June 2025

International Society of Sugar Cane Technologists
Founded 1924

Bulletin

Welcome to the ISSCT Bulletin for June 2025, in which we collect latest ISSCT updates, along with news, research, and past and upcoming events related to sugar cane technology.

Contents

ISSCT News

XXXII Centennial Congress

Considerable time and energy were devoted to the organisation of the ISSCT XXXII Centennial Congress which is now in the final stages of preparation. Virtual meetings were held with Congress Organising Committee (COC), Chair Technical Programme Committee (TPC), the Editor and the Secretariat. Further meetings are planned with the inclusion of the ISSCT Executive Committee (ExCo). The items considered in those meetings were the Venue - *Valle del Pacífico Events Center* in Cali, the Pre-Congress Tour with two options which will be held from 22-23 August 2025, the Congress from 24-28 August 2025 and the Post-Congress Tour 30-31 August 2025. The preparations are on target and well in line with ISSCT regulations and traditions. A presentation of 25 slides covering these aspects as well as the social and cultural events, a partial technical programme, the registration procedures were circulated to all ISSCT members, not only to inform them but to motivate them to participate in this milestone event for ISSCT. A reduction in the congress registration fee was given to groups of 5 to 9 delegates and in excess of 10 as an incentive towards their participation.

Opening Ceremony

The Opening Ceremony will be held on Monday 25 August 2025 at 9.30 am at the *Valle del Pacífico Events Center* in Cali. It will consist of two parts. The first one will include speeches from Colombian officials, COC officers and ISSCT Chair and General Secretary. The second part will include a presentation on ***The First 100 Years of the International Society of Sugar Cane Technologists–1924-2024:*** **History and Development** and a Keynote address on the evolution of the sugarcane agroindustry in Colombia.

Social activities

There will be social activities as follows:

- Sunday 24 August – Opening of Trade Exhibition and Welcoming Cocktail
- Monday 25 August – Official Opening of Congress
- Tuesday 26 August – Cultural evening
- Thursday 28 August – Farewell Banquet

Technical Program

Pre and Post Congress Tours

The Pre-Congress Tour with two options will cover field and factory aspects. The Field topics will include: Decarbonisation, Diversification and Biofuels, Connectivity and Digital Agriculture, Sustainable Technology Adoption, Precision Agriculture, Irrigation, Compost application, Transportation using natural gas, ethanol diesel and electric fuelled tractor, Use of drones, Fleet control operations and Sugarcane Varieties for Sugar, Energy and Biofuels, among others. A visit to the world-renown research, development and innovation centre CENICAÑA is included in the program.

The Factory component will be about Preparation and extraction, Hundred percent mechanical harvesting management in a refining process, Alcohol production and added value from vinasse, Evaporation and crystallisation, Cogeneration, Fermentation, distillation, dehydration and evaporation of vinasse, Anhydrous alcohol production Water consumption and Production of paper for sustainable packaging, and other aspects related to milling and Co-Products.

Post-Congress Tour

The Post-Congress Tour will be held in the Carthagena area on the Caribbean side of Colombia will include technical visits to a Green Hydrogen Plant and the Port area.

Papers and Posters

At mid-June 162 Papers and 100 Posters have been finalised. There are still 15 submissions to be completed but the program should be available by the end of June. The Technical Program will comprise, apart from oral communications and posters presentations, 41 other presentations from the Centennial Volume. An innovation will be the digital display of posters which should render them more attractive and interactive. Presentations will start after lunch on Monday 25 August 2025 and will run through the following three days.

Plenary Sessions

Three plenary sessions will be also held at Congress on the themes:

- **Climate Change and Adaptation**. Speakers: Luis Fernando Salazar, UNALA, Guatemala Glaucia Souza, University of São Paul, Brazil; Marilia Capellaro Ferreira, Bonsucro Limited, UK; Christophe Poser and Mathias Christina, CIRAD, France
- **Artificial Intelligence**. Speakers: Martin Hilbert, University of California, USA; Guilherme Fraga, Sãn Martinho, Brazil.
- **Molecular Biology**. Speakers: John Jaime Riascos, CENICAÑA, Colombia; Michael Butterfield, Centro de Tecnologia -Canavieira (CTC), Brazil; Michael Jones, Murdoch University, Australia.

Centennial volume on contribution of ISSCT to the progress of the sugar industry during its existence

A Centennial Volume entitled: ***The First 100 Years of the International Society of Sugar Cane Technologists–1924-2024*** in two Parts namely: History and Development and Research Advances and Impact is in the final stage of preparation. The first part contains one contribution and the second part 40 ones. Four periods had been considered: 1924-1938; 1950-1974; 1975-1999; 2000-2023. A digitalised version will be made available to all compliant ISSCT members at the time of the Congress. It will also be uploaded on the website.
The aspects covered are:

- Advancements to industry through R&D
- Impact of advancements on industry
- Three personalities that have distinguished themselves in R&D in the disciplines concerned.

For the first part a single presentation will be made at Congress while for the second part the authors who have contributed will make each a 15-minute PowerPoint presentation at the beginning of the oral presentations of each Sections/Commission. Those who are not attending will provide presentations which will entrusted to a member knowledgeable in the area concerned.

Trade Exhibition

There will be the usual Trade Exhibition at Congress. Some 70 Corporate members have already confirmed their participation and more are expected to register in the weeks ahead. The exhibitors include producers and exporters of industrial and agricultural machinery as well as others who will demonstrate advanced technologies and various innovations including Artificial Intelligence which the industry could avail itself for its improvement and progress in the years ahead. The official opening of the Trade Exhibition will take place on Sunday 24 August 2025 at 6 pm and will be followed by a Welcoming Cocktail.

Accompanying Persons' Program
There will be Accompanying Persons' Programs during the Pre- and Post-Congress Tours as well as during Congress. These will comprise visits to botanical gardens, museums, ecological parks, haciendas, historic monuments, lunches and dinners in reputed restaurants, cultural shows, etc… The programme will enable the participants to enjoy the exclusive cachet of the Colombian charming cities with their most iconic landmarks from the historic centres with their colonial architecture and colourful streets to the beautiful beaches. It will be a truly unforgettable experience to discover the history, culture and magic of Colombia.

Awards and recognition
Awards will be made at the XXXII Congress to the prominent sugarcane technologists who have been designated in the contribution for each of the 10 disciplines and the four periods mentioned above. Some awards will have to be made posthumously, especially for the periods 1924-1938 and 1950-1974.

Personalities and institutions which have contributed significantly to the advancement of the Society during its existence, will be given proper credit and recognition.

Best Papers and Posters
The best papers and posters will be awarded according to the usual criteria included in the TPC Operations Manual.

Memorabilia
A centennial pin will be given to all delegates with the ISSCT logo and the Centennial Congress one with the dates 1924-2024 engraved.

Participation
Invitations have been sent to all members of the Society in excess of 3000 and beyond to encourage them to take part in the Centennial Congress which will be

an unforgettable experience given that no effort has been spared to set up a scientific and technical program of high level and social activities that will bring the delegates and their partners together in an atmosphere of conviviality which will allow networking, revival of established links and creation of new ones for the projection the Society into the future.

Governance

Meetings

Meetings of ExCo/TPC/COC together and separately will take place on Thursday 21, Sunday 24, Tuesday 26, Wednesday 27 and Thursday 28 August 2025.

Council will be meeting on three occasions on Sunday 24, Monday 25 and Wednesday 27 August 2025.

The Agenda will be circulated in late July 2025 one month ahead of Congress.

Executive Committee

At the end of the XXXII Congress, there will be five vacancies at the level of ExCo, but three outgoing members are re-eligible.

Nomination of candidates for election to ExCo shall be made on the prescribed form (Form 5 - https://issct.org/form5exec/), supported by a proposer and a seconder, both members of the ISSCT, together with a written Curriculum Vitae including a record of qualifications as specified in Article V: The Executive Committee; sub-clause 2.1 (https://issct.org/about-issct/constitution/)

Such nominations shall be submitted to the General Secretary not later than noon on the first day of Congress on 25 August 2025. The documents must be submitted to the Compliance Committee which must report on the eligibility of the nominees to the third meeting of Council at Congress on Wednesday 27 August 2025.

Hosting of the XXXIII Congress

As per Constitution Article IX - The Congress; Clause 2 - https://issct.org/about-issct/constitution/, Affiliated members have been invited to host the XXXIII Congress in 2028. Bids on the prescribed Form 1 (https://issct.org/hostcongform1/)– should reach the General Secretary by 25 July 2025, at latest.

Dr Peter Allsopp awarded Member of the Order of Australia

Congratulations to Dr Peter Allsopp, ISSCT Editor (Ex-officio), who has been recognised for significant service to entomology and to the sugar cane sector, with the award of Member of the Order of Australia.

The Order of Australia recognises Australians who have demonstrated outstanding service or exceptional achievement.

Sugar Cane News

Shaping future sugarcane: Researchers propose ideal plant architecture and breeding strategies

PHYS.ORG	**Phys.org**	**April 29, 2025**	**https://phys.org/news/2025-04-future-sugarcane-ideal-architecture-strategies.html**
	In an article published in Molecular Plant on April 8, researchers led by Prof. Wang Bing and Prof. Li Jiayang from the Institute of Genetics and Developmental Biology (IGDB) of the Chinese Academy of Sciences (CAS) have proposed an innovative concept of "ideal plant architecture for sugarcane" and discussed the challenges, opportunities, and strategies for shaping it. *This article provides new insights for achieving breakthroughs in sugarcane yields and has significant implications for ensuring global sugar security.*		

Virgin Australia and Qatar Airways partner for sugarcane-to-SAF project

	Bioenergy Insight	**April 14, 2025**	**https://www.bioenergy-news.com/news/virgin-australia-and-**

			qatar-airways-partner-for-sugarcane-to-saf-project/

Virgin Australia and Qatar Airways have agreed to work together with Renewable Developments Australia (RDA) to become key partners on a project that will set out to deliver a homegrown Sustainable Aviation Fuel (SAF) production facility in the Charters Towers Region of North Queensland.

The project aims to establish a fully-integrated Ethanol to Jet (EtJ) facility that converts bioethanol derived from sugarcane grown onsite into 100% SAF, using proprietary PureSAFSM technology supplied from KBR, while also generating all of the project's energy requirements from renewable sources.

School made from sugarcane waste signals a new era in sustainable construction

	Brighter	**April 28, 2025**	https://www.thebrighterside.news/post/school-made-from-sugarcane-waste-signals-a-new-era-in-sustainable-construction/ **Sugarcrete page (UEL):** https://www.uel.ac.uk/sugarcrete

As the global climate crisis worsens, finding greener ways to build homes, schools, and cities has never been more urgent. One of the most promising breakthroughs is emerging from the University of East London's Sustainability Research Institute, where a team has created Sugarcrete™ — a new building material that could change construction forever.

Working with Tate & Lyle Sugars, the team combined bagasse, the fibrous waste left after processing sugarcane, with special sand and mineral binders. What they produced isn't just another eco-friendly idea. Sugarcrete™ could offer a way to build structures with a fraction of the carbon emissions of traditional materials.

Sunlight and sugarcane waste power hydrogen production at rate four times higher than commercialization benchmark

	TechXplore	**April 22, 2025**	https://techxplore.com/news/2025-04-sunlight-sugarcane-power-hydrogen-production.html

A technology for hydrogen (H_2) production has been developed by a team of researchers led by Professors Seungho Cho and Kwanyong Seo from the School of Energy and Chemical Engineering at UNIST, in collaboration with Professor Ji-Wook Jang's team from the Department of Materials Science and Engineering at UNIST.

This innovative method utilizes biomass derived from sugarcane waste and silicon photoelectrodes to generate H_2 exclusively using sunlight.

New technology helps grow paddy as co-crop with sugarcane [Bangladesh]

	The Financial Express Insight	**May 18, 2025**	https://thefinancialexpress.com.bd/national/country/new-technology-helps-grow-paddy-as-co-crop-with-sugarcane
FE The Financial Express	*Agriculture scientists have innovated a new technology of cultivating paddy as co-crop with sugarcane attaining a unique success in the cost-effective production of the two crops in the same place together.* *In the last one decade, due to losses in cultivation, sugarcane production in Pabna and surrounding districts has decreased remarkably. As a result, sugar mills in North Bengal have struggled to meet the threshing target due to lack of raw materials. Agricultural scientists at Bangladesh Sugarcrop Research Institute (BSRI) in Ishwardi upazila of Pabna district have developed the method of cultivating paddy as a companion crop with sugarcane to overcome this crisis and make sugarcane farming profitable.*		

CTC unveils sugarcane technologies to generate R$60bn [Brazil]

	Valor Agribusiness	**April 16, 2025**	https://valorinternational.globo.com/agribusiness/news/2025/04/16/ctc-unveils-sugarcane-technologies-to-generate-r60bn.ghtml
Valor Agribusiness	*CTC (Sugarcane Technology Center) is rolling out a new suite of technologies for Brazil's sugarcane sector in the 2025/26 season, which began in April.* *According to the company, the innovations could generate R$60 billion over the next 15 years. The launch includes a new series of genetically improved sugarcane varieties, a biotechnology platform, and progress in the development of synthetic cane seeds.*		

China to boost investments in Brazil by $27B, Lula says

	Agência Brasil	**June 12, 2025**	https://agenciabrasil.ebc.com.br/en/politica/noticia/2025-05/china-boost-investments-brazil-27b-lula-says
agênciaBrasil 35 anos	*Brazilian President Luiz Inácio Lula da Silva announced that China will invest a further BRL 27 billion in Brazil. Their focus is on infrastructure and technology, but investments should also cover education, as extensive training will be necessary.*		

	The new deals include a $1 billion investment in the production of renewable aviation fuel from sugar cane and the creation of a research and development center for renewable energy, the Planalto presidential palace reported.

'World's first' boiler-less sugarcane processing technology becomes commercially viable [India]

	Deccan Herald	**April 15, 2025**	https://www.deccanherald.com/india/assam/worlds-first-boiler-less-sugarcane-processing-technology-becomes-commercially-viable-3494174
DH DECCAN HERALD	*The boiler-less sugarcane processing technology, claimed to be the world's first such mechanism and installed in a plant in Assam four years ago, is now commercially viable, the company that developed the system said.* *A plant in central Assam's Hojai district has been using this technology which allows it to produce jaggery from sugarcane juice without burning any of the residual biomass, company officials claimed.*		

Drone technology vital to boost sugarcane yield, cut costs: Experts [Pakistan]

	Associated Press of Pakistan	**April 27, 2025**	https://www.app.com.pk/domestic/drone-technology-vital-to-boost-sugarcane-yield-cut-costs-experts/#google_vignette
APP Associated Press of Pakistan DIGITAL	*The introduction of drone technology has the potential to revolutionize the sugarcane sector in Pakistan by reducing costs, increasing productivity, and promoting environmental safety, said agricultural scientists and sugarcane experts Dr. Asif Tanveer and Dr. Shahid Afghan while talking to APP.* *They emphasized that urgent adoption of this precision agriculture tool could help Pakistan achieve its goal of becoming one of the world's leading sugarcane producers while doubling farmers' income.*		

DOST, Philsurin Launch Sugarcane R&D Projects in Philippines

DailyGuardian	**Daily Guardian**	**April 22, 2025**	https://dailyguardian.com.ph/dost-philsurin-launch-sugarcane-rd-projects-in-philippines/

	Two newly launched projects aim to strengthen the Philippine sugarcane industry by developing high-performing varieties with improved drought tolerance and disease resistance. *Sugarcane-growing areas in the country experience dry periods lasting 4.5 to 6 months, making drought tolerance a critical trait for sustainable production.*

Latest Research

Advances in Sterile Insect Technique Driven by Sugarcane Pest Management in South Africa

Eldana saccharina, also known as the African sugarcane stalk borer, is an insect pest indigenous to Africa that targets gramineous crops such as sugarcane, maize (corn), sorghum, and millet in several countries, including Zimbabwe, Mozambique, Ethiopia, Ghana, Nigeria, and others. In South Africa, E. saccharina is the most damaging pest of sugarcane. The larvae feed internally on plant tissue, leading to a significant reduction in sugarcane yield. In South Africa, this damage amounts to over $60 million in annual revenue losses.

In 1939, the first severe outbreak of this pest was recorded on sugarcane in South Africa. Since then, E. saccharina has spread throughout the sugarcane-growing areas of South Africa, affecting both coastal and inland regions (see map). Since the 1970s, the South African Sugarcane Research Institute (SASRI) has been actively involved in conducting research to control this pest. Over the years, attempts have been made to manage E. saccharina using a variety of control tactics, including insecticides, varietal resistance, biological control, and habitat management. A more recent control strategy is the ***sterile insect technique*** *(SIT), which is currently in the proof-of-concept phase at SASRI.*

Published May 22, 2025

> **Link**

Implications of technological improvement and circular agriculture on environmental sustainability of sugarcane production

The spatially differentiated environmental impacts and associated costs of technological improvement and circular agricultural practices in sugarcane production were assessed. Analysis of the cause-effect relationship between the key processes and substances each helped develop alternative scenarios for impact reduction. $PM_{2.5}$ emissions contributed to 92 % of the total human health impacts from open burning of field residues. Freshwater ecotoxicity, mainly due to ametryn emissions from pesticide application, contributed to 47 % of the total damage to the ecosystem. The environmental costs were 116 % higher than the value of sugarcane production, signifying the critical importance of adopting alternative pathways that provide economic benefits from environmental cost reduction compared to the production value. Scenarios considering green cane harvesting and waste management approaches demonstrated high potential for total impact reduction of 99 % and 97 %, respectively, and economic gains of 202 and 225 billion THB, respectively (5.76 and 6.42 billion USD, respectively). The economic benefits of waste utilization were 137 % higher than the value of sugarcane production, demonstrating the potential benefits of product substitution to help mitigate impacts. The core findings highlight the significance of the $PM_{2.5}$ impact-related external costs and underscore the benefits of adopting green cane harvesting in conjunction with on-field *waste utilization to mitigate the impact of open burning and produce value-added products. Technological improvement and circular agricultural practices coupled with valuation of spatially differentiated impacts can provide useful and more accurate information to policymakers, to prioritize the implementation of mitigation strategies for enhancing the environmental sustainability of sugarcane production.*

To be published: September 2025, article available now

> Link

A near real-time spatial decision support system for improving sugarcane monitoring through a satellite mapping web browser

The global importance of sustainable sugarcane as a source of food and energy has driven the development of decision-making tools based on remote sensing (RS) to improve crop management. An approach in agricultural lands is the implementation of spatial decision support systems (S-DSS) for crop monitoring. However, most of these systems are designed for global or regional scales, limiting their applicability to local contexts with specific requirements. This study proposes a methodology to address some weaknesses associated with the underuse of S-DSS by integrating end-user requirements into the design process. To achieve this an easy-to-use near real-time S-DSS was developed, tailored to the needs of two sugarcane cooperatives in Costa Rica, validated with real data and field work, and adapted to three management scales (cooperative, farm and plot). Our Sugarcane Satellite Tracking (SugarSaT) provides two core tools: sugarcane harvest progress monitoring and an early warning system. The results validated that SugarSaT offers a suitable approach for the monitoring of sugarcane plantations that uses current and historical satellite data. Regarding the harvested area, more than 93 % of plots was correctly identified when 100 % of the sugarcane was delivered to the mill whereas about the early warning system, a plot test considering anomalies caused by bloom achieved an overall accuracy of 75.3 %. A usability test revealed that 83 % of the surveyed agronomic advisors believed that SugarSaT is suitable for integration into their daily activities. In conclusion, this S-DSS represents a significant step forward in sugarcane monitoring, enabling agronomic advisors to leverage satellite imagery for spatially informed decision-making while balancing scientific insights with the practical needs of end-users.

To be published: December 2025, article available now

> Link

Salty Challenges and Remedial Strategies in Sugarcane: Exploring the Impact of Salinity and Innovative Approaches for Adaptation

Journal of Crop Breeding

Sugarcane (Saccharum officinarum L., from the family Poaceae) is one of the most economically important crops globally, widely cultivated in tropical and subtropical *regions due to its production of sugar, ethanol, bioenergy, and bagasse. Given its key role in providing renewable energy and derived products, sugarcane is a major focus of agricultural and industrial research. However, one of the most significant challenges impacting sugarcane production, especially in saline areas, is salinity stress. Soil salinity is one of the most critical environmental stresses, leading to reduced plant growth and yield, posing a serious global threat to agricultural production. Salinity stress negatively affects sugarcane growth and development in several ways, including reduced water uptake, disruption of metabolism, and accumulation of sodium in plant tissues. As a result, the severe decline in yield and product quality in saline areas has become a major concern for both farmers and researchers. This review aims to examine the challenges posed by salinity in sugarcane and to present innovative remedial strategies for enhancing the crop's resistance to salinity.*

Published: March 2025

> **Link**

Sugarcane and Energy Cane, A Valuable Biofuel Substitute For Petroleum Gasoline

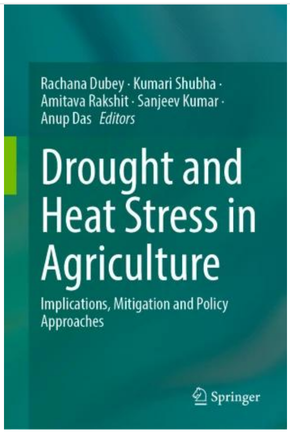
científica digital

This chapter examines the progressive role of sugarcane in sustainable biofuel production, highlighting the distinctions between first-, second-, and third-generation (1G, 2G, and 3G) ethanol. First-generation ethanol is derived from the fermentation of sugars in sugarcane juice, but this method is constrained by limited productivity and a tradeoff between sucrose and fiber content. Second- -generation ethanol improves upon this by utilizing lignocellulosic residues such as bagasse and straw, enhancing energy yield per hectare without expanding land use. However, it requires complex pretreatment and enzymatic hydrolysis processes. Advances like deep eutectic solvents, mechanocatalysis, and engineered microbes are improving the feasibility of 2G ethanol. The third-generation approach targets non-food biomass sources such as marine algae and enhanced energy cane varieties, which offer high fiber content and adaptability to marginal environments. These 3G technologies promise carbon-neutral fuel but remain challenged by high costs, energy-intensive hydrolysis, and the need for optimized microbial fermentation of diverse sugars. Energy cane emerges as a key transitional crop, offering superior yields (up to 180 tons per hectare), greater stress tolerance through robust rhizome systems, and multi-cycle productivity, thereby lowering operational costs and supporting bioelectricity co-generation. While 1G ethanol is well-established and 2G is commercially emerging, 3G holds the most transformative potential by addressing food security concerns, maximizing biomass conversion, and aligning with low-carbon economic goals. Ultimately, energy cane acts as a vital "green necklace" connecting traditional and future biofuel strategies, reinforcing Brazil's potential leadership in global renewable energy transition.

Published: 2025

> **Link**

Utilization of Nanotechnology for Mitigation of Drought and Heat Stress in Crop Plants



The looming challenge of feeding a global population projected to reach 9 billion necessitates substantial increases in food grain production. Concurrently, climate change, manifesting through increasing occurrences of drought and heat stress, poses a significant threat to agricultural productivity. Drought and heat stress are critical factors causing substantial reductions in the growth and yield of crop plants. Heat stress, defined as temperature rise beyond a threshold causing irreversible damage to crops, along with decreasing rainfall and its variability, have escalated the frequency and severity of drought events. Recent data indicate a fourfold increase in drought frequency from the 1970s to the 2010s, highlighting the urgency of this issue. The impacts of these stresses are profound, with major crops like wheat, maize, rice, and sugarcane experiencing significant yield reductions. These reductions directly threaten global food security, particularly in countries like India, where a large portion of the workforce relies on agriculture. Addressing these challenges necessitates innovative and cost-effective approaches. Traditional agronomic and breeding methods have provided some mitigation but face limitations in cost and expertise. Emerging technologies, particularly nanotechnology, offer promising solutions. Nanoparticles, due to their unique physical and chemical properties, can enhance crop productivity under stress conditions. They improve seed germination, vegetative growth, and yield components by increasing chlorophyll content, net photosynthesis, and biomass accumulation. Additionally, nanoparticles boost antioxidant enzyme activities, enhance root hydraulic conductance, and improve nutrient use efficiency. The application of nanofertilizers further mitigates abiotic stress by reducing resource use and greenhouse gas emissions. Thus, nanotechnology presents a viable pathway to enhance agricultural resilience against drought and heat stress, ensuring sustainable food production in the face of climate change.

Published: May 30, 2025

> **Link**

Data Labelling and Heuristics to Estimate Sugar Cane Rows Orientation For Uav-Aided Precision Agriculture

SSRN

With the growth of the world population, the demand for agricultural areas has reached the limits of sustainability. It is then urgent to increase the efficiency of plantations, producing more crops without increasing the planted areas. Precision Farming has emerged in this context, integrating state-of-the-art technologies into agricultural systems. One of the most demanded cultivars is sugarcane, used as food and biofuel. However, its long growth cycle and sensitivity to mechanical damage necessitate highly accurate harvesting processes. Traditional GNSS-guided autonomous harvesters suffer from positioning inaccuracies that can lead to significant crop loss through stump crushing and soil compaction. This study presents a novel image-based method for estimating sugarcane row orientation using Unmanned Aerial Vehicles (UAVs) to augment autonomous harvester guidance. Agricultural experts manually labelled aerial imagery captured by UAVs, and a ground truth dataset was constructed through the *probabilistic fusion of annotations using a static Kalman Filter—accounting for inter-expert variance. The proposed method employs an image processing pipeline involving Excess Green Index transformation, morphological filtering, and a rotation-based projection technique, refined by a Savitzky-Golay filter to identify crop row angles. The system was implemented and benchmarked on an embedded SoC-FPGA platform (Xilinx ZCU104), demonstrating real-time performance and angle estimation accuracy within application tolerances. Experimental validation across heterogeneous field conditions showed a median angular error of 0.9° and a processing time of 2.82 seconds per image, indicating the method's suitability for real-time UAV-assisted crop orientation correction. This work contributes a validated heuristic framework, an expert-fused labelled dataset, and insights into the feasibility of embedded implementations for precision agriculture.*

Published: May 28, 2025

> **Link**

Occurrence and field evaluation of sugarcane genotypes for resistance to ring spot disease in China

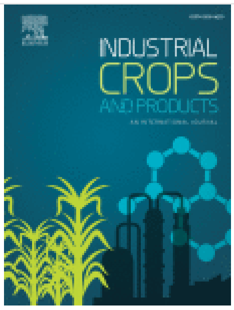
Sugarcane ring spot disease significantly impacts crop yield, necessitating the development of resistant cultivars. This study investigated the pathogenicity, morphology, growth characteristics, and molecular identity of the causal fungal pathogen while assessing the resistance of various sugarcane genotypes. Morphological and molecular analyses identified Curvularia guangxiensis as the primary pathogen. Pathogenicity assays demonstrated that strain FS1 exhibited greater virulence than strain BH1, inducing more severe leaf lesions. FS1 also displayed a higher growth rate on potato dextrose agar (PDA) and triggered earlier symptom onset. A multifactorial analysis of genotype, location, and year revealed significant effects on disease incidence, with broad-sense heritability estimated at 0.7, highlighting substantial genetic and environmental contributions. Cluster analysis categorized sugarcane genotypes into five resistance groups, identifying CP81-1258 and Q202 as highly resistant, while CP88-1762, FN07-2020, and GT94-119 were highly susceptible. These findings provide critical insights for breeding resistant sugarcane cultivars and optimizing disease management strategies.

Published: 5 June, 2025

> **Link**

Unmanned aerial vehicle-based prediction of cold tolerance indicators in sugarcane (*Saccharum* spp. hybrids) varieties

Louisiana is one of only two remaining sugarcane producing states in the U.S., and the industry is faced with labor shortage. Integration of predictive models incorporating markers offers a non-destructive tool for precision breeding. Chemical markers allow a direct measurement of damage and tolerance for sugarcane against winter freeze, which is the primary abiotic stress in Louisiana representing the northernmost sugarcane growing region worldwide. This study first utilized exploratory (cluster and principal component) analyses to show the effects of air temperature, but not genotype, on red, green, and blue reflectance data collected by unmanned aerial vehicle (UAV). Of tested algorithms (multiple linear regression (MLR), XGBoost, partial least squares, and artificial neural network), best fit models were obtained by MLR for yield (theoretical recoverable sugar, Cane Pol, Cane Brix, fiber, and moisture content), primary product (sucrose), and freeze damage indicators (fructose and glucose hydrolysis products of sucrose). Parts per million-level cold tolerance indicator (tyrosine-like fluorophore) and additional secondary products (polyphenols and trans-aconitic acid) in juice were modeled after concentrations were normalized to the canopy coverage, as the UAV sensor is detecting the canopy pixels. Built models could be used in freeze damage assessment as well as marker-assisted tolerant variety development, without the constraint of waiting for the abiotic stress to happen.

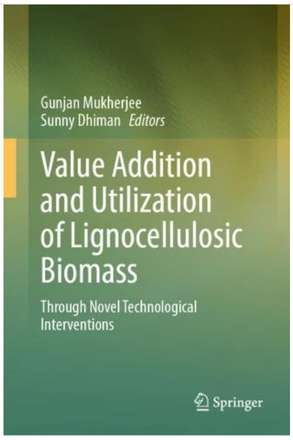


Published: January 21, 2025

\> **Link**

Bioethanol for "Bharat" (India): A Focused Journey Toward Sustainability

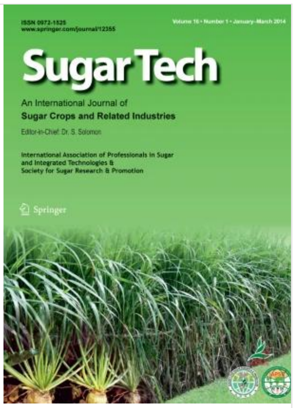
The Indian government has been strengthening its Ethanol-Blended Petrol (EBP) program in an effort to become more self-sufficient in the energy sector in a sustainable manner. Presently, Indian ethanol producers and oil marketing companies (OMCs) are striving to achieve a 20% ethanol blending target nationwide by 2025–2026, which calls for more than 1000 crore liters of ethanol. Apart from being renewable, ethanol when blended with petrol is also a better fuel for the environment than regular fossil-based petrol. Over the past few years, the country has witnessed a notable expansion in the ethanol sector, with over 100 new distilleries, and marked the capacity of 1623 crore liters by 2023–2024. The Indian government's diversification of feedstocks allows producers to ferment ethanol from a variety of sources, including sugarcane juice, syrup, starchy grains like surplus rice, maize, and damaged food grains, in addition to molasses, which was previously the primary raw material for bioethanol production. This allows flexibility for the producers to produce 1G ethanol. The work has also been done and is still being done in the area of 2G ethanol, which uses lignocellulosic feedstocks such as agro-residues to ferment fuel-grade ethanol.



Published: March 29, 2024

\> **Link**

Growth Analysis and Simulation Approach for Sugarcane Genotypes Grown Under Different Growing Seasons



Selecting the appropriate genotypes for various growing seasons and environments could improve sugarcane productivity, and the decision support system for agrotechnology transfer (DSSAT) program offers a tool to decrease time and resources for this process. The objectives of this study were to evaluate the performances of four sugarcane genotypes (Phukeaw 1 (PK1), Phukeaw 2 (PK2), MPT09-296, and Khon Kaen (KK3)) for planting dates of 1 Mar 2020 and 15 Dec 2020, and to calibrate and validate the genetic coefficients of four sugarcane genotypes for the Canegro model. Four sugarcane genotypes were evaluated using a randomized complete block design (RCBD) with four replications in two growing periods from 2020 to 2021 in Chaiyaphum, Thailand. Soil characteristics before planting, crop traits, weather data, and management data were recorded as input for model calibration to determine the genetic coefficients. Low temperatures and solar radiation were associated with low biomass accumulation rates when planting on 15 Dec 2020. KK3 appeared to be a good genotype in terms of total and stalk dry weights at the final harvest. On the 1 Mar 2020 planting date, KK3 showed the highest value of CGR from 4 to 6 MAP and 8–10 MAP, except for the 15 Dec 2020 planting date, where it achieved the highest value of CGR only from 4 to 6 MAP. The calibration results generally showed good accuracy between simulated and observed sugarcane traits, as indicated by d-stat values above 0.8 for all sugarcane genotypes. For model validation using an independent data set, the results revealed fair to good agreement between simulated and observed values for total stalk dry weight, stalk height, and sucrose percentage. This suggests the model's potential as a tool for evaluating sugarcane genotype performance across different growing seasons.

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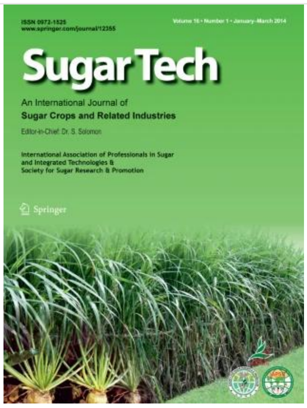
Repurposing Spent Sugarcane Bagasse Biosorbent from Waste Lubricating Oil Spill into Biochar



This research explored the potential of sugarcane bagasse (SGB) as a sustainable biosorbent material for waste lubricating oil spill remediation. Then the study introduces an eco-novel strategy for repurposing expended sugarcane bagasse (SGO) that has been used to clean up lubricating oil into biochar and pragmatically analyzes the impact of sorbed oil on the resulting biochar. A non-electric and low-temperature auto-thermal, top-lit updraft gasifier was employed to carbonize the bagasse feedstocks for 120 min. At peak temperatures of 311 °C and 321 °C, a yield of 31.30% and 23.47 wt.% was recorded for SGB and SGO, respectively. The SEM, FTIR, and BET analyses revealed that the sorbed lubricating oil had some positive impact on SGO. Firstly, the textural profile analysis showed that both biochars are mesoporous, with SGO having a superior surface area of 542.265 m^2/g compared to SGB (527.645 m^2/g). The FTIR analysis also reveals the presence of different O-containing functional groups, with SGO having more

carbon networks in these functional groups. The SEM analysis shows that the biochar samples have a heterogeneous mixture of particles with various layered structures, shapes, and sizes. More specifically, SGB has a striated structure with slit-shaped pores, while SGO has a network of blind, open, and closed interconnected pores with a glossily rough structure. The improved SGO biochar exhibits meritorious potential in practical applications like fillers for composite production, and energy storage devices, thus demonstrating an eco-conscious solution for repurposing expended biosorbent and promoting environmental sustainability. **Published: April 1, 2024** > **Link**	

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