Welcome to the ISSCT Bulletin for December 2022, in which we collect latest ISSCT updates, along with news, research, and past and upcoming events related to sugar cane technology.

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ISSCT News

XXXI Congress

The preparations for the XXXI Congress are proceeding well with registration having gathered momentum during the past weeks. As already mentioned, the Early Bird Registration Rate of USD 1100 is maintained until 15 January 2023.

Concerning the technical programme there will be 130 papers, 55 posters and 8 webinars' reports. There are four outstanding papers which are about to be finalised.

The number of papers and posters per discipline is given below:

Plenary papers	9
Agricultural Engineering papers	7
Agricultural Engineering posters	3
Agronomy papers	19
Agronomy posters	23
Germplasm and Breeding papers	15
Germplasm and Breeding posters	4
Entomology papers	8
Entomology posters	6
Pathology papers	10
Pathology posters	2
Molecular Biology papers	6
Molecular Biology posters	3
Factory Engineering papers	12
Factory Engineering posters	2
Factory Processing papers	18
Factory Processing posters	3
Coproducts papers	14
Coproducts posters	3
Management papers	7
Management posters	-
Webinar reports	8
	182

The programme will be circulated in week 26 December and also uploaded on the ISSCT and the Congress Websites.

Plenary Sessions

There will be three plenary sessions as follows:
Agriculture - Growing organic sugar, regenerative agriculture, modelling climate change

Co-Products – Importance of diversification and integration in the Indian sugar industry, sugar beet products, alternative sugars

Sugar and health – health effects of sugars versus alternative sweeteners, the challenge of sugar reformulation – some examples from the UK, Sugars and Health: what does the latest evidence tell us?

There will be three guest speakers one for the Agriculture session and two for the Sugar and Health session. There CVs will be detailed in the January 2023 issue of the ISSCT Bulletin.

Trade Exhibition is meeting with success as all but two booths have been reserved by companies supplying equipment and services to the sugarcane industry worldwide.

Visa

Concerning entry visa into India: it is recommended that application be made for a tourist visa. E-Visa is accessible in most countries. Applicants should produce their air ticket and hotel voucher in support of their application. Conference visas are also available but the procedure is more complex and those wishing to avail themselves should contact COC (Mr. Sanjay Awasthi - sanjayawasthi@isgec.co.in) who will provide advice and the documents required.

Further information is available on the Congress Website at https://issctcongressindia2023.in/ Or from the ISSCT Secretariat at issctsecretariat@gmail.com

Please note that to attend the Congress you must be a compliant member of ISSCT. The Individual Membership dues are USD 140 and may be settled through the following link:
http://members.issct.org/appform/issct_india_2022.aspx



Sugar Cane News

Straw and sugar cane replace coal in low-carbon iron-making process

	Institution of Mechanical Engineers	**November 24, 2022**	**https://www.imeche.org/news/news-article/straw-and-sugar-cane-replace-coal-in-low-carbon-iron-making-process**

Known as the Biolron process, the technique was developed by Anglo-Australian metals and mining firm Rio Tinto. It has been tested over the last 18 months in Germany by a team from Rio Tinto, Finnish sustainable technology company Metso Outotec and the University of Nottingham, which yesterday (23 November) declared that its 'effectiveness… has been proven'.

Designed to provide a potentially cost-effective option to cut industrial carbon emissions, the Biolron process uses plant matter, known as lignocellulosic biomass – such as wheat straw, sugar cane bagasse, canola sticks or barley straw – instead of coal. The biomass is blended with iron ore and heated by a combination of combusting gases released by the biomass and high-efficiency microwaves, which can be powered by renewable energy. The method converts iron ore to metallic iron.

"It has been incredibly exciting to have the opportunity to take part in this research that, if developed to a commercial scale, has the potential to have an immense impact on decarbonisation within the steel production process. We look forward to continuing to support Rio Tinto as it enters the next phase of testing, and hope that it yields just as much success," said Chris Dodds, head of the department of chemical and environmental engineering at the University of Nottingham.

Syngenta introduces 'Crop Doctor' feature in its app to provide instant solutions for pest and disease attacks

	Agriculture Post	**November 19, 2022**	**https://agriculturepost.com/agritech/syngenta-introduces-crop-doctor-feature-in-its-app-for-instant-solution-for-pest-and-disease/**

Syngenta, a leading science-based global agriculture company, Friday announced the introduction of Crop Doctor feature in its Cropwise Grower App, an AI-powered tool offering swift, simple and effective solutions for farmers to identify pest or disease attacks and get an instant remedy.

Announcing Crop Doctor, Susheel Kumar, MD and Country Head, Syngenta India said, "Globally farmers are facing challenges including climate change, soil erosion and biodiversity loss, as well as having to manage changing consumer expectations. We work on supporting farmers by further improving the way crops are grown and protected, and to work with partners to find solutions that address environmental, societal and economic challenges. The newly added Crop Doctor feature in the Cropwise Grower App will be very helpful for the farmers."

Can an AI-powered insect trap solve a $220 billion pest problem?

	CNN Business	**November 24, 2022**	**https://edition.cnn.com/2022/11/24/business/trapview-ai-pest-management-spc-**

			intl/index.html
	Pests destroy up to 40% of the world's crops each year, causing $220 billion in economic losses, according to the UN Food and Agriculture Organization (FAO). Trapview is harnessing the power of AI to help tackle the problem. *The Slovenian company has developed a device that traps and identifies pests, and acts as an advance warning system by predicting how they will spread.* *"We've built the biggest database of pictures of insects in the world, which allows us to really use modern AI-based computing vision in the most optimal way," says Matej Štefančič, CEO of Trapview and parent company EFOS.* *Trapview says it has sold over 7,500 devices in more than 50 countries since it launched in 2012. It has focused on Italy, France, Spain, the United States and Brazil, targeting crops as varied as grapes, tomatoes, olives, tree fruits, brassicas, cotton and sugarcane.*		

SCG unveils new green tech: 'Bio-coal', purifier on show during summit

	Bangkok Post	**December 2, 2022**	**https://www.bangkokpost.com/business/2451439/scg-unveils-new-green-tech**
	Sony will start to replace plastic as a packaging material for its products starting in 2023. *SET-listed Siam Cement Group (SCG), Thailand's largest cement maker and industrial conglomerate, continues to position itself as focused on the environment and health by developing two new technologies that can reduce carbon dioxide and help clean the air.* *The technologies, displayed during the Asia-Pacific Economic Cooperation (Apec) summit that ended last month, are an air purifier and "bio-coal" that can replace fossil fuel-derived bituminous coal.* *SCG is in the process of making bio-coal from various types of agricultural waste such as sugar cane leaves. Many farmers harvest sugar cane by burning because of a lack of workers, but they can cut the plants instead and sell the sugar cane leaves to SCG. Using sugar cane leaves to make bio-coal can save 350,000 rai of sugar cane plantations from burning, said Mr Nithi..*		

Australia's first fully traceable sustainable sugar exported from Queensland to South Korea [Australia]

	ABC News	**November 18, 2022**	**abc.net.au/news/rural/2022-11-18/first-traceable-sugar-shipment-townsville-to-south-korea/101662058**
	Tracking your sugar from the paddock to the supermarket shelf is now a reality with the help of blockchain technology. *In an Australian-first trial, 25,000 tonnes of sustainable Queensland raw sugar is being shipped from Townsville to South Korea.* *The product will be traceable through the entire supply chain.* *Mark Hampson from Queensland Sugar Limited, Australia's largest raw sugar marketer, said the initiative reflected the desire of consumers to become more sustainable buyers.* *"Consumers are demanding more traceability and a better understanding of where their product*		

	comes from, how it's produced, and how it's managed through the supply chain," he said.

$14.25 million grant to boost good jobs with sugarcane industry partnership [Australia]

	Queensland Government	**December 8, 2022**	**https://statements.qld.gov.au/statements/96765**
Queensland Government	*In a partnership that goes back to the 1900s, the Queensland Government is continuing its support for our sugarcane industry with a 5-year $14.25 million funding grant to Sugar Research Australia Limited (SRA) for research, development and extension (RD&E) activities.* *Minister for Agricultural Industry Development and Fisheries and Minister for Rural Communities Mark Furner said the Queensland Government had been working with and supporting this iconic industry for 122 years.* *"The Queensland Government has a long-standing history of supporting RD&E activities that improve the prosperity and sustainability of the sugarcane industry," Mr Furner said.* *"This grant will see a further $14.25M committed to strategic RD&E investments that will increase our understanding of industry problems, enable the uptake of advanced technology, and implement innovative management practices to strengthen the industry.*		

ICAR-IISR Signs MoU with NamFarmers.com to Accelerate Digital Dissemination of Technologies [India]

	Krishi Jagran	**November 14, 2022**	**https://krishijagran.com/agriculture-world/icar-iisr-lucknow-signs-mou-with-namfarmerscom-to-accelerate-digital-dissemination-of-technologies/**
KRISHI JAGRAN	*ICAR-Indian Institute of Sugarcane Research, Lucknow, signed an MoU with NamFarmers.com to accelerate the dissemination of IISR-developed technologies. The MoU will aid in the rapid dissemination of ICAR-IISR developed technologies.* *Dr. R.K. Singh, Assistant Director General (CC), ICAR, was in attendance. He stated that the ICAR-IISR, Lucknow has shown promising results after signing a Memorandum of Understanding (MOU) with DSCL Sugars under the PPP mode to double farmer income.* *Dr. Pathak stated that there is enormous potential for the dissemination of improved sugarcane production technology because the Institute has developed a number of improved sugarcane varieties with matching production and protection technologies that are in need of faster dissemination among the stakeholders.*		

Indonesia plans to launch 5% bioethanol mix of fuel in three years [Indonesia]

REUTERS	**Reuters**	**December 7, 2022**	**https://www.reuters.com/business/energy/indonesia-plans-launch-5-bioethanol-mix-fuel-three-years-2022-12-07/**
	Indonesia's energy ministry plans to start rolling out a 5% ethanol blend of fuel made using		

sugarcane in three years time, starting with a few provinces of the country, it said in a statement on Wednesday.

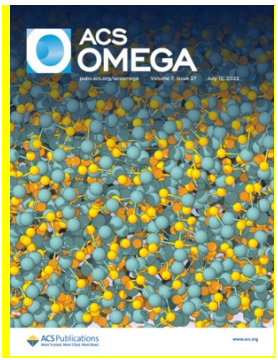
Under a new roadmap, which was developed with the Bandung Institute of Technology, the introduction of bioethanol fuel could begin by mixing 5% sugar-based ethanol with Pertamina's 90-octane or higher octane gasoline, the statement said, with implementation starting in the capital Jakarta and in East Java.

The Southeast Asian country has been trying to boost efforts to diversify fuel sources due to high fuel prices.

However, Indonesia needed to expand its production capacity of ethanol made from sugarcane, said Edi Wibowo, bioenergy director at the ministry. He said the country's annual production of fuel-grade bioethanol was currently around 40,000 kilolitres.

Latest Research

Impact of Agroclimatic Variables on Proteogenomics in Sugar Cane (Saccharum spp.) Plant Productivity



Sugar cane (Saccharum spp. hybrids) is a major crop for sugar and renewable bioenergy worldwide, grown in arid and semiarid regions. China, the world's fourth-largest sugar producer after Brazil, India, and the European Union, all share ~80% of the global production, and the remaining ~20% of sugar comes from sugar beets, mostly grown in the temperate regions of the Northern Hemisphere, also used as a raw material in production of bioethanol for renewable energy. In view of carboxylation strategies, sugar cane qualifies as one of the best C4 crop. It has dual CO2 concentrating mechanisms located in its unique Krantz anatomy, having dimorphic chloroplasts located in mesophylls and bundle sheath cells for integrated operation of C4 and C3 carbon fixation cycles, regulated by enzymes to upgrade/sustain an ability for improved carbon assimilation to acquire an optimum carbon economy by producing enhanced plant biomass along with sugar yield under elevated temperature and strong irradiance with improved water-use efficiency. These superior intrinsic physiological carbon metabolisms encouraged us to reveal and recollect the facts for moving ahead with the molecular approaches to reveal the expression of proteogenomics linked with plant productivity under abiotic stress during its cultivation in specific agrizones globally.

Published June 2022

> **Link**

Brazilian sugar cane industry – A survey on future improvements in the process energy management

The Brazilian Energy Matrix is characterised by the presence of Renewables, whose participation reached 46.1% in 2019, equivalent to 133.8 Mtoe, of which 18.0% represented the sugarcane biomass share, 12.4% the hydraulic, 8.7% the wood and charcoal, and 7.0% corresponded to other renewables. The sugarcane industry produces sugar, ethanol, and electricity as main products and, considering the total primary energy produced, 52.861 Mtoe comes from

sugarcane products (BEN, 2020). Another aspect of this industry is that it is energy self-sufficient, that being so, the energy used in the production process is also produced (from bagasse) in the same process. The aforementioned data show the significance of the sugarcane industry for the country and being this an energy industry, there is no doubt that the energy management holds importance to its industrial process. The present work will address different alternatives to improve the industrial process of sugarcane, aiming at optimising the energy management. Among the proposals to be presented, the following can be mentioned: increasing of electric energy in cogeneration, thermal integration of process streams using the Pinch Point method, second-generation ethanol production, water use in the process, integration with biodiesel production, vinasse disposition aiming at increasing energy production and reducing pollution. The main objective is to identify each proposal's influence on and contribution to the improvement of the performance and efficiency in the production process from sugarcane.

Published: November 15, 2022

> **Link**



Identification of Location-Specific Male and Female Sugarcane Parents and Formulation of Breeding Strategies

Profuse flowering was noticed in 68 sugarcane genotypes during the 2017 and 2018 cropping seasons. To identify location-specific male and female parents, pollens from the anthesized genotypes were collected at 5.30, 6.30, and 7.30 a.m. The viability was tested using potassium iodide (KI) and acetocarmine staining methods. The analysis of variance indicated a significant effect for genotype, time of pollen collection, year, staining methods, and interaction between genotype and time of pollen collection, and staining methods. The pollen viability was high in the early morning collections (5.30 a.m.). The KI stain displayed higher viability percentages than acetocarmine. The pooled mean and 't' test-based analysis of pollen germination revealed that the clone G 2012091 had the highest germination percentages of 75.80 and 77.30 in the acetocarmine and KI staining methods, respectively, while the genotype CoG 93076 had the lowest germination in all three evaluated times. Based on the pollen viability and germination studies, the genotypes G 2012091, G 2012061, G 2012035, G 2014036, and G2012115 were designated as male while CoG 93076 was earmarked as female. To formulate breeding strategies, the effects of crossing and selfing were estimated. In the bi-parental crosses, the fluff germination ranged from 5.4 to 20.80% and from 5.0% to 21.40% during the 2020 and 2021 seasons, respectively, while a decline was noticed in all the selfed seeds. Selfing did not affect quality traits; however, it reduced the performance of quantitative traits. It is ascertained that bi-parental hybridization followed by selection would be rewarding.

Published December 7, 2022

> **Link**



Microwave pretreatment of biomass for conversion of lignocellulosic materials into renewable biofuels

For the conversion of lignocellulosic material into renewable biofuels the microwave pretreatment of raw material is a new and promising technology. This work presents a numerical simulation of microwave heating of materials derived from sugar cane, african palm and green algae in microwave domestic oven. The power absorption of

biomasses is studied in cylindrical and spherical shapes, with volumes varying from 10-5 m3 to 100 × 10-5 m3, as function of humidity (from 20% to 80%). Maxwell equations were employed to calculate the microwave electromagnetic field distribution in the microwave cavity and in the samples, coupled to heat equation when the humidity is varied. Penetration depth varied from 2 × 10-2 to 10 m and from 2 × 10-3 to 7 × 10-1 as function of humidity. Plots of electric field and temperature distribution inside the oven were done for sugar cane, palm oil and green algae for cylindrical and spherical samples for 30% and 65% of humidity in the samples. The coefficient of variation (COV) varied between 0.05 and 0.18. The rate of heating efficiency was evaluated using the degree of thermal runaway (and evolution of average temperature () and their relationship with the energy absorbed by the samples and COV, respectively. The comprehensive evaluation coefficient, that describes the usability of a specific lignocellulosic material in industry, varied between 0.3 and 10.0, was calculated for the biomasses shapes and sizes as function of power and humidity.

Published December 7, 2022

> **Link**



Preparation, characterization, and bioactivities of polysaccharides fractions from sugarcane leaves

Three new polysaccharides (SLP-50, SLP-70, and SLP-90) were fractionated successively by gradient concentrations of ethanol. This study aimed to investigate the initial structural characterization and bioactivities of these sugarcane leaves polysaccharides (SLPs) obtained by ultrasound-assisted extraction. The results, which were further validated by IR spectrometry, revealed that the three SLPs contained uronic acids, proteins, and sulfate groups in addition to carbohydrate. SLP-50 (36.40 kDa), SLP-70 (12.97 kDa), and SLP-90 (3.52 kDa) were acidic heteropolysaccharides mainly comprised of mannose (Man), rhamnose (Rha), glucuronic acid (Glc A), galacturonic acid (Gal A), galactose (Gal), glucose (Glc), xylose (Xyl), and arabinose (Ara), in different molar ratios. SLP-90 exhibited higher antioxidant capacity than SLP-50 and SLP-70. In vitro, all fractions showed significant hypoglycemic potential and antibacterial activity against Gram-positive and Gram-negative bacteria. The IC50 values of SLP-50, SLP-70, and SLP-90 were 0.11, 0.05, and 0.67 mg/mL on α-glucosidase, respectively, which were significantly lower than that of acarbose (0.80 mg/mL). These findings could provide a reference for developing and applying SLP-based functional foods.

Journal online now

> **Link**

Expected Climate-Induced Alterations in Sugarcane Yield and Its Agronomic Adaptation Strategies



The present study tries to evaluate climate change impact and its vulnerability on one of the significant crops, sugarcane using the DSSAT crop simulation model. It was also an endeavor to understand the current status of major sugarcane production and agricultural practices in the study area and evolve a synergistic agronomic adaptation framework involving all stakeholders. A dynamical downscaling technique employing the RegCM, the regional climate model, was employed. The period of study was from 1971 to 2098 (128 years). This simulation output was used to predict the crop productivity changes in the Kancheepuram area using crop simulation model DSSAT v 4.7. The future yield projections showed a decline in yield for sugarcane. The likely yield changes for sugarcane were ascertained for the near, mid, and end centuries. The alterations in productivity for sugarcane were just -1.8, -2.6, and -2.8 percent for the near, mid, and

end of the twenty-first century, respectively. The effect of CO2 fertilization (+520 ppm) could be noticed till the mid-century, thereafter yield was shown to fall when that threshold level was reached. Agronomic adaptation was simulated using the model, adopting different sowing windows that are prevalent in the study area. According to the findings, sugarcane planted on March 15 can augment yield rates by 3.5% in the near-century under the RCP 4.5. Success and implementation of planned climate change adaptation lie in the hands of the stakeholders and can reduce the weather and climate risks to a great extent.

Published: December 3, 2022

> **Link**

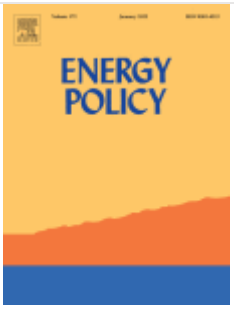
Management of mechanized harvesting through operational modelling

The activity of agricultural experimentation may require high budget and long periods of time for obtaining data. Due to production features, decision-making processes within agro-industrial mills that use sugarcane as raw material must be optimized. In this scenario, modeling operating systems that use embedded technology as agricultural automation enables the optimization of decision-making and influences operational performance and costs. This article presents a model for receiving and processing sugarcane based on its harvesting capacity, considering the harvestability index and the nominal capacity of the harvester. Sensitivity analysis enables the assessment of potential offenders and the reallocation of assets, thus optimizing resources and ensuring plant operation. This analysis also enables new possibilities, such as harvesting under different row spacings and harvesting simultaneously different rows.

Journal to be published in 2023, article available now

> **Link**

The role of productivity and efficiency gains in the sugar-ethanol industry to reduce land expansion for sugarcane fields in Brazil



During the 2000s, the development of flex-fuel automotive vehicles in Brazil and rising international commodities prices allowed the Brazilian sugar-ethanol sector to grow at higher rates and expand area planted to sugarcane relative to levels verified in the 1990s. However, this land expansion increases the pressure on land-use change and management. This paper seeks to estimate the technical efficiency and decompose the total factor productivity (TFP) in the sugar-ethanol industry using a stochastic frontier framework. Primary data was obtained from an unbalanced panel of 90 sugar and ethanol producers for the harvest years from 2012/2013 to 2016/2017, providing 209 valid observations. Results suggest that mills have a small gap to increase their efficiency under the current technology, and the industry's TFP has been primarily impacted by the efficiency effects, on the other hand, SE mills might improve TFP rising their scale of production. Therefore, the results in this paper suggest that small SE mills may benefit from merging with other mills to explore economies of scale to enhance their TFP and strengthen economic competitiveness, contributing to the Brazilian environmental policy agenda.

Journal to be published in January 2023, article available now

> **Link**

Identification and Counting of Sugarcane Seedlings in the Field Using Improved Faster R-CNN

Sugarcane seedling emergence is important for sugar production. Manual counting is time-consuming and hardly practicable for large-scale field planting. Unmanned aerial vehicles (UAVs) with fast acquisition speed and wide coverage are becoming increasingly popular in precision agriculture. We provide a method based on improved Faster RCNN for automatically detecting and counting sugarcane seedlings using aerial photography. The Sugarcane-Detector (SGN-D) uses ResNet 50 for feature extraction to produce high-resolution feature expressions and provides an attention method (SN-block) to focus the network on learning seedling feature channels. FPN aggregates multi-level features to tackle multi-scale problems, while optimizing anchor boxes for sugarcane size and quantity. To evaluate the efficacy and viability of the proposed technology, 238 images of sugarcane seedlings were taken from the air with an unmanned aerial vehicle. Outcoming with an average accuracy of 93.67%, our proposed method outperforms other commonly used detection models, including the original Faster R-CNN, SSD, and YOLO. In order to eliminate the error caused by repeated counting, we further propose a seedlings de-duplication algorithm. The highest counting accuracy reached 96.83%, whilst the mean absolute error (MAE) reached 4.6 when intersection of union (IoU) was 0.15. In addition, a software system was developed for the automatic identification and counting of cane seedlings. This work can provide accurate seedling data, thus can support farmers making proper cultivation management decision.

Published: November 18, 2022

> **Link**

Events

events.ChiniMandi.com	**Sugar & Ethanol India Conference – 2023** *ChiniMandi Sugar Events* **7-8 January 2023** **Hotel Pullman, Aerocity, New Delhi, India** > **Link**
International Society of Sugar Cane Technologists Founded 1924	**ISSCT XXXI Congress** *International Society of Sugar Cane Technologists / The Sugar Technologists' Association of India (STAI)* **February 2023** • ***Congress: 20-23 February*** • ***Pre-congress tour: 17-18 February*** • ***Post-congress tour 24-28 February*** **Hyderabad International Convention Centre (HICC), India** > **Link**
SUGAR INDUSTRY TECHNOLOGISTS SIT	**SIT Annual Technical Meeting** *Sugar Industry Technologists* **7-11 May 2023** **Louisiana Sugar Refining, New Orleans, USA** > **Link**

ISO DATAGRO NY SUGAR & ETHANOL CONFERENCE 2023	**16th ISO DATAGRO NY Sugar & Ethanol Conference 2023** *ISO DATAGRO* **7-11 May 2023** **583 Park Avenue - New York - USA** > **Link**