April 2022

International Society of Sugar Cane Technologists
Founded 1924

Bulletin

Welcome to the ISSCT Bulletin for April 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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News from ISSCT

ISSCT XXXI Congress Newsletter 1


XXXI ISSCT CONGRESS

XXXI ISSCT CONGRESS 2023

20-23 February 2023 NEWSLETTER 1

HICC, Hyderabad, India APRIL 2022

INVITATION TO ATTEND THE ISSCT XXXI CONGRESS

Dr. Raúl Castillo Mr. Sanjay Awasthi Dr. Jean Claude Autrey

Dear Members,

We are pleased to inform you that the XXXI Congress of the International Society of Sugar Cane Technologists (ISSCT) will be held from 20-23 February 2023 at the state-of-the-art facility of the Hyderabad International Convention Centre (HICC), Hyderabad, India.

The programme for the Congress was finalized during the Mid-Term Meeting which was held virtually on 2-3 March 2022 in which members from the ISSCT Executive, Technical Programme Committee and Congress Organizing Committee (COC) were present. The members discussed in detail the prevailing pandemic situation throughout the world and the best time to host the Congress. During the meeting, the COC made a detailed presentation on the arrangements being made for the Congress, proposed visits to field/factory for the Pre/Post congress tours, sightseeing tours for the accompanying persons, hotels, logistics etc. After in-depth discussions, the ISSCT Executive agreed to hold the XXXI Congress in India from 20-23 February 2023.

On behalf of the Congress Organizing Committee and the ISSCT Council and Executive Committee, we are happy to share with you that an interesting programme has been developed for the Congress that will cover the Northern and Southern parts of the country. This will give an opportunity to the delegates to witness the diverse cultural heritage, traditions, cuisine and faiths prevailing in the country that makes India unique. Details of the programme are given in this newsletter.

Many indigenous innovations, designs and developments have taken place in India in the past two decades which the Indian sugar industry would like to share with the ISSCT community. With the growth in the Indian economy and the introduction of the new regulatory and Bio-Fuel Policy by the Govt. of India, the Indian sugar industry is at the cusp of becoming financially independent and globally competitive in the years to come. Therefore, there could be no better time to host the ISSCT Congress in India.

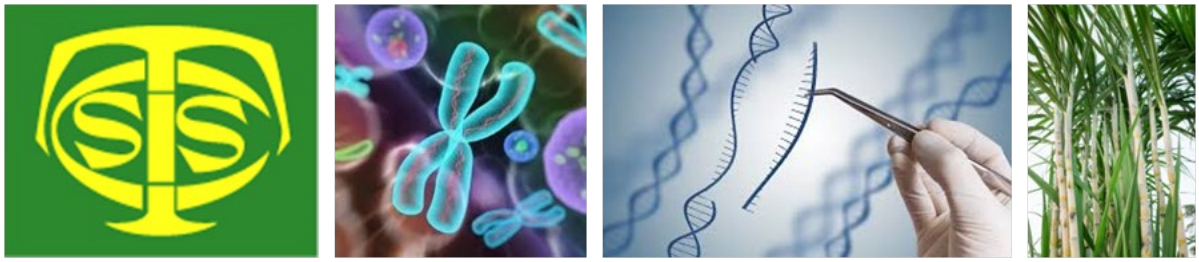
On behalf of the Congress Organizing Committee and the ISSCT Council and Executive Committee, we extend a very warm

The ISSCT XXXI Congress Newsletter 1 has been finalized and it may be accessed through the following link.

https://issct.org/wp-content/uploads/2022/04/ISSCT XXXI Congress Newsletter 1 (1).pdf

It contains detailed information on the Congress itself and the related activities i.e. Pre and Post Congress Tours, Social and Cultural events, Accompanying Persons' Programme, Trade Exhibition, Hotel Accommodation, Visa, Call for Papers and Posters, Registration Fee and the composition of the various committees that have been set up to organize and manage the Congress. The Congress website https://www.issctcongressindia2023.in/ will be accessible as from 1 May 2022. Additional information is included in the Newsletter 1 on the Indian sugar cane industry.

Announcement: ISSCT Molecular Biology Webinar



ISSCT MOLECULAR BIOLOGY WEBINAR

Tuesday 2 August 2022

11 a.m. GMT

"Genome Editing of Sugarcane"

As part of the series of Webinars that will be organized by the ISSCT in 2022 for its different disciplines, the **Molecular Biology** Webinar of the Biology Commission will be held on Tuesday 2 August 2022 at 11 a.m. GMT.

Programme

Introduction by María Francisca Perera, from the ISSCT Molecular Biology Section.

Main topics

Technology, applications and regulation

- **Editing the Complex Sugarcane Genome: Technology Overview, Challenges and Perspectives by Prof. Fredy Altpeter (University of Florida)**

Sugarcane is a prime feedstock for commercial production of biofuel and table sugar. Genome editing tools such as CRISPR/Cas9 and TALEN have been employed in several crops including sugarcane. They enable precise targeting and introduction of double stranded DNA breaks *in vivo*. Subsequent cellular repair mechanisms, predominantly non-homologous end joining (NHEJ), act as

critical steps to endogenous gene editing. However, there is very limited control over these mechanisms, which generate an abundance of random insertions and deletions (indels). Frameshift mutations associated with these indels of unspecified size and sequence might result in loss of function phenotypes of agronomic importance. Gain of function mutations, on the other hand, generally requires precise nucleotide substitutions in the target locus. This can be accomplished with the aid of a homologous repair template by involving the cellular homology directed repair (HDR) mechanism, or alternative approaches including base editing and prime editing. The progress with both targeted mutagenesis and gene targeting since our first report of successful editing of the complex sugarcane genome in 2016 will be reviewed. Challenges posed by highly polyploid genomes and synthetic biology perspectives for fueling the emerging bioeconomy will be discussed.

- **International perspectives on the (de)regulation of genome-edited crops by Dr. Hennie Groenewald (Biosafety South Africa; ISBR Board member)**

Genome editing (GEd) holds huge potential benefits as it allows the relatively quick, efficient, accurate and cost-effective modification of valuable genetic traits in crops, livestock and micro-organisms. However, to realize these benefits, products developed using GEd must be subject to fit-for-purpose, science-based safety regulations that satisfactorily manage national priorities, while allowing meaningful international integration. Discussions regarding the governance of GEd invariably raise questions whether the organisms resulting from its application should be considered "genetically modified" (GM) or not - and as a result be regulated as such or not. Depending on the regulatory approach taken in each country or region, the commercialization of these crops and their products may or may not require approval from the respective regulatory authorities. GEd crop developers, therefore, need to be aware of the current mosaic of regulatory schemes that affect these products. This presentation will provide an overview of the varied approaches to GEd regulation taken by several jurisdictions around the world and discuss the underlying principles on which these approaches are based.

Country case studies

The projects of four research centers in sugarcane genome editing will be presented by:

- Viktoriya Coneva from Centro de Tecnologia Canavieira (CTC), Brazil

Progress towards the development of efficient transgene-free sugarcane genome editing tools at CTC

Genome editing approaches enable targeted gene knock-out and templated modifications, thereby allowing for the generation of plants with precise genome alterations. Remarkably, such changes can be accomplished without T-DNA integration (transgene-free), which is of prime relevance to the ability to directly edit elite sugarcane germplasm. Scientists at CTC Genomics, a subsidiary of CTC located in St. Louis, MO, USA, are working to adapt and optimize genome editing tools for using in sugarcane. Current progress will be discussed with an emphasis on producing GM-free knock-outs in the context of the main challenges presented by sugarcane – its polyploid genome with limited genomic resources and the vegetative propagation of elite germplasm.

- Germán Serino from Chacra Experimental Agrícola Santa Rosa, Argentina

Sugarcane editing research in Chacra Experimental Agrícola Santa Rosa

Genome editing was tested in sugarcane using ALS herbicide tolerance as a model. Three vectors, each targeting specific segments of the sugarcane ALS gene and also three DNA templates, were designed. Combinations of the editing vectors, DNA templates and a transformation vector bearing selective marker NPTII were co-transformed into the cultivar NA05-860 and resistant calli selected in culture medium using standard protocols currently used at Chacra. Plants derived from independently transformed calli were transferred to the biosafety greenhouse, DNA extracted from leaf samples and analyzed by RT-PCR and sequencing. Sequencing confirmed that editing occurred in some of the analyzed plants. Editing resulted in the deletion of the target fragment but not in the desired codon modification. Efforts continue to optimize editing conditions that result in the desired modification.

- Jershon Lopez from Centro de Investigación de la Caña de Azúcar (CENICAÑA), Colombia

Gene editing of sugarcane: a new genetic improvement tool to obtain sugarcane varieties with higher productivity

Since 2018, The Colombian Sugarcane Research Center, Cenicaña, has been working on genome editing, first as a proof of concept to demonstrate that the Crispr Cas9 system could be used in sugarcane. Cenicaña is carrying out research on obtaining a DNA-free protocol using ribonucleoproteins that will allow the generation of non-transgenic edited plants that would be considered as conventional sugarcane varieties under Colombian Agricultural Institute resolution 29299 of 2018. This protocol has been developed through the edition of the sugarcane PDS gene (phytoene desaturase) that will allow the edited plants to be distinguished by their albino phenotype produced after knocking out the gene. Additionally, work is being done on editing the ALS gene associated with herbicide resistance, which would allow easy discrimination of edited plants. Cenicaña is also working on an appropriate in vitro culture system that will allow gene editing with greater efficiency. It is expected that with the implementation of this genome editing methodology, Cenicaña will have new sugarcane varieties with higher sucrose and biomass contents, and with better response to water and nitrogen efficiency, making the Colombian sugar sector more sustainable and competitive.

- Yogesh Parmessur from Mauritius Sugarcane Industry Research Institute (MSIRI), Mauritius

Application of Gene editing in the knocking out of flowering genes in sugarcane

Profuse flowering in some commercial sugarcane cultivars poses a major problem in Mauritius due to its association with pith formation and sucrose loss. One approach to limit flowering is to suppress the activity of gene(s) in the sugarcane flowering pathway. This may be achieved by knocking out selected flowering genes using the CRISPR/Cas9 gene editing (GE) tool. Initial experiences of the strategy adopted for implementing the technology to sugarcane are described.

The facilitators are: Dr. Karen Aitken from CSIRO, Australia, Dr. Mike Butterfield from CTC, Brazil and Dr. Yogesh Pasmessur from MSIRI, Mauritius.

Discussion

Q&A Session

Conclusion

Language

The Webinar will be conducted in English.

Registration

The Registration Form for the Webinar may be accessed through the following link: https://us06web.zoom.us/meeting/register/tZIqf--prDIsG9dlKKbvBLE1ZTiQVtWkONel

The Webinar is only open to compliant members of ISSCT. When you register for the webinar, your registration will be checked against ISSCT membership and payment records, and you will receive an e-mail with the meeting details (Username and Password to access the Webinar). If you have outstanding membership dues, you will be asked to pay these online before your registration is approved. The Individual Membership dues are USD 140 and may be settled through the following link: http://members.issct.org/appform/issct_india_2022.aspx

Further information

For further information, please contact Francisca Perera, franciscaperera@yahoo.com.ar or the ISSCT Secretariat at issct@intnet.mu

Please click here for short biodata on the presenters

Sugar Cane News

Wageningen University & Research: Production Of Bulk Raw Materials From Agro Residues One Step Closer

	Food Navigator Asia	**March 29, 2022**	https://indiaeducationdiary.in/wageningen-university-research-production-of-bulk-raw-materials-from-agro-residues-one-step-closer/

The CAPCOM-NL project has demonstrated the technical and economic viability of producing a raw biomass material from agro residues– in the form of a pellet – that can be traded and used on large scale. A tradable renewable raw material of this type is urgently needed as a way of accelerating the transition to a circular bio-economy.

Agro-industry residues have an important role to play in the new bioeconomy. These residues can potentially be used on a large scale as renewable raw materials for chemicals, fuels and other materials, providing a sustainable alternative to fossil-based raw materials. However, they are currently underused because they are still more costly than the current fossil-based raw materials and they can't easily be traded as commodities.

The power of SWAT MAPS

	Future Farming	**March 22, 2022**	futurefarming.com/smart-farming/tools-data/the-power-of-swat-maps/ *[Subscription Required]*

Use of these high-tech field mapping systems is growing. Here's a first-hand look, from South Africa and Montana. A state-of-the-art Canadian soil and moisture analysis system for optimising crop yields called SWAT MAPS is making inroads in North America, South Africa and Australia. Before two farmers, one in Montana and one in South Africa, share how they are using SWAT in combination with precision planting, fertiliser application and more, let's do a quick overview.

Artificial intelligence to improve Reef water quality by reducing herbicide use on farms [Australia]

	Great Barrier Reed Foundation	**March 28, 2022**	https://www.barrierreef.org/news/blog/artificial-intelligence-to-improve-reef-water-quality-by-reducing-herbicide-use-on-farms

A smart robot that detects and sprays weeds on sugarcane farms has proven to be highly effective at eliminating weeds and significantly reducing herbicide use, preventing toxic chemicals from flowing onto the Reef.

Townsville-based tech firm AutoWeed partnered with James Cook University and Sugar Research Australia to design the weed detection and spraying system that uses deep learning techniques to detect and spray weeds without hitting sugarcane.

	Recent trials show it is 95 percent as effective as conventional blanket spraying methods, but with significantly lower volumes of chemical herbicide entering waterways and washing out to the Reef.

Brazil's GMO sugarcane area to nearly double this year, company says [Brazil]

	Reuters	**April 6, 2022**	https://www.reuters.com/world/americas/exclusive-brazils-gmo-sugarcane-area-nearly-double-this-year-company-says-2022-04-06/
	Brazilian farmers are set to nearly double the area planted with transgenic sugarcane in the season starting this month, the world's main supplier of the genetically modified (GMO) crop, Centro de Tecnologia Canavieira (CTC) (CTCA3.SA), told Reuters. *CTC estimates that new cane varieties resistant to stem-boring insects will cover 70,000 hectares in the 2022/23 crop cycle, up from 37,000 hectares last year in Brazil, one of the biggest sugar producers in the world.*		

Public sector research leading LATAM's foray into crop biotechnology [Brazil]

	Alliance for Science	**March 25, 2022**	https://allianceforscience.cornell.edu/blog/2022/03/public-sector-research-leading-latams-foray-into-crop-biotechnology/
	Embrapa, a government-funded, Brazil-based company, is challenging the private sector in bringing biotechnology innovations to Latin America. *It's significant that a public research institution is leading Brazil's foray into genetically engineered crops. It ensures the research being done by Embrapa resonates with the needs of Brazilian consumers and farmers and upends the popular narrative that big companies control biotechnology in the Latin American region.* *The company already has achieved a number of successes. In early 2020, Embrapa announced it had released a genetically modified (GM) Brazilian bean resistant to a destructive plant disease. More recently, Embrapa scientists used CRISPR-CAS/9 to develop the first gene-edited sugarcane varieties with properties valuable to biofuel production.*		

Largest sugar-ethanol plant in the world becomes Bonsucro certified [Brazil]

	Bonsucro	**March 28, 2022**	https://bonsucro.com/largest-sugar-ethanol-plant-in-the-world-becomes-bonsucro-certified/
	Usina São Martinho in Pradópolis Brazil – the largest sugar-ethanol plant in operation in the world – has achieved Bonsucro certification. Founded in 1948, the mill has an approximate crush capacity of 10 million tonnes of sugarcane each harvest. The mill produces sugar and ethanol, and generates electricity from burning the sugarcane bagasse. Usina São Martinho is one of four plants which comprise São Martinho S.A., one of the world's largest sugar-energy groups.		

Sugarcane Breeding Institute's initiative helps farmer grow organic cane [India]

THE HINDU	The Hindu	March 14, 2022	https://www.thehindu.com/news/cities/Coimbatore/sugarcane-breeding-institutes-initiative-helps-farmer-grow-organic-cane/article65224106.ece

Indian Council of Agricultural Research-Sugarcane Breeding Institute (ICAR-SBI), Coimbatore, has helped a farmer grow organic cane and market jaggery.

A press release from the institute said that after farmer R. Ramasamy of Varappalayam, Thadagam, expressed his desire to organically cultivate sugarcane, the extension section of ICAR-SBI that maintains a technology park supplied Co 0212 and Co 11015 varieties sugarcane that were suited for making quality jaggery with a golden yellow hue and high retention quality.

The technology park, which grows popular sugarcane varieties on demonstration plots for farmers' benefit, supplied the two varieties in January 2020.

Union Minister of Agriculture and Farmers' Welfare Released 2 Products of ICAR-Sugarcane Breeding Institute [India]

KJ KRISHI JAGRAN	Krishi Jagran	March 31, 2022	https://krishijagran.com/agriculture-world/union-minister-of-agriculture-and-farmers-welfare-released-2-products-of-icar-sugarcane-breeding-institute/

Narendra Singh Tomar, Hon'ble Union Minister of Agriculture & Farmers' Welfare released two products of ICAR-Sugarcane Breeding Institute, Coimbatore viz., Cane jam and Entomo-pathogenic nematode (EPN) formulation, a biopesticide to manage white grub pests during the 93rd Annual General Meeting of the ICAR (Indian Council of Agricultural Research) Society.

Thai Plant Will Convert Sugar Cane to Sustainable Plastics [Thailand]

Environment + Energy LEADER	Environment & Energy Leader	March 16. 2022	https://www.environmentalleader.com/2022/03/thai-plant-will-convert-sugar-cane-to-sustainable-plastics/

NatureWorks, a manufacturer of polylactic acid (PLA), a low-carbon bioplastic made from renewable agricultural resources, will automate their new, greenfield plant in Thailand, converting sugar cane to the polylactic acid (PLA) biopolymer, called Ingeo. ABB, a global technology company, will manage the automation.

The new plant in Thailand will ferment and distill plant-based sugars – in a process similar to making beer or wine – converting the sugars first to lactic acid, then lactide, and then polymerize them into Ingeo.

Biorefinery slated for operation in 2024 [Thailand]

Bangkok Post	Bangkok Post	April 1. 2022	https://www.bangkokpost.com/business/2288514/biorefinery-slated-for-operation-in-

			2024
	Bio Base Asia Pilot Plant (BBAPP), which manages the multi-purpose biorefinery pilot plant in the Eastern Economic Corridor of Innovation in Rayong, is scheduled to start operation in 2024. *According to Narong Sirilertworakul, president of the National Science and Technology Development Agency (NSTDA), the government allocated 3.4 billion baht to support the infrastructure of BBAPP, a joint venture between NSTDA and Bio Base Europe Pilot Plant (BBEPP), a service provider for process development, scaling up and custom manufacturing of bio-based products and processes.* *The plant, now under construction, is part of the government's strategy to drive bio-, circular and green economic development in the country.*		

Amyris Starts Commissioning Of Industry Leading Fermentation Plant [USA]

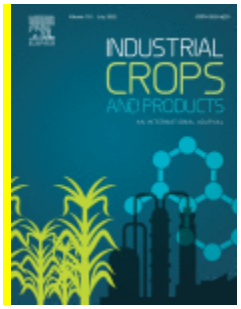
	Cision	**April 11, 2022**	https://www.prnewswire.com/news-releases/amyris-starts-commissioning-of-industry-leading-fermentation-plant-301522500.html
	Amyris, Inc. (Nasdaq: AMRS), a leading synthetic biotechnology company accelerating the world's transition to sustainable consumption through its Lab-to-Market™ technology platform today announced that it has started the commissioning of its new fermentation plant in Barra Bonita, Brazil. *The greenfield site at Barra Bonita is a strategic investment with which Amyris leads the biotechnology sector with manufacturing at industrial scale. The new plant is strategically located next to the Raizen sugar mill, which is the world's second largest of its kind, ensuring continuity of supply and favorable feedstock economics.*		

This Sugarcane Operation May Be The Most Sustainable Farm In Florida [USA]

	Successful Farming	**March 3, 2022**	https://www.agriculture.com/farm-management/farm-land/the-most-sustainable-farm-in-florida
	Shortly after the Fanjul family fled Cuba and arrived in Florida in 1959, they set up a small sugar-production plant on 4,000 acres of land in Western Palm Beach County. The sugarcane was harvested by hand, and the very first crop produced just 10,000 tons of sugar. *Six decades later, that modest farming operation has expanded to encompass approximately 190,000 acres across nearly 5,000 individual fields. And the family's company – now known as Florida Crystals – is part of the world's largest refiner and marketer of cane sugar with annual production of more than 6 million tons.* *Along the way, Florida Crystals has implemented multiple techniques to improve environmental sustainability and increase economic efficiency. "As a farmer, your land is your main asset," says Diego Luzuriaga, Florida Crystal's vice president of research and development. "You have to take care of your land, and we're always working on better ways to do that."*		

Latest Research

Combining N fertilization with biochar affects root-shoot growth, rhizosphere soil properties and bacterial communities under sugarcane monocropping



High-dose nitrogen (N) fertilization has been widely adopted to achieve higher yield in intensive sugarcane monocropping system in Southern China, while long-term excessive N fertilization causes high N losses and negative environmental impacts. Biochar (BC) has been considered a soil amendment to potentially improve soil fertility and crop productivity. However, little is known about the effects of N fertilization combined with BC on sugarcane growth, rhizosphere soil characteristics and microbial community composition. In this study, a greenhouse-pot experiment with six treatments in triplicates was carried out to examine the responses of root-shoot growth, rhizosphere soil properties and bacterial communities to different BC and N fertilization treatments in sugarcane monocropping soil (duration over 20 years). The results demonstrated that N fertilization combined with BC promoted the aboveground growth of sugarcane, while different dose of BC exhibited a significant effect on switching root and shoot growth responses. With the increase in the BC amendment rate, the rhizosphere soil pH, TC and C/N ratio increased correspondingly. As compared with the N-only treatment, N fertilization combined with moderate dose of BC significantly decreased soil NO3--N and nitrification potential (SNP), whereas N treatment with higher-dose BC resulted in a sharp increase in SNP. DESeq2 analysis revealed that N fertilization coupled with higher BC-amendment enriched Mesorhizobium, Porphyrobacter, Rhizobacter and Allorhizobium-Neorhizobium-Pararhizobium-Rhizobium. Redundancy analysis indicated that soil pH, NO3--N and C/N were key edaphic factors that shifted the soil bacterial community composition, especially for nitrifying flora and N-fixing flora. The above findings suggest that the combination of N fertilization with moderate-dose BC might be an alternative strategy to promote crop growth and soil sustainability under sugarcane monocropping system.

Journal to be published August 2022, article available online now

> Link

Cultural control of giant sugarcane borer, Telchin licus (Lepidoptera: Castniidae), by soil mounding to impede adult emergence

Florida Entomologist

The giant sugarcane borer, Telchin licus (Drury) (Lepidoptera: Castniidae), also known as the banana stem borer, is an economically important pest of sugarcane in eastern Colombia. The presence of larval and pupal stages within stalks makes biological control of this pest difficult, and growers often resort to insecticide applications. Hilling up the soil around the base of plants, or soil mounding, is a cultural practice sometimes used to improve rooting in sugarcane. Because mature larvae cut holes in stalks close to ground level through which they can emerge as an adult, we

hypothesized that soil mounding would impede adult emergence, and thus contribute to population reduction. Two experiments were conducted in fields with significant infestations of this pest in Puerto López, Meta, Colombia, during the seasons of adult emergence in this region (Apr–May and Oct–Nov). Manual mounding of soil to a height of 20 cm was tested in the first trial, and mechanized mounding of soil in the second, which also compared 2 mounding heights (10 and 20 cm). In both cases, 2 m row transects of plants were caged to collect emergent adults. Adult emergence was reduced up to 65% in all mounding treatments, whether manual or mechanical, and regardless of mounding height, demonstrating that this cultural practice could be a useful tactic for inclusion in an integrated management program for this pest. However, as with any other cultural practice in pest management, region-wide implementation likely would be required to impact local population densities, and efficacy will depend further on low levels of moth immigration from alternative host plants.

Biofuel was produced from sugarcane bagasse (Saccharum barberi sp.) in a bench-scale pyrolysis reactor at 500°C using a zeolite catalyst. Measured properties of the biofuel make it suitable for partial substitution of diesel in transport fuel.

Journal published 4 April 2022

> Link

Mapping 33 years of sugarcane evolution in São Paulo state, Brazil, using landsat imagery and generalized space-time classifiers

Remote sensing techniques can help estimate large sugarcane areas in order to support sustainable planning and management for the sugarcane industry, as well as in the context of environmental monitoring. In this study, four generalized space-time classifiers of high-resolution satellite images were tested in Sao Paulo State (SP) in order to map out sugarcane areas over the course of 33 years. These classification models were created based on the random forest (RF) algorithm, using Landsat historical imagery from 1986 to 2019 as input data. Models were calibrated with reference data under the sugarcane and "other uses" classes over 10 sites across the state of São Paulo and applied to the entire state area. The four models differed in their use of input data from the different Landsat sensors. The Dice Coefficient (DC) accuracies across sites ranged between 0.60 and 0.90. The best model employed data from all sensors and was calibrated with data from 6 consecutive years. When this model was applied on independent years, the DC values averaged at 0.82. The sugarcane areas estimated from satellite imagery demonstrated a notable correlation with areas estimated from reference Canasat maps (R2 = 0.91), data from the Brazilian Institute of Geography and Statistics (R2 = 0.92), and data from the Brazilian National Supply Company (R2 = 0.73). The general trend was a large increase in sugarcane areas starting in the early 90s up until 2015, and a trend toward stabilization, and even small decreases, after 2015. This study showed that a single classification model trained on 6 years of data allowed for the accurate monitoring of sugarcane areas over 33 years, without the tedious and time-consuming work of re-calibrating the classifier for previous or new years. Year-to-year accuracy, however,

largely depended on the availability and quality of Landsat imagery. The results were applicable to the monitoring of sugarcane areas over large areas and numerous years, which could assist the sugarcane energy sector.

Journal published 8 April 2022

> Link

Synthesis of Green Nano Composite Using Sugar Cane Waste for the Treatment of Cr Ions from Waste Water

A lot of agricultural waste is generated in India and the farmers mostly burnt that waste and create environmental problems. Efforts are being made to convert that waste into some useful products and Nano-technology stays no behind in making that agricultural waste into a useful product. Nano-technology helps by making Nano-composites using agri-residues like bagasse and some industrial wastes like fly ash and thereby reduce the environmental pollution. Carbon and its compounds and have an ionic attraction for metals compounds and property helps in the removable of heavy metals present in water. Graphite based Nano composite prepared were applied to various waste water bodies of pulp and paper industry and it had been found that the colour of the water gets reduced by 60–80%, decline in BOD by 40–70% and COD by 70–80%.

Journal published 7 April 2022

> Link

Classification of sugarcane genotypes susceptible and resistant to the initial attack of sugarcane borer Diatraea saccharalis using epicuticular wax composition

Identifying compounds present in the sugarcane epicuticular wax and using these compounds to classify the genotypes susceptible and resistant to the initial attack of sugarcane borer (Diatraea saccharalis) was the aim of this study. A greenhouse experiment was performed in a factorial scheme with and without borer infestation using genotypes previously characterized as resistant or susceptible in field-based experiments. Sugarcane whorls of six-month-old plants were collected before (BI) and after (AI) 72 hours of sugarcane borer infestation. The sugarcane epicuticular wax was extracted in both times, i.e., BI and AI and its chemical composition was assessed by gas chromatography coupled to mass spectrometry (GC-MS). Twenty-five compounds were identified for both BI and AI. Classification models were built using partial least squares for discriminant analysis (PLS-DA) and linear discriminant analysis (LDA). Variable selection methods were used to improve the classification models. Ordered predictors selection for discriminant analysis (OPSDA) selected compounds that correctly classified all the test samples before borer infestation (Error = 0.000), and exhibited the most suitable classification parameters for the test set after borer

infestation (Error = 0.111). The C30 pentacyclic triterpene friedelin and a high alcohol/aldehyde ratio were associated with the classification of resistant genotypes. Our findings have applicability in developing a screening methodology for breeding programs interested in identifying genotypes resistant to the initial feeding of sugarcane borer.

Journal published 7 April 2022

> Link

Marker-trait Association for Resistance to Sugarcane Mosaic Virus (SCMV) in a Sugarcane (Saccharum spp.) Panel

Sugarcane mosaic disease (SMD) caused by sugarcane mosaic virus, is one of the main diseases in sugarcane production areas in Brazil. Thus, the identification of new sources of resistance for use in future introgression crosses is key for reliable economic gains. Here, we aimed to screen a diversity panel of 98 sugarcane genotypes for SMD under natural infection conditions, to investigate virus-specific amplicons from SCMV coat protein gene (CP), and identify marker-trait associations via association mapping using Amplified Fragment Length Polymorphism (AFLP) and Simple Sequence Repeats (SSR). The highest SMD incidence (26.53%) was observed eight months after planting, with significant differences ($p<0.01$) among genotypes and a means-based broad-sense heritability of 62.49% with a noticeable contribution of Saccharum spontaneum to SMD resistance. The CP sequence analysis revealed no variation among the four selected plant samples, which phylogenetic analysis revealed clustering with the RIB-1 strain while putative amino acid substitutions indicate a new SCMV isolate. From a subset of 135 SSR and 663 AFLP markers, selected after quality control, 91 markers were associated with response to SCMV ($p < 0.05$) by simple linear regression, and 24 were significant at $p < 0.01$. Four out these 24 fit in a stepwise regression at $p < 0.05$, all contributing for the resistance to SMD, and are present in thirteen genotypes showing no SMD symptoms. These four markers collectively explain 29.95% of trait variation, while individually explain from 5.51 to 14.02%, and may correspond to new genomic regions conferring genetic resistance to SMD which investigation is worthwhile.

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Effects of Mechanized Harvesting of Sugarcane over the Soil

SUELO Y AGUA
SOIL AND WATER

The present work is focused on the effects on the soil due to the traffic of sugarcane harvesting machines. The investigation took place in areas of three different units of sugarcane production in the UEB "Héctor Rodríguez", located on the north coast of Villa Clara. The CASE IH 8 800 harvesting machine and self-dumping car pulled by the Maxxum CASE 150 tractor were used for the study. The main characteristics of the predominant soils were determined, as well as the variations of soil micro relief, the bulk density and the soil moisture. The results showed soil modifications due to the traffic of the equipment during the harvest, highlighting the effect of the tractor and self-

balancing aggregate. The machines introduce considerably modifications in field profile, by moving over and through the furrow, affecting the root zone. Dry bulk density values characteristic of heavy clay soils, were found, increasing this value after the harvesting machinery passing. O

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> Link

Sugarcane plant detection and mapping for site-specific management

The sugarcane production sector is one of the most adept at adopting technology to manage equipment and sugarcane fields. Developing new technologies and optimizing the use of the technologies already used in other production systems is essential for successful field management. The optimized use of technologies will help in the localized management to increase viability, maximize profitability, and minimize the environmental impacts of sugarcane production. Technologies to detect, measure, and spatialize plants can be one of the solutions for the row level management. Moreover, this data can be used to temporally follow the development of sugarcane fields, being essential data for localized field management. The spatialization of plants and plant spacing can help in the investigation of factors that influence sugarcane yield. In this context, the overall objective of the thesis was to explore tools and methods for detecting plants at row level to improve and support localized management of sugarcane plantations. An approach to sugarcane plant detection using photoelectric and ultrasonic sensors was developed and evaluated. Aerial image and ground sensors have been tested to detect and measure sugarcane plant spacing. Temporal evaluation of sensors and aerial images during four different stages of sugarcane development was made to propose the best time to detect sugarcane plants and measure the plant spacing. High-resolution images were used to map plant population and plant spacing. These two data were used to check the relationship between slope, path angle, and the plant population, furthermore, map regions with higher susceptibility to plant reduction over the years. At last, a spatio-temporal analysis of yield and plant spacing was performed to verify the relationship between these two variables in regions with different yield potentials in commercial crops. Results show that ultrasonic and photoelectric sensor fusion associated with the machine learning model has accuracy above 95%. These two sensors and high-resolution images had the best accuracy and precision in detecting and measuring plant spacing at 31 and 47 days after harvest. Spatial and temporal analysis showed that regions with a terrain slope of 5-8% and greater than 8% with curved paths have an inferior number of plants compared to other regions. The local analysis identified that regions with steeper slopes and curved paths have high susceptibility of plant reduction over the years compared to other regions. Finally, yield loss within the sugarcane row occurs with increasing plant spacing. Regions with different yield potentials require different optimum populations to maximize yield. Low-yielding regions require a larger plant population and are more susceptible to lose in yield within the row with increasing plant spacing.

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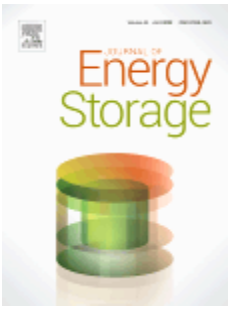
Effect of bagasse drying on thermal energy storage utilizing zeolite water vapor ad/desorption at a sugar mill



Recently, polygeneration in the sugarcane industry, which produces not only raw sugar but also other products (ethanol and electricity), has been attracting attention for green economy via the utilization of local natural resources. We focus on "heat" as a polygeneration method for the sugarcane industry. This study describes a thermal energy storage and transport system that can eliminate the spatio-temporal mismatch between the heat source, the sugar mill, and the fossil fuel consumption. The polygeneration system connects the thermal energy storage system with the sugar mill plant, such that the additional power generated by drying sugarcane bagasse, a fuel with a high moisture content, is used as the auxiliary power for thermal energy storage. Here, assuming the bagasse drying process at a sugar mill, we studied the bagasse drying rate, the bagasse drying in the bagasse elevator, simulations of a sugar mill with bagasse drying, and the thermal energy storage system utilizing the water vapor ad/desorption cycle of zeolite; a sugar mill in Tanegashima, Japan, was used as an example. A fixed-bed test packed with sugarcane bagasse was conducted, and a numerical model was developed for simulating the temperature distribution and the evolution of the outlet vapor pressure in the fixed-bed reactor. Subsequently, the bagasse drying process using a covered bagasse elevator was numerically simulated, and a moisture reduction of 2% was expected. This result was incorporated into the process simulation, to evaluate the relationship between additional power generation and temperature as well as the flow rate of unused heat for thermal energy storage. Finally, this relationship was incorporated into the numerical design of a heat-charging device, to evaluate the effect of bagasse drying on the thermal energy storage system. The coefficient of performance (COP) of the heat-charging system with bagasse drying was 1.6 times higher than that without bagasse drying.

Journal to be published July 2022

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Sugarcane yield estimation through remote sensing time series and phenology metrics

Accurate agricultural yield prediction is a fundamental tool for sustainable agricultural planning and to ensure food security in regions critically affected by climate change and extreme weather events. Existing regressionbased crop yield estimation approaches typically rely on a specific set of predictor variables, but have not been compared systematically. This paper demonstrates and compares the utilization and the combinatorial use of three different sets of object-based predictors for sugarcane yield estimation through the agricultural monitoring platform agIknowledge which utilizes earth observation data of the Sentinel-2 satellites, captured between 2018 and 2019 for a study area of about 10,000 hectares in Ethopia. We compare several regression models using a range of different predictor variables, such as (i) multi-temporal variables (i.e., parcel-based vegetation index time series), (ii) time series descriptors (i.e., phenological metrics) and (iii) spatio-temporal variables. We achieve R2 scores of up to 0.84 for the estimation of sugarcane yield and up to 0.82 for the

estimation of sugar quantity through Random Forest regression, based on the combinatorial use of all predictor variables. Our experiments demonstrate that dimensionality-independent phenological metrics achieve good yield estimation results which could be a very useful variable set for model transfer and domain adaptation.

Journal to be published December 2022, article available online now

> Link

Events

	2022 S.I.T. Orlando Conference *Sugar Industry Technologists* 17-19 April 2022 **Orlando, Florida, USA** > Link
	2022 Australian Society of Sugar Cane Technologists Conference *Australian Society of Sugar Cane Technologists* 19-22 April 2022 **Mackay MECC, Queensland, Australia** > Link
	ASSCT Annual Florida & Louisiana Joint meeting *American Society of Sugar Cane Technologists* 14-16 June 2022 **Hyatt Regency Coconut Point Bonita Springs FL USA** > Link
	XVI International Congress on Sugar and Cane Derivatives: Diversification 2022 *AZCUBA Sugar Group, the Cuban Association of Sugar Technicians and the Cuban Institute of Research on Sugarcane Derivatives* 20-24 June 2022 **Cuba**

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	Conferencia Bonsucro México 2022 *Bonsucro* 30 June – 1 July 2022 Mexico City, Mexico > Link
	American Sugar Alliance Symposium *American Sugar Alliance* 29 July - 3 August 2022 ~~Seattle, WA, USA~~ Location TBC > Link
	94th SASTA Congress 2022 *SASTA – South African Sugar Technologists' Association* 16-18 August 2022 ICC, Durban, 45 Bram Fischer Rd, Durban, 4001 South Africa > Link
	28ª Feira Internacional da Bioenergia *Fenasucro & Agrocana* 16-19 August 2022 Centro de Eventos Zanini, Sertãozinho, Brazil > Link
	XII Congreso Tecnicaña (XII Tecnicaña Congress) *Tecnicaña* 12-16 September 2022 *At Tecnicaña we are preparing to share a unique international scenario with the Sugarcane Agroindustrial Sector, for this reason, we invite you to participate in this great meeting that will allow us to have the opportunity to meet again around sugarcane to discuss and reflect on the future and projections of the agribusiness.* Cali, Valle del Cauca, Colombia > Link

 	**7th IAPSIT International Sugar Conference & Sugarcon-2022** *"Sustainability of the Sugar and Integrated Industries: Issues & Initiatives"* *Indian Institute of Sugarcane Research* ~~16-19 February 2022~~ **Postponed to 16-19 October 2022** Lucknow, India & virtual platform (for international delegates) > Link
	**31st ISO International Seminar 2022** *International Sugar Organization* 22-23 November 2022 • *Congress: 20-23 February* • *Pre-congress tour: 17-18 February* • *Post-congress tour 24-28 February* East Wintergarden, Canary Wharf, London, UK > Link
	**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