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International Society of Sugar Cane Technologists
Founded 1924

Bulletin

Welcome to the ISSCT Bulletin for April 2023, 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

Note From Mr Sanjay Awasthi, Chair ISSCT Council and Executive Committee & President STAI, on the XXXI ISSCT Congress held from 20-23 February 2023 in Hyderabad, India



The Sugar Technologists Association of India successfully organized the mega and prestigious XXXI ISSCT Congress from 2023 February 2023 at the state-of-the-art Hyderabad International Convention Centre, Hyderabad.

This was the first event of ISSCT that was held in physical mode after the onset of the COVID 19 pandemic in the year 2020. Despite various odds, some 1000 persons from 38 countries were at the congress venue. To make the programme interesting and engaging for the delegates, few initiatives were introduced for the first time viz Digital Presentation of the Posters, Panel Discussions and presentation of Excellence Awards. The Congress has been a resounding success both on the organizational and scientific aspects

Read the full note on the ISSCT website

The Editor's reflections on papers and posters to the Hyderabad Congress



The Hyderabad Congress saw almost 200 papers and posters accepted for publication in the Proceedings and for presentation. What are the main things learnt from the submission and reviewing process?

Firstly, those manuscripts written in good English passed through the process much easier than those written in poor English.

ISSCT understands that English is not the native language in many of the sugar-producing areas of the world. We do make some allowances for this, but we have

limited time and require the authors' assistance to ensure the process runs smoothly.

Before submission, authors must have their papers reviewed by colleagues, and, if appropriate, by a person fluent in English. Authors who are not fully conversant with technical English and the type of sentence construction used in technical papers of the type required by ISSCT must have their paper reviewed by a person fluent in English before emailing their paper to the Editor. If there is any doubt on this point, authors must email their paper to the Editor well before the stipulated deadline.

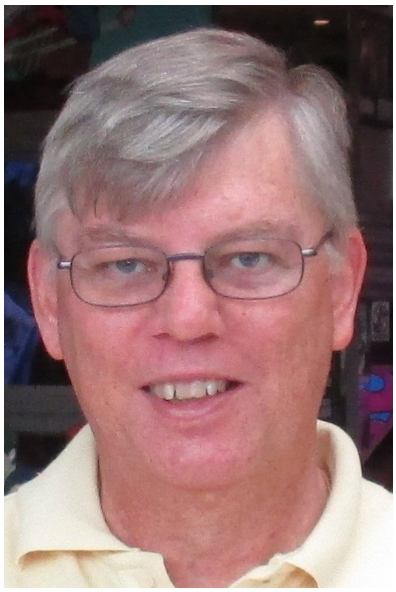
Secondly, it was obvious that many authors had not read the Instructions to Authors sent to them after their submission of an expression of interest, or, if they had, they took little notice. This was particularly noticeable in the layout of lists of references. The Instructions give examples of the required layouts – it's not 'rocket science', so there is no excuse for poorly arranged lists. I spent considerable time in filling-in details of many references, time I could have used more profitably.

Thirdly, there were several authors who had papers or posters accepted but did not attend the Congress. This shows great disrespect to attending colleagues. At least one of the authors must be a current member of ISSCT before the paper/poster is accepted. Authors must make every effort to present their paper at the Congress. However, if they are unable to attend, they must ensure that someone with a good knowledge of the work can make the presentation on their behalf and answer detailed questions on the paper. ISSCT will require authors to have registered for the Cali Congress at least 1 month before the Congress date. We will call for papers and posters for the 2025 Cali Congress during mid-2024. Papers and posters should be of interest to an international audience and should present original data, new concepts, novel analysis, or innovative presentation or interpretation of previously published material. Papers may be of a scientific, economic or technological nature but must not be of an overtly commercial nature or written with inadequate disclosure of relevant information for commercial reasons.

So, start thinking about a submission, now!

Peter Allsopp
ISSCT Editor

Summary of Co-products papers and posters presented at the ISSCT XXXI Congress held in February 2023 in Hyderabad, India



The strategic priorities of ISSCT for the 2023 Congress held in Hyderabad, India were set by the ISSCT President, Dr RO Castillo and included:

(i) Globalization of ethanol research,
(ii) Sugar and health,
(iii) Organic sugar production and
(iv) Sugarcane streak mosaic virus.

A focus on the utilization of bagasse and green harvest residues for alternative products was noted during the discussions at ISSCT. With these strategic objectives known a program was developed for the Co-product webinar held in 2022 which continued through to the XXXI ISSCT Congress.

Plenary Presentations

The co-products plenary session focussed on the theme of "Diversification done differently".

- Mohan and Kanodia discussed the importance of diversification and integration in the sugar industry with reference to India. They noted the Indian sugar industry is experiencing a drive for economic and environmental sustainability focused on the diversification of income streams which needs to be intensified to generate more revenue streams and thus lower the dependency on income from sugar.
- Muir reported on value adding for an European beet sugar company. They have been able to produce plant-based chemicals for over half a century to replace fossil-fuel-based chemicals, but until recently there has been no incentive to do so. Some interesting opportunities are emerging in co-product valorisation and Europe is standing on the verge of major changes in that strong incentives and rigorous targets have been deployed to set Europe on the path to becoming carbon neutral by 2050.
- Autrey reported the Mauritian sugarcane industry has embarked on a comprehensive programme for the diversification of its activities in and outside sugar. Intra sugar initiatives comprise production of bioelectricity from bagasse, bioethanol from molasses, bio-fertilizers from effluents and specialty sugars.

Globalization of Ethanol Research

India has moved to embrace increased ethanol production through a National Policy on Biofuels. One of the key aspects that have underpinned the success of this program has been the research and development undertaken in the background to support this policy. Several papers and a poster were presented in this regard.

The Indian Government has promoted the use of bio-ethanol as a blending stock with the main automotive fuel of petrol in line with the National Policy on Biofuels - 2018 under the Ethanol Blended Petrol (EBP) Programme. The Government policy envisages blending 20% ethanol in petrol by 2025. As a result, most of the sugar industries are expanding their operations towards generating increasing volumes of ethanol. The program for the increased production of Bio-ethanol was called in one paper "the saviour of the Indian sugar industry". Many molasses-based distilleries are either expanding their distillery capacity or building new distilleries. The government has given them the flexibility to produce ethanol from three feedstocks, C molasses, B molasses or syrup/juice. This has driven changes to the sugar plants and with many plants started viewing ethanol as their primary product and sugar as secondary. The vinasse generated from these feedstocks varies both in terms of quality and quantity. Boilers burning this vinasse have changed significantly in the last decade, with the focus to utilize the maximum possible heat rather than simply incinerating vinasse in a combustor. Utilizing most of the heat directly reduces the secondary fuel combustion, resulting in the saving of bagasse. Several boilers have been designed and commissioned that are adaptable to the changing quality of vinasse from the various feedstocks.

To achieve zero liquid discharge at molasses-based distilleries in India, the vinasse is evaporated generating condensates which present challenges. These challenges may vary from reduction of organic load (COD/BOD) or reusing the treated water returned to the fermenter and cooling tower to achieve a complete zero liquid discharge for the smooth functioning of the plant. One factory installed and operated a granular based anaerobic reactor to treat and reuse multiple effect evaporator condensate, spent lees, and blow downs. The plant had remarkable results where 90% to 95% of the chemical oxygen demand (COD) is digested across the reactor. The treated water is continuously used in the fermenter and cooling tower make-up, making a zero effluent discharge plant achievable.

Another paper reports the large opportunity to fulfil India's national commitment made at COP26, which can be achieved by increasing the share of renewable energy in India's overall energy mix, which is currently dominated by fossil fuels. After industry, the air, water and surface transportation sector is the second largest contributor of Indian greenhouse gas emissions and is dominated by internal combustion engines (ICE) that use fossil fuels. These fossil fuels are mainly imported, so causing huge outflows of foreign exchange. Hence, the current need is to leverage domestic alternative energy sources that can help mitigate the risks of climate change and positively impact on the economy and society. Biofuels, as renewable transportation fuels (gases/liquids), are a very promising, alternative clean energy source. Biofuels are environment friendly and help improve the rural economy. Besides facilitating energy self-reliance, biofuels use the existing infrastructure and environment of the ICE automotive industry. A technology platform envisions the use of bio-based renewable feedstock to produce low-carbon transportation fuels for all modes of transportation. The platform comprises established solutions such as 1st generation bioethanol and biodiesel and fast-emerging advanced biofuels such as 2nd generation bioethanol, compressed bio-gas (CBG), sustainable aviation fuel (SAF), marine bio-fuels etc. In particular, utilizing second generation feedstock for the production of biofuels with low carbon intensity can help achieve energy security and curb the emissions and air pollution caused by burning stubble and cane trash.

Another paper reported on the merits of clarifying B molasses to improve molasses storage and minimize distillery scaling problems. This work is most promising and good results of increased molasses purity, lower ash contents, better C molasses exhaustion and capacity improvements for ethanol plants are reported.

Papers from other countries examined other issues in ethanol production and effluent processing.

- A Cuban paper reviewed, the use of non-sulphur raw materials in the ethanol production process at laboratory scale. The high sulphate contents in vinasse tend to reduce the methane content in the biogas produced. The best alternative found in the study is to use ammonium phosphate and urea as the nutrient sources and phosphoric acid to control the pH during the fermentation.
- A French-Reunion paper investigated the potassium extraction from methanization effluent by ion-exchange chromatography as an alternative fertilizer. The paper noted concentrating the potassium up to three times, the high acidic contents. Further work is required for the process to become practical.

- An Australian paper investigated a slightly different theme of the integrated production of biomethane and hydrochar from sugarcane trash for various applications. The work requires further techno-economic analysis before further process development, scale-up and commercialization.

Other work presented including bagasse utilization and cane harvesting residues

- Xylose production from sugarcane harvesting residues as an alternative towards a biorefinery.
- The Influence of molding conditions on the properties of bio-based materials produced by thermo-compression from sugarcane bagasse
- A perspective for adding value to bagasse and sugarcane agricultural residues.
- A paper that describes and discusses three initiatives that sugar companies should be seriously considering –vertical farming, producing single-cell protein and exploiting the sugar platform to produce substitutes for petrochemicals.
- A method for production of chloromethylfurfural (CMF) and vanillin from sugarcane bagasse with simultaneous fractionation of pentose syrup and lignin
- How sugarcane vinegars compare to other commercial vinegars: composition and health benefits
- Analysis for the fuel-alcohol business in the Colombian sugar sector - foresight and strategic thinking
- A paper on Microbial process to produce gluconic acid: a value addition to the sugar industry
- Investigating the unlocking the real potential as animal feed of protein and lipid derivatives from black soldier fly larvae fed cane-by products.

Conclusion

Diversification is seen as a major opportunity to increase the income for the sugar industry in future. Major opportunities are arising as the move to de-carbonise gains momentum throughout the world. Of note, the substitution of fossil fuels in India is progressing with the E10 goal achieved and E20 target set for 2025. The introduction of second-generation production plants to increase bioethanol production, with little or no increase in carbon emissions, is gaining momentum in India and Brazil. Significant advances are being made in the field of effluent treatment to make zero liquid discharge more feasible. These advances include

biological treatments and the more effective combustion and dust collection technologies for boilers co-fired with concentrated vinasse.
Other advances in technology for co-products are also reported at the Congress.

Bryan Lavarack
ISSCT Co-Products Commissioner

Obituary: Michel Hoarau



It is with great sadness that we have learned about the demise of Mr. Michel Hoarau on 20 February 2023. Michel had a career spanning over 37 years in Reunion where his contribution to the advancement of the sugarcane industry was remarkable. He was also active in the region and in Africa. Expressions of sympathy on behalf of the ISSCT have been sent to his wife and family. His obituary may be accessed through the following link:

Obituary: Michel Hoarau

Sugar Cane News

Allbirds launches 'world's first net zero carbon shoe'

FASHIONUNITED	**Fashion United**	**March 21, 2023**	**https://fashionunited.uk/news/fashion/allbirds-launches-world-s-first-net-zero-carbon-shoe/2023032168593**

Apparel and footwear retailer Allbirds, which is known for its sustainable efforts, has designed what it claims is the "world's first net zero carbon shoe", called M0.0NSHOT.

The shoe's upper is made of regenerative merino wool, grown in New Zealand at the Lake Hawea Station (LHS), while its midsole consists of a newly-developed sugarcane-based foam that contains 80 percent bio content, both being carbon-negative.

Agriculture 4.0 is a potential solution to meet food and climate goals

Forbes India	**Forbes**	**January 18, 2023**	**https://www.forbesindia.com/blog/climate-change/agriculture-4-0-is-a-potential-solution-to-meet-food-and-climate-goals/**

Every year, nearly one-third of food produced for human consumption—worth over $1 trillion and weighing approximately 1.3 billion tonnes—is lost or wasted globally. At the same time, nearly 828 million people go to bed hungry every night. These statements, culled out from two separate UN

World Food Programme reports, do not paint a picture of irony. They merely draw attention to the fact that one of the primary causes of rising hunger around the world is food wastage or loss.

It is more obvious than ever that our food systems in their current state are inadequate to end poverty and hunger. A potential solution is the use of technology such as big data analytics and AI to improve the yield or income per acre of farmers—so that they remain invested in agriculture.

Agriculture 4.0, a considerably more advanced variant of precision farming, has the potential to transform the traditional farming industry.

New grants now available from the Bonsucro Impact Fund

Bonsucro	**April 11, 2023**	**https://bonsucro.com/new-grants-now-available-from-the-bonsucro-impact-fund/**

New grants are now available from the Bonsucro Impact Fund (BIF), for projects that tackle the most pressing sustainability challenges.

We've published our latest calls for proposals on climate change adaptation and water stewardship, with a third call launching soon centred on human rights and decent work.

This year, Bonsucro is delighted to be able to grow our investment in projects proposed by members. After the success of the first year, we're ready to offer bigger grants for innovative projects that address critical challenges facing the sugarcane sector.

If you have a project concept that will create meaningful impact, then make sure to apply for one of our grants.

The Bonsucro Impact Fund is awarding three grants per theme. Two grants of up to £50,000 will be given for 'innovation projects' – projects that pilot innovative and scalable approaches, technologies or tools that will drive sustainability in the sugarcane sector.

Study paves way to more efficient production of 2G ethanol using specially modified yeast strain

EurekAlert	**March 27, 2023**	**https://www.eurekalert.org/news-releases/984043**

A Brazilian study paves the way to increased efficiency of second-generation (2G) ethanol production based on the discovery of novel targets for metabolic engineering in a more robust strain of industrial yeast. An article on the study is published in the journal Scientific Reports.

The databases compiled by the authors are at the disposal of the scientific community in the repository of the State University of Campinas (UNICAMP), which is a member of the Dataverse Project, an international collaborative initiative supported by FAPESP

Jet planes and sugar cane: Qantas and Airbus get on board biofuel factory in Queensland [Australia]

The Guardian	**March 30, 2023**	**https://www.theguardian.com/business/2023/mar/30/sugar-cane-aviation-fuel-qantas-airbus-jet-planes-biofuel-factory-queensland-australia**

Qantas is banking on converting byproducts from north Queensland sugar cane into sustainable

aviation fuel, as the air industry comes under increasing pressure to minimise its emissions.

On Thursday, Qantas announced that it and plane manufacturer Airbus will jointly invest $2m in a biofuel production facility that it hopes can produce up to 100m litres of sustainable aviation fuel (SAF) a year when it opens in 2026. The Queensland government has also pledged $760,000 as part of an initial capital raising of $6m for the project.

The biofuel production facility is being developed by Jet Zero Australia in partnership with LanzaJet, a US company that has already produced SAF from carbon monoxide waste from a steel plant in China. This has been used in a blended form on commercial flights from the US.

China Makes Unprecedented Decision, Approves Eight New GM Crops [China]

SeedWORLD	**SeedWorld**	**January 19, 2023**	**https://www.seedworld.com/china-makes-unprecedented-decision-approves-eight-new-gm-crops/**

On January 13, 2023, China's Ministry of Agriculture and Rural Affairs (MARA) announced new and renewed biosafety certificates that encompassed eight genetically modified crops. This decision followed the National Biosafety Committee (NBC) meeting held in December 2022, according to a release.

Eight new and two renewed certificates were issued for GM crops approved as processing materials for import. Three new GM cotton events were developed by BASF, Bayer and Corteva. Two renewed GM cotton events were created by BASF, one GM rapeseed event was developed by Corteva, two GM sugarcane events were developed through the Brazil Sugarcane Technology Center and two GM alfalfa events were created by Bayer. The validity period will be five years for the new and renewed biosafety certificates.

Royal Eswatini Sugar Corporation hits tech sweet spot with SAP S/4HANA Public Cloud deployment [Eswatini]

The New Dawn	**The New Dawn**	**March 29, 2023**	**https://thenewdawnliberia.com/royal-eswatini-sugar-corporation-hits-tech-sweet-spot-with-sap-s-4hana-public-cloud-deployment/**

One of Africa's leading sugar producers is celebrating significant cost-savings and efficiency gains following a landmark deployment of SAP's powerful S/4HANA Public Cloud platform.

Rob Coombe, Group IT Manager at Royal Eswatini Sugar Corporation, says the new technology platform will support the company's business strategy by unlocking greater agility, cost-efficiency and innovation capability. "Our SAP S/4HANA Public Cloud deployment drives greater efficiency across our business by allowing us to leverage best-practice standards that keep processes running smoothly while unlocking significant cost savings. The power and scalability of the platform can also support our business as we enter new product segments and markets, allowing us to quickly and efficiently bring new processes and business capabilities online."

Sugar minister explains factors for poor yield [Fiji]

The Fiji Times	**The Fiji Times**	**March 26, 2023**	**https://www.fijitimes.com/sugar-minister-explains-factors-for-poor-yield/**
	Sugar Minister Charan Jeath Singh says high soil acidity and low soil nutrients are two of the main contributing factors to low cane production, productivity and poor yield. *He said ultimately affected sugar production and performance of the sugar industry.* *Mr Singh shared this with stakeholders in Lautoka while officiating at the Interactive Workshop on Integrated Nutrient Management for Sugarcane in Fiji at Lautoka's Waterfront Hotel this week.* *"In deciphering the downward performance of the sugar industry from past years to present, numerous challenges were highlighted and through the Sugar Research Institute of Fiji data, I understand that the soils in sugarcane belts have become very acidic, where, the pH mostly ranges from 3.2 to 6.0," he said.*		

Case IH starts programme to train sugarcane harvester operators [India]

businessline.	**The Hindu Business Line**	**April 3, 2023**	**https://www.thehindubusinessline.com/economy/agri-business/case-ih-starts-programme-to-train-sugarcane-harvester-operators/article66694856.ece**
	Global agri equipment-maker Case IH, a brand of CNH Industrial, has announced a harvester operator training programme under its corporate social responsibility initiative. *The "Unnat Kaushal-Sugarcane Harvester Operator Training" has been introduced in collaboration with Krishi Vigyan Kendra (KVK) in Baramati, Maharashtra for sugarcane harvester operators from all over India.*		

New cane variety developed jointly by TNAU and ICAR Sugarcane Breeding Institute in Coimbatore in high demand [India]

TH	**The Hindu**	**March 21, 2023**	**https://www.thehindu.com/news/cities/Coimbatore/new-cane-variety-developed-jointly-by-tnau-and-icar-sugarcane-breeding-institute-in-coimbatore-in-high-demand/article66645631.ece**
	The highest demand order of 160 tonnes of cane seeds has been placed by cooperative sugar mills across the State for the new high-yielding variety Co - 18009 (Punnagai) developed by Tamil Nadu Agricultural University (TNAU) through a tie-up with Indian Council of Agricultural Research (ICAR) Sugarcane Breeding Institute, Coimbatore, for planting during 2024. *Owing to the ethanol policy, the sugar mills are gradually coming out of red, and are able to settle pending dues to the farmers, banking on the most productive varieties of sugarcane. Of the nearly 375 tonnes of cane seeds sold so far, orders have also been placed for 140 tonnes of CO 14012 (Avani) variety, and 75 tonnes of CO 11015 (Atulya) by the cooperative sugar mills, official sources said.*		

Sugar industry calls for mechanisation in sugarcane agriculture [India]

	AgriculturePost.com	**March 28, 2023**	**https://agriculturepost.com/farm-inputs/farm-mechanisation/sugar-industry-calls-for-mechanisation-in-sugarcane-agriculture/**
	Indian Sugar Mills Association (ISMA), in association with ICAR– Indian Institute of Sugarcane Research (IISR), Lucknow conducted a seminar on 'Mechanisation in Sugarcane Agriculture' today at the premises of ICAR-IISR. *The seminar was attended by officials from the Central and state governments, including Chairman, Commission for Agricultural Costs & Prices (CACP), Professor Vijay Paul Sharma; Addl. Chief Secretary and Cane Commissioner (UP), Sanjay R. Bhoosreddy and Subodh Singh, Additional Secretary, Department of Food & Public Distribution, Government of India.*		

National Seminar on "Mechanization in Sugarcane Agriculture: Challenges and Solutions" was organized at IISR, Lucknow [India]

	Indian Council of Agricultural Research	**March 28, 2023**	**https://icar.org.in/content/national-seminar-%E2%80%9Cmechanization-sugarcane-agriculture-challenges-and-solutions%E2%80%9D-was**
	The National Seminar on "Mechanization in Sugarcane Agriculture: Challenges and Solutions" was organized jointly by Indian Sugar Mills Association (ISMA), New Delhi and ICAR-Indian Institute of Sugarcane Research at IISR, Lucknow. *The chief guest of the program Prof. Vijay Paul Sharma, Chairman, CACP, Ministry of Agriculture and Farmers Welfare, Government of India highlighted two options for increasing farmers' income viz., increasing sugarcane production and sugar recovery by adopting improved production technology and reducing its production cost. Prof. Sharma urged the Scientists to provide a complete package of mechanization of all agricultural activities from field preparation to sugarcane harvesting to the farmers and their promotion through cooperatives/FPOs and stressed on increasing the income of sugarcane farmers by setting up Farm Machinery Banks.*		

West Kenya Sugar adopts Digicane technology to improve cane farming [Kenya]

	The Star	**April 3, 2023**	**abc.net.au/news/rural/2022-11-18/first-traceable-sugar-shipment-townsville-to-south-korea/101662058**
	As the rains pound various parts of the country, there is renewed hope among farmers after the longest drought in 40 years occasioned by failed rains. *In Western region, where agriculture is the backbone of the economy, the roads are deserted as most residents are busy in their farms. Here, sugarcane farming is the main agricultural activity.* *In a bid to help farmers increase production, West Kenya Sugar Company has developed a technology—Digicane— that will give real time data on cane availability in farmers' fields.*		

Rafizi has 'sweet' plans for sugar cane industry [Malaysia]

	FMT	**March 14, 2023**	**https://www.freemalaysiatoday.com/category/highlight/2023/03/14/rafizi-has-sweet-plans-for-sugar-cane-industry/**

Malaysia's sugar cane industry will be developed to help meet the nation's demand for sugar, says economy minister Rafizi Ramli.

He said that currently, the country is entirely dependent on importing raw sugar from Brazil following the closure of the sugar cane plantation in Chuping, Perlis, in 2012.

He said the government is currently identifying land parcels of up to 405ha in northern Perak for this purpose.

"All (100%) of the country's raw sugar is being imported, and when there are price increases or issues with currency and oil (prices), freight costs will be high.

How Katsina Farmers 'Harvest' Money From Sugarcane [Nigeria]

	Daily Trust	**April 2, 2023**	**https://dailytrust.com/how-katsina-farmers-harvest-money-from-sugarcane/**

Sugarcane farming, which was an exclusive reserve for local farmers, has, in recent years, become a lucrative venture that attracts youths and the elite in Katsina State.

Sugarcane (saccharum officinarum) is a highly productive tropical grass, which is native to Asia, where it has been cultivated for over 4,000 years. It was one of the first cash crops of early colonial America, from where the black type was imported into Nigeria in the 1960s.

According to the Agricultural Marketing Resource Centre (2022), beside other industrial processing, over 70 per cent of the world sugar comes from sugarcane.

Sabuwa, Dandume, Faskari, Maska, Kankara, Bakori, Danja and Kafur were the hub of sugarcane production in Katsina State, and according to the farmers, they were raking millions of naira yearly from its farming.

UAF develops two new varieties of sugarcane [Pakistan]

	Dawn	**March 22, 2023**	**https://www.dawn.com/news/1743445/uaf-develops-two-new-varieties-of-sugarcane**

The University of Agriculture Faisalabad (UAF) has developed two high-yielding varieties of sugarcane.

New varieties that are insect-resistant transgenic sugarcane (CABB-IRS) and herbicide-tolerant transgenic sugarcane (CABB-HTS) have been approved for field trials by the National Biosafety Committee (NBC) of the Federal Ministry of Climate Change.

The varieties were developed by Dean Faculty of Agriculture Faisalabad Prof Dr Muhammad Sarwar

	Khan and UAF Centre of Agricultural Biochemistry and Biotechnology team, headed by dean Prof Dr Sarwar Khan.

Small farmers to get boost from big agri firms through Go Negosyo program [Philippines]

INQUIRER.NET	**Inquirer**	**March 7, 2023**	**https://business.inquirer.net/389934/small-farmers-to-get-boost-from-big-agri-firms-through-go-negosyo-program**
	Backed by investors including the Bill and Melinda Gates Foundation and CDC Group, Cropin is set on digitizing the agricultural industry. Today, the company announced the launch of Cropin Cloud, a cloud platform with integrated apps. Founded in 2010, Cropin's other products are live in 92 countries, it is partnered with over 250 B2B customers and it has digitized 26 million acres of farmland. It claims the world's largest crop knowledge graph of more than 500 crops and 10,000 crop varieties. *Krishna Kumar, the founder and CEO of Cropin, told TechCrunch that Cropin Cloud was developed because the agriculture industry does not have access to a "unified, coherent platform that can enable and help build a wide variety of solutions," even as it faces disruptions caused by climate change, geo-political tensions, food supply chain disruptions and a growing global population.*		

Could sugar cane help capture carbon? These LSU researchers are working on it [USA]

THE ADVOCATE	**The Advocate**	**March 18, 2023**	**https://www.theadvocate.com/baton_rouge/news/environment/lsu-professor-says-sugarcane-could-reduce-greenhouse-gases/article_ccf73726-c4f7-11ed-a095-0b6d31a710c5.html**
	Carbon capture — the process of pumping greenhouse gasses deep underground instead of emitting them into the air — is an issue of growing importance in Louisiana. *Some state leaders and industry experts say it's a powerful tool for stopping global warming and a huge potential economic driver. Some residents have raised fears of health problems or environmental risks, but multiple major carbon capture projects are planned for the state.* *A group of LSU professors have been researching a different kind of carbon capture that would use something Louisiana already has in abundance: sugarcane.* *The process is called "biomass slurry fracture injection," and Department of Environmental Sciences Associate Professor Brian Snyder has been researching it for about three years, along with Harun Rashid and Olufemi Olorode of the Department of Petroleum Engineering, and Carlie Dutile of the Department of Biological and Agricultural Engineering.*		

Florida Sugar Grower's Digital Plans Crystallize [USA]

THE WALL STREET JOURNAL.	**The Wall Street Journal**	**April 4, 2023**	**https://www.wsj.com/articles/florida-sugar-growers-digital-plans-crystallize-de79808b**
	For years, billions of dollars in technology innovation have flooded the agriculture sector, promising		

	cutting-edge data collection and analysis around the farming process. Some farms are only now starting to figure out how to put that data to work. *Florida Crystals, one of the largest growers of sugar cane in the U.S., is one of them. The privately held company farms 130,000 acres in Florida every season, and for decades it has used Excel spreadsheets or physical paper to map out when and where it would plant, tend and harvest, relying on subjective and experiential knowledge, CIO Kevin Grayling said.*

Agribank contributes to boosting hi-tech agriculture [Vietnam]

Vietnam+	**Vietnam+**	**March 28, 2023**	**https://en.vietnamplus.vn/agribank-contributes-to-boosting-hitech-agriculture/250256.vnp**
	In the hope of making contributions to the growth of a clean and high-value agricultural sector, the Vietnam Bank for Agriculture and Rural Development (Agribank) has taken an active role in providing capital, consultations and other support to farmers in promoting technology. This move is seen as crucial for the sector to develop in a sustainable and effective direction. *Agricultural development based on innovations in science and technology is considered as one of the key solutions to challenges as the sector grows. Insiders believe the superiority of biotechnology, greenhouse technology, drip irrigation technology, sensor technology, automation, and the Internet of things is helping the sector save production costs, increase productivity, and improve the quality of farm produce, thus actively contributing to environmental protection. Experts and scientists agreed that this is an important measure to make breakthrough progress in agricultural development, assisting agricultural restructuring and enhancing farmers' lives.*		

Latest Research

Sugarcane leaf-stalk separating technology: A critical review

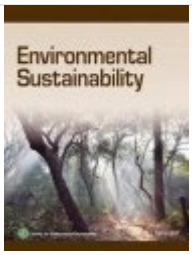


Separating sugar cane leaves and stalks is a crucial component in the sugarcane production process. In this article sugarcane leaf-stalk separation technology currently being used in commercial sugarcane production is reviewed. Two harvesting modes (whole-stalk harvesting and chopper harvesting) and three harvesting methods (combined whole-stalk harvesting, stepwise whole-stalk leaf-stripping, and combined chopper harvesting) are described, including a brief discussion of their advantages, limitations, and technical challenges. This is followed by a comprehensive review of two core physical properties of sugarcane: leaf-stalk binding force and suspension speed of sugarcane materials. The principles, process and equipment, critical components, and evaluation indexes of sugarcane leaf-stalk separating technologies are reviewed. The application, problems, and solution strategies of forward-stripping and reverse-stripping for whole-stalk harvesting, airflow fields for chopper harvesting, and critical components for both harvesting modes are summarised. Finally, potential new technologies were recommended for improving the performance and adaptability of sugarcane leaf-stalk separating technologies.

Published: April 2023

> Link

Using sugar cane vinasse as a biofertilizer: effects on soil microbial community due to periodical application

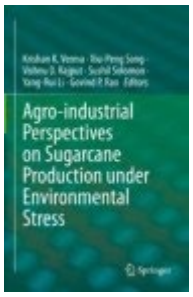


Bioethanol production from sugarcane generates by-products such as vinasse, with a high content of organic matter and potassium. While vinasse can be used as a fertilizer, its effect on the soil and its microbiota is unknown. In this work, we evaluated the effect of systematic vinasse application on microbial communities of soils used for sugarcane cultivation. The assays were carried out in the field and controlled conditions using the same soil type previously irrigated only with water or with vinasse. In the field, soil samples were taken prior to summer irrigation and one month later during years. No significant differences were found in the abundance of most microbial populations nor in the microbial activity by the vinasse treatment. However, in some sampling dates, populations of phosphate solubilizing bacteria, Bacillus spp. and ammonifying bacteria were significantly lower in soil with systematic vinasse irrigation compared to the control. Under controlled conditions, the treatments included two doses of vinasse and a control without vinasse. The abundance of heterotrophic bacteria and fungi increased in both soils with vinasse addition compared to the control, and at 180 days an increase in ammonifying bacteria was observed. Although microbial populations remained higher with the vinasse treatments, their activity decreased over time, with more evident effects on soils without application history. According to our results, vinasse application could have temporary effects on microbial communities, depending on soil type and doses, so local research is needed to create technical standards that regulate the use of vinasse on agricultural soils.

Published: March 22, 2023

> Link

Potential Parents for Developing Climate-Resilient Sugarcane Varieties in India: A Breeding Perspective



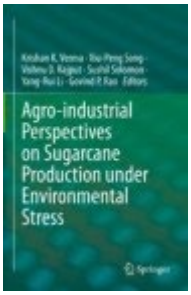
Under the changing climatic conditions due to aberrations of weather parameters, there is a change in the microclimate vis-a-vis change in the pest and disease scenario of crops that are widely cultivated. Sugarcane, being a long-duration crop grown on a larger scale across many states in India, often encounters the vagaries of weather conditions over the seasons. Several strategies and workable solutions are available to mitigate the climate-induced stresses in crops in general and sugarcane in particular. Evolving climate-resilient sugarcane genetic stock or parental clone is one of the focused breeding objectives with the ultimate purpose of evolving climate-resilient commercial sugarcane cultivars. Sugarcane breeders worldwide emphasize evolving sugarcane cultivars that can withstand different stresses posed by biotic and abiotic factors. Red rot, which was once considered an important disease in the subtropical region of India, is now a major disease in the tropical region of the country as well and phasing many high sugared and high-yielding varieties. Several sugarcane varieties especially those from sub-tropical India and basic species clones of Saccharum and related genera like Erianthus have been recognized as stable parents with respect to resistance to the predominant isolates/pathotypes of Colletotrichum falcatum prevailing in India. In India, sugarcane is also affected by another significant disease, i.e., smut caused by Sporisorium scitamineum, and the disease is much more pronounced in the ratoon crop than in the plant crop. Sources of resistance to smut were identified in S. officinarum clones and could be efficiently utilized in the commercial breeding

program. Very few diseases like pokkah boeng, rust, sugarcane grassy shoot and viral syndromes may assume greater importance if the macro and micro-climates are altered drastically. Besides the fungal diseases, yellow leaf disease (YLD) has inflicted more damage than other viral diseases. Incorporation of coat protein genes through transgenic or RNAi technology is being viewed as practical strategy to control YLD. Occurrence of drought, erratic rainfall necessitates developing drought tolerant varieties. Co, Co allied and other varieties and inter specific hybrids can be used as drought tolerant parents. Sugarcane grown under arid and semiarid region is subjected to salinity. Among the species clones, S. spontaneum, S. robustum and Narenga were flood tolerant while S. robustum is better at high temperature. Thermo-insensitive genotypes identified from varietal evaluation trials performed equally in both the extremes of temperature. To breed varieties with for higher winter ratooning ability, it is suggested to have one of the parents of subtropical origin. Among the different crossing methods, the bi-parental crossing is the most effective method in commercial sugarcane improvement. Development of pre-breeding materials or genetic stock with greater tolerance intensity by utilizing the wild species or intergeneric hybrids followed by bi-parental crossing between parents of diverse origin, where one parent with resistance to different biotic and abiotic stresses is the way forward to evolve climate-resilient sugarcane varieties.

Published: January 1, 2023

> **Link**

Agro-technologies to Sustain Sugarcane Productivity Under Abiotic Stresses



Sugarcane (Saccharum spp. hybrid) is a major crop that provides bioenergy, fibre, biofertilizer, and the myriad of by-products/co-products with ecological sustainability. Sugar industries are prominent in India, and they play an essential role in rural socioeconomic development by mobilizing rural resources and producing higher income and employment possibilities. The sugar industry is a seasonal business entirely reliant on the monsoon for optimal sugarcane production. Sugarcane farming has been confronted with multifarious demand, product diversification, and sustainability limitations in the recent past. To meet the escalating demands of sugar, holistic remedial measures in sugarcane farming need to be deployed to address production constraints and, particularly, sustained sugarcane productivity at the farm level. Droughts, shirking soil and water resources, salinity, alkalinity, waterlogging, high temperature, cold, frost, widespread iron and zinc deficiencies, etc., affect cane production significantly in many countries. These issues must be addressed through agronomic interventions and proper management to make sugarcane agriculture sustainable and profitable.

Published: January 1, 2023

> **Link**

Enhancing the co-production of sugars from sugarcane bagasse via CuCl2-catalyzed organosolv pretreatment and additives

In this work, the effects of CuCl2-catalyzed organsolv on sugarcane bagasse pretreatment and enzymatic hydrolysis were investigated under different reaction conditions. The majority of hemicellulose and lignin were degraded when 0.025 mol/L CuCl2 were used in the pretreatment at 160 °C for 10 min, resulting in 89.25% of glucose

yield after hydrolysis for 72 h, which was revealed by structure alteration, which was confirmed by different characterization analysis. Furthermore, the effect of additives (Tween 80, BSA, tea saponin, and xylanse) on enzymatic hydrolysis was determined. Except for xylanse, the glucose and xylose yields were enormously enhanced by adding additives, and their increased yield rose initially and then declined with the extending of hydrolysis time. Combined with the pretreatment and enzymatic hydrolysis, the maximal total xylose and glucose yields reached 87.1% and 97.96%, respectively, by adding tea saponin (60 mg/g substrate) with reduction of 50% enzyme loading.

Article online now, journal to be published March 2023

> **Link**

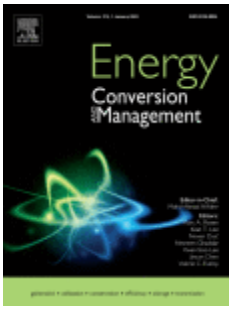


Economic performance of biogas production and use from residues co-digestion in integrated 1G2G sugarcane biorefineries: Better electricity or biomethane?

Recovering bioenergy through anaerobic digestion (AD) has become the most attractive waste management approach in modern industrial plants, because both the environmental adequacy and the provision of clean biogas-derived energy can be successfully met. Recent investigations have particularly shown the energetic benefits of residue co-digestion in sugarcane biorefineries, which significantly enhances biogas production compared to mono-digestion schemes. This work carried out an economic analysis to assess the feasibility of producing biogas from residues co-digestion in an integrated 1G2G (first and second generation) ethanol biorefinery and its application in electricity and biomethane (BioCH4) production. Scenarios considered the mono-digestion of 1G vinasse in the season (MD1-base scenario), the mono-digestion of 1G vinasse in the season followed by the mono-digestion of 2G vinasse in the off-season (MD2), the co-digestion of 1G vinasse, filter cake and deacetylation liquor in the season followed by the co-digestion of filter cake and deacetylation liquor in the off-season (CD1), and finally the co-digestion of 1G vinasse, filter cake and deacetylation liquor in the season followed by the mono-digestion of 2G vinasse in the off-season (CD2). The scenarios comparison aimed to investigate the potential to implement year-round biogas production in sugarcane processing plants. The results showed that co-digestion-based scenarios (CD1 and CD2) had the best performance for producing both electricity and BioCH4 from biogas, with the higher profitability related to the latter. Scenario MD1 scenario presented a negative net present value (NPV) for both electricity and BioCH4 production, whilst only BioCH4 production would be profitable in scenario MD2. The NPV for electricity production in scenario CD2 reached USD 9 million (4-fold higher than mono-digestion of 1G vinasse reported in the literature), whilst a peak of USD 45 million was calculated for BioCH4 production. In addition, the current bioelectricity production from bagasse burning showed to be much more economically unfavorable compared to biogas production and use. Biogas recovery from residue co-digestion has been increasingly confirmed as an attractive alternative for energy generation within 1G2G ethanol biorefineries, maintaining year-round production and consisting of a robust BioCH4 source, with great potential to be used both as a biofuel to supply the plant's fleet and to replace natural gas via injection into the grid.

Article online now, journal to be published February 2023

> **Link**



Optimizing the Design and Planning of a Sugar-Bioethanol Supply Chain under Uncertain Market Conditions

In today's society, the so-called green consciousness about environmental issues has triggered an intense search for renewable energy sources. Bioenergy, obtained by transformation processes of biomass such as castor bean or sugar cane, plays a decisive role in this context, providing much of the energy used in the electricity production, heat supply, and transport sector. Sugar cane, in particular, has assured considerable economic relevance due to its multiple applications. It is commonly employed as fodder for animal feed or as raw material for producing electricity, bioethanol, sugar, molasses, and other bioproducts. Currently, the integrated management of all stages of the transformation processes of this biomass has become a major challenge due to the complex interactivity and exchanges between all the actors present in the logistics chain. In this work, a scenario-based approach built upon a mixed-integer linear programming (MILP) formulation is proposed aiming at designing and planning, under demand uncertainty, a sugar-bioethanol supply chain network whose harvesting, production, storage, and distribution activities are integrated. The model's optimization objective is to maximize the expected net present value (ENPV) when deciding on the location, size, and technologies of industrial parks and storage sites, the size of truck fleets, which markets to serve, and inventory levels, among other important issues. The adequacy and efficiency of the MILP model are illustrated through a case study based on the Brazilian sugar-bioethanol industry.

Published: 4 April, 2023

> **Link**

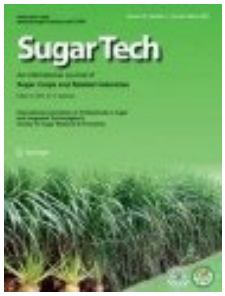


Design and Experiment of Double Scissor Sugarcane Field Transporter

At present, the sugarcane field transporters used widely in Guangxi, China, have insufficient applicability and efficiency due to the integral working mechanism. Thus, a self-propelled double scissor sugarcane field transporter for small plots in hilly areas was designed. The double scissor lifting mechanism and side opening carriage was used to improve the efficiency and stability, and the auxiliary support unit control by electric unit can enhance adaptability of the transporter to slope. The leveling performance of auxiliary support unit and the transverse stability of the field transporter were studied by simulation and experiments. Experimental results showed that the unloading angle of newly proposed field transporter was 30.02°, while this value of the traditional sugarcane field transporter was about 120°. The unloading angle of the double scissor sugarcane field transporter was reduced by 74.98% compared with the traditional sugarcane field transporters. As the transverse displacement of the gravity center in unloading process was 360.68 mm, which was far less than 1/2 of the transverse outrigger span, the double scissor sugarcane field transporter has a sufficient stability. In addition, the auxiliary support unit can complete leveling of field transporter in 60 s with the error within 0.3°. It can fulfil the requirements of sugarcane field transportation in hilly areas.

Published: 13 April, 2023

> **Link**



The use of UAS-based high throughput phenotyping (HTP) to assess sugarcane yield

A sensor mounted on an unmanned aerial system (UAS) may enable breeding programs' selection efficiency. The objectives of this study were to investigate the use

of UAS with red, green, and blue (RGB) camera to assess sugarcane yield and to investigate the direct and indirect influences of canopy features on cane yield of sugarcane. A trial was conducted from 2019 to 2021 at the Texas A&M AgriLife Research and Extension Center in Weslaco, Texas, and arranged in a complete randomized block design, consisting of 7 genotypes with 4 replications. Seven UAS image acquisitions were performed at the plant cane stage using an RGB sensor. At the first ratoon stage, five flights were conducted using RGB and multispectral sensors. Ground measurements were obtained, including pol, tons of sugar per hectare (TSH), and tons of cane per hectare (TCH). The results showed that the correlation of canopy features with pol at the elongation phase was poor, compared to those acquired at the maturity phase. Likewise, the most significant correlations between canopy features with TSH and TCH were found in the late elongation to maturity phase. In addition, a good agreement of the validation dataset between the observed and predicted pol (R2 0.58, RMSE 0.77%), TSH (R2 0.68, RMSE 2.24 Mg ha- 1), and TCH (R2 0.66, RMSE 13.64 Mg ha- 1) was observed. The canopy height model (CHM) and Normalized Difference Vegetation Index (NDVI) had the highest direct effect on TCH. Therefore, assessing sugarcane yield using UAS-based imagery looks promising for High Throughput Phenotyping (HTP) in sugarcane breeding programs.

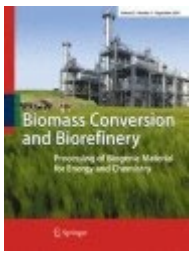


Published: January 2023

> **Link**

Integrated biorefinery of Mucor circinelloides biomass and sugarcane bagasse for application of high-value biopolymers

The replacement of expensive components in microbial growth media with pretreated lignocellulosic waste component to increase the product spectrum and add value to the bioproducts has been encouraged to achieve sustainable and feasible utilization of waste biomass as per the biorefinery approach. This study demonstrates an integrated biorefinery approach towards utilization of sugarcane bagasse and biomass of Mucor circinelloides ZSKP. A maximum reducing sugar recovery of 80.67 g/l was achieved after combining pretreatment with saccharification. A low temperature, glycerol, and ammonium phosphate pretreatment method was established, where glycerol pretreatment conditions were reduced from 250 to 150 °C and from 120 to 45 min. The ammonium phosphate-containing hydrolysate yielded 12.89 g/l of fungal biomass after fermentation to add to 20.8 g lignin from the delignification step. The biomass production was further improved to 17.69 g/l after supplementation with corn steep solids and mineral salts. The fermentation process also yielded 2.36 g/l chitosan and 4.9 g/l of lipids after extraction from the oleaginous fungus. The lignin infused glycerol plasticized chitosan biocomposite plastic had a 100% improvement in thermogravimetric properties with almost 50% more energy needed to increase the temperature of the material when compared to glycerol only plasticized biocomposite. The fungal chitosan showed antimicrobial properties and was effective as a preservative spray for fresh tomatoes and apples extending their shelf life to at least 14 and 18 days, respectively. This study therefore demonstrated that a novel two-step pretreatment process could be environmentally beneficial and yielded multiple products for biotechnological applications.



Published: 12 April 2023

> **Link**

Events

	**Geneva Sugar and Biofuels Conference** *Platts and F.O. Licht* **April 17-20 2023** **Fairmont Grand Hotel Geneva, Switzerland** > **Link**
ASSCT Australian Society of Sugar Cane Technologists	**44th ASSCT Conference** *Australian Society of Sugar Cane Technologists* **April 18-21 2023** **Cairns Convention Centre (CCC), cnr Wharf & Sheridan Street, Cairns QLD 4870, Australia** > **Link**
SUGAR INDUSTRY SIT TECHNOLOGISTS	**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**

	62nd International Sugar Council *ISO* **5-9 June 2023** **The Royal Villas, Ezulwini, eSwatini** > **Link**
	38th American Sugar Alliance International Sweetener Symposium *American Sugar Alliance* **4-8 August 2023** **Napa, California** > **Link**
	95th SASTA Congress *South African Sugar Technologists' Association* **15-17 August 2023** **ICC, Durban, South Africa** **Abstract submissions are due by 20 February 2023 and if accepted, the papers will be due for submission to SASTA in April 2023.** > **Link**
	Sugarex Thailand 2023 *Fireworks Exhibitions and Conferences* **14-15 September 2023** **Khonkaen International Convention & Exhibition Center (KICE), Khonkaen, Thailand** > **Link**

	**XII Congreso ATALAC 2023 COSTA RICA** *Asociación de Técnicos Azucareros de Latinoamérica y El Caribe ATALAC* **Congress: 18-20 September 2023** **Centro de Convenciones de Costa Rica, Heredia.** **Post-Congress: 21-22 September 2023** **Hotel Condovac La Costa, Guanacaste.** > **Link**
	**32nd ISO INTERNATIONAL SEMINAR** *ISO* **21-22 November 2023** **London** > **Link**
	**ISSCT XXXII Centennial Congress** *International Society of Sugar Cane Technologists / Asociación Colombiana de Tecnicos de la Caña de Azúcar (TECNICAÑA).* **August 2025** **Centro de Eventos Valle del Pacifico, Cali – Colombia** > **Link**