting of the Institute Biosafety Committee (IBSC) took place at ICAR-CIRCOT on August 20, 2025.

ICAR-CIRCOT in NEWS

ICAR-CIRCOT—Bajaj develops industrial cottonseed dryer to boost cottonseed oil recovery and cake quality

Nagpur 6 August: Cottonseed serves as a valuable resource for extracting edible oil and producing protein-rich oil cakes for animal feed. The recovery of oil from cotton seed largely relies upon the moisture content in it. An optimum moisture content of 10-12% (w/w) is considered ideal for oil recovery and producing quality cakes from cottonseeds. The quality of cakes is significantly impacted if the moisture content in cottonseed exceeds 12%. However, the moisture content in cottonseed may vary from 15-40%. The processing of high-moisture cottonseeds may result in reduced oil recovery and compromised cake quality, causing financial losses to stakeholders. Additionally, storing wet cotton seeds further accelerates quality deterioration due to fungal growth and spoilage.

To address this critical issue, ICAR-Central Institute for Research on Cotton Technology (CIRCOT), in technical collaboration with M/s. Bajaj Steel Industries Ltd., Nagpur, has developed a compact, energy-efficient continuous flow type cottonseed dryer based on direct heating mechanism with the aim of enabling efficient online drying of cotton seeds directly within ginning units, thereby improving the processing efficiency and product quality. This innovation, led by scientists Dr. S.K. Shukla (Director, ICAR-CIRCOT, Mumbai), Dr. Varsha Satankar, Dr. S.V. Ghadge, Dr. K. Pandiyan, and Er. D.U. Patil, holds the potential to bring about a revolutionary transformation in cottonseed processing.

The dryer features an innovative design incorporating collapsible mild steel (MS) conveyor belts, which enable the cottonseed to be exposed to heat twice on each conveyor—once from the top and once from the bottom. This dual-surface heating mechanism not only enhances drying efficiency but also contributes to a more compact machine footprint, optimizing space utilization. The advanced combustion chamber to reduce the overheating, six stages heat exchanger with finned ducts and tubes to enhance heat transfer efficiency, a well-engineered ducting system for efficient transfer of heated air to the dryer and six stages seed conveyer with double-sided heating of cottonseed make it Smart Cottonseed Dryer for Industrial use. The system is suitable for handling throughputs of 5 TPH to 8 TPH. The dryer effectively reduces the seed moisture to the optimal level, resulting in a 2% increase in oil recovery and a 2–3% enhancement in the protein content of the resulting oil cake, thereby significantly increasing the overall value of the by-products.

This technology has been adopted by M/s. Shree Krishna Cotton Company, Saoner, and M/s. Shrigopal Rameshkumar Sales Private Limited, Mohali, Nagpur. Sh. Chandak, Shree Krishna Cotton Company, has mentioned the benefit accrued on oil recovery and quality of oil cake after adoption of ICAR-CIRCOT – BAJAJ continuous flow type cottonseed dryer. He said that about 2% increase in oil recovery along with a significant improvement in cake quality was achieved due to optimal moisture level required for efficient cottonseed processing through dryer. He also mentioned that this technology has proven to be highly beneficial for cottonseed drying, and insisted for its use in other ginneries and oil processing units to harvest the additional benefit.

Key Features:
* It reduces the moisture level to optimum level from 30-40% to 10-12%.
* It improves the oil recovery by 2% & protein content by 2-3 %
* The dryer is of continuous-flow type cotton seed dryer
* Uniform drying of the cottonseed as compared to traditional sun drying.
* Fuel efficient system, requires about 150 kg wood fuel/biomass briquette for drying of cotton seeds having 40% moisture content.
* New improved energy efficient heat exchanger design
* Finned ducts and tubes in heat exchanger enhance heat transfer efficiency.

सिरकॉट ने विकसित किया कपास बीज ड्रायर

नागपुर | अत्यधिक नमी वाले कपास बीजों की प्रोसेसिंग के कारण तेल की मात्रा में कमी और खल की गुणवत्ता में गिरावट आती है, जिससे हितधारकों को आर्थिक नुकसान होता है। इसके अलावा गीले, बीजों के भंडारण से फफूंदी और खराबी के कारण गुणवत्ता को अधिक तेजी से खराब होने की प्रक्रिया को तेज करता है। इस समस्या को हल करने के लिए, भा. कृ. अनु. प.- केंद्रीय कपास प्रौद्योगिकी अनुसंधान संस्थान (सिरकॉट) ने मे. बजाज स्टील इंडस्ट्रीज लिमिटेड, नागपुर के तकनीकी सहयोग से एक कॉम्पैक्ट, ऊर्जा-कुशल, निरंतर प्रवाह प्रकार का उन्नत ड्रायर विकसित किया है। यह ड्रायर प्रत्यक्ष हीटिंग तंत्र पर आधारित है और इसे जिनिंग इकाइयों में सीधे कपास बीजों को निरंतर सुखाने के लिए डिजाइन किया गया है, जिससे प्रसंस्करण क्षमता और उत्पाद गुणवत्ता में सुधार होता है। इस तकनीक को सिरकॉट, मुंबई के निदेशक डॉ. एस.के. शुक्ला, डॉ. वर्षा सातनकर, डॉ. एस.वी. घाड़गे, डॉ. के. पांडियन तथा इंजी. डी.यू. पाटील के नेतृत्व में विकसित किया गया है। ड्रायर की डिजाइन में कोलैप्सिबल माइल्ड स्टील कन्वेयर बेल्ट का उपयोग किया गया है।

दैनिक भास्कर | Sat, 09 August 2025
https://epaper.bhaskarhindi.com/c/77921621

ICAR-CIRCOT, Bajaj Steel develop industrial cottonseed dryer

■ Business Reporter

ICAR-CENTRAL Institute for Research on Cotton Technology (CIRCOT), in technical collaboration with Bajaj Steel Industries Ltd, Nagpur, has developed a compact, energy-efficient continuous flow type cottonseed dryer based on direct heating mechanism with the aim of enabling efficient online drying of cottonseeds directly within ginning units, thereby improving processing efficiency and product quality.

This innovation, led by scientists Dr S K Shukla, Director, ICAR-CIRCOT, Mumbai, Dr Varsha Satankar, Dr S V Ghadge, Dr K Pandiyan, and Er. D U Patil, holds the potential to bring about a revolutionary transformation in cottonseed processing.

The dryer features an innovative design incorporating collapsible mild steel (MS) conveyor belts, which enable the cottonseed to be exposed to heat twice on each conveyor once from the top and once from the bottom.

THE TIMES OF INDIA, NAGPUR
MONDAY, AUGUST 11, 2025

2 Ngp firms adopt new dryer to boost cottonseed quality

Sarfaraz.Ahmed
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KEY FEATURES

- Lowers cottonseed moisture from 30-40% to 10-12%
- Boosts oil recovery by 2% and protein in oil cake by 2-3%
- Continuous-flow dryer for steady operation
- Dries cottonseed evenly, better than traditional sun drying
- Fuel-efficient, using about 150 kg of wood or biomass briquettes to dry cottonseeds with 40% moisture
- Finned ducts and tubes improve heat transfer for faster, better drying

Nagpur: Addressing the critical issue of moisture content and oil recovery in cottonseed, ICAR-Central Institute for Research on Cotton Technology (CIRCOT), in technical collaboration with Bajaj Steel Industries, developed a compact, energy-efficient continuous flow-type cottonseed dryer. This dryer is based on a direct heating mechanism which enables efficient online drying of cottonseeds directly within ginning units, thereby improving processing efficiency and product quality.

This innovation, led by scientists Dr SK Shukla (director, ICAR-CIRCOT, Mumbai), Dr Varsha Satankar, Dr SV Ghadge, Dr K Pandiyan, and DU Patil, holds the potential to bring about a revolutionary transformation in cottonseed processing.

This technology was adopted by two cotton companies in Saoner and Mohali in Nagpur district.

The recovery of oil from cottonseed largely relies upon the moisture content in it. An optimum moisture content of 10-12% (w/w) is considered ideal for oil recovery and producing quality cakes from cottonseeds. The quality of cakes is significantly impacted if the moisture content in cottonseed exceeds 12%. However, the moisture content in cottonseed may vary from 15-40%.

The processing of high-moisture cottonseeds may result in reduced oil recovery and compromised cake quality, causing financial losses to stakeholders. Additionally, storing wet cottonseeds further accelerates quality deterioration due to fungal growth and spoilage.

The cottonseed dryer has a smart design with foldable mild steel conveyor belts that heat the cottonseed from both the top and bottom, making drying faster and more efficient. The six-stage conveyor system heats the cottonseed on both sides, making it a smart choice for industrial use. The dryer can process 5-8 tons of cottonseed per hour. It reduces seed moisture to the ideal level, improving oil recovery by 2% and increasing the protein content of the oil cake by 2-3%, which boosts the value of the by-products.

Glimpses

ICAR-CIRCOT & regional units celebrated the 79th Independence Day on August 15, 2025

Contact us

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