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

Contents

News from ISSCT 3

ISSCT Co-products Commission Webinar 3

ISSCT Entomology Webinar 7

Sugar Cane News 13

How Food Waste Will Propel IndyCar As Shell Switches To 100% Renewable Fuel In 2023 13

Seat sensors, new lights and sugar cane - how will future aircraft cabins look? 14

Are 'natural' products better than synthetic ones? 14

Following several fallow decades, herbicide companies are searching for new modes of action 14

Genome editing can be useful for climate adaptation of crops, say scientists 15

Sugar already provides loads of renewable energy to the grid, so why won't it do more? [Australia] 15

Petrobras and Raízen sign agreement for biomethane production [Brazil] 16

EID Parry's inks partnership with Nutrition Innovation to make healthy sugar [India] 16

Working on diesel-ethanol tech, says Praj [India] 17

Are biofuels finally coming of age? [India] 17

CBN okays sugarcane facility for farmers [Nigeria] 17

Self-Sufficiency: Dangote Sugar On Course To Deliver 9,800mt Per Day In Numan [Nigeria] 17

Govt urged to tailor a policy to modernise agriculture sector [Pakistan] 18

Latest Research 18

Systematic review of life cycle assessments applied to sugarcane bagasse utilization alternatives....18

Bioenergy siting for low-carbon electricity supply in Australia....19

Production of biodegradeable plastic by Bacillus sp. using sugarcane bagasse....19

Impact of Agroclimatic Variables on Proteogenomics in Sugar Cane (Saccharum spp.) Plant Productivity....20

Assessing Agriculture Sustainability in Mexican States....20

Treatment of vinasse by adsorption on activated carbon from sugarcane bagasse agglomerated with Al2O3....21

Economic Evaluation for Bioproducts Production from Carbohydrates Obtained from Hydrolysis of Sugarcane Bagasse....21

Novel alleles linked to brown rust resistance in sugarcane....22

Identification of Host Proteins Interacting with RNA Silencing Suppressor of Sugarcane Streak Mosaic Virus....22

Diffusion of technologies: a longitudinal analysis of the Brazilian agricultural machinery sector....23

Events....23

American Sugar Alliance Symposium....23

94th SASTA Congress 2022....24

28ª Feira Internacional da Bioenergia....24

SugarEx Thailand 2022....24

XII Congreso Tecnicaña (XII Tecnicaña Congress)....24

Sugar & Ethanol Asia....24

7th IAPSIT International Sugar Conference & Sugarcon-2022....25

Bonsucro Global Week....25

25th World Ethanol & Biofuels....25

31st ISO International Seminar 2022....25

ISSCT XXXI Congress....25

News from ISSCT

ISSCT Co-products Commission Webinar

THEME:

Value adding to bagasse

Thursday 28 July 2022, 11 a.m-1 p.m. GMT



The webinar is planned for **28 July 2022 from 11:00am GMT – 1:20pm GMT**

The ISSCT Co-product Commissioner will chair the event with presentations from:

- Mercurius Biorefining, USA + QUT, Australia
- Kasetsart University, Thailand
- Praj Industries, India
- Raizen, Brazil
- CNPEM, Brazil
- CENICAÑA, Colombia
- Audubon Sugar Institute, USA

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/tZElcO2qpzItE9OFkPgyg2CMJKu7z9HQHrD7

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 the ISSCT Co-products Commission – Bryan Lavarack b.lavarack@mkysugar.com.au or the ISSCT Secretariat at issct@intnet.mu; issctsecretariat@gmail.com

PROGRAMME

11:00 GMT – Welcome by Dr. Bryan Lavarack (Mackay Sugar, Australia)

11:00 – 11:20 am GMT - Presentation 1
Mercurius REACH technology – Pilot demonstration
Karl Seck (Mercurius Biorefining, USA) and Dr. Darryn Rackemann (QUT, Australia).
Karl received a BS Degree in Chemical Engineering from the University of Kansas and is the CEO/President and Founder of Mercurius Biorefining Inc. a company formed to develop and commercialize transformational technology to efficiently convert biomass into drop-in biofuels and green chemicals. Karl has spent most of his career in the petroleum refining field as a process engineer, holding design, technical services, optimization, and operations management positions with three oil companies: Conoco, Sunoco, and Clark. After working for a mid-sized engineering firm, Karl started his own process consulting service in 2001 to provide optimization services to the petroleum industry. Karl is now overseeing the pilot scale demonstration of the Mercurius REACH process in Mackay using sugarcane bagasse.
Darryn is a senior chemical engineer in the Centre for Agriculture and the Bioeconomy, with Queensland University of Technology. He has over 20 years R&D experience in the cane sugar production industry. Darryn completed his Master's in engineering at JCU specializing in sugar crystallization and completed a Chemistry PhD at QUT examining value-added chemicals produced from bagasse. Darryn's current research interests are in the valorisation of sugar industry products to value added beverages, chemicals, fuels and materials.

11:20 – 11:40 am GMT - Presentation 2
Cellulosic fibers from sugarcane bagasse for diverse applications
Associate Prof. Prakit Sukayi (Kasetsart University, Thailand)
Associate Prof. Prakit Sukayi is a Senior Research Fellow and Deputy Head of the department of Biotechnology, faculty of Agro-Industry, Kasetsart University, Thailand for over 10 years. He was a post-doctoral fellow in Biocomposites from Seoul National University, South Korea. Prior to that, he obtained Dr.nat.techn.

(Food Biotechnology) from University of Natural Resources and Life Sciences, Vienna, Austria and Master of Science (Biotechnology), Kasetsart University, Thailand. He is the head of Cellulose for Future Materials and Technologies Special Research Unit, with not less than ten postgraduate including international students in his unit researching into but not limited to, the utilization of agro-industrial waste such as extraction of cellulose nanocrystal from sugarcane and cassava bagasse and energy cane using enzymatic process. Extraction of bioactive compound from plant extracts such as coconut husk, jack fruit, rambutan peel and sappan wood. Synthesis and modification of bacterial cellulose (nanocellulose, nanofibrils, nanocrystals and alignment). Its utilization as structural framework and a carrier of bioactive compound such as turmeric, hydroxyapatite and magnetic nanoparticles as scaffold for tissue repair and regeneration (bone tissue, wound dressing, skin and face masks). He has gained national recognition in his research as "Outstanding Research Awards" from National Research Council of Thailand, in 2018 and Science and Technology Research Grant from Thailand Toray Science Foundation in 2021. He has a hardworking research team who works assiduously to achieve their project objectives within stipulated time. His department and the university as whole has state of the art facilities when it comes to biomass conversion, biomolecules production and material characterization.

11:40 am – 12:00 pm GMT - Presentation 3
Technology developments for low Carbon Intensity (CI) Ethanol
Presenter Yash Mankame (Praj Industries, India)
Yash Mankame is Head of Business Development (Ethanol) at Praj Industries Ltd. Praj is leader in Bio-economy, specialising in Technology, Engineering and supply of 1st Gen and 2nd Gen Ethanol plants, Bio-CNG plants and waste-water treatment solutions.
Yash is a Chemical Engineer by qualification and has more than 30 years of experience in Bio-energy space. He has been involved in development of more than 50 Bio-energy projects from conceptualisation to commercial production.

12:00 – 12:20 pm GMT - Presentation 4
Second generation ethanol production at Raizen
Marisa Coral (Raizen, Brazil)
Marisa Coral, Corporate E2G Process manager at Raizen (Piracicaba/SP – Brazil), studied Biology (2006) at University Federal of Alfenas/MG, with a master degree in Bioprocess Engineering at Federal University of Paraná/PR (2009) and was awarded a PhD in Molecular Biophysics applied to Bioenergy (2013) from the University of São Paulo at Physics Institute of São Carlos/SP, worked as research fellow at University of York (2012) on Center for Novel Agricultural Products (CNAP). Worked also as Research Scientist and Project Leader for new enzymes

development at Novozymes, focusing on biorrefinary, enzyme application and upscaling (2013/2016). In 2016, joined Raizen Cellulosic Ethanol Program as Bioprocess Specialist and since than have being working on new technologies development to overcome this new industry challenges, also looking for new opportunities on new products development with higher added value and sustainability for the sugarcane industry. In 2018 assumed the E2G Process and Quality Control manegment at Costa Pinto industrial plant, focusing on industrial process optimization. Since 2020, have been working on project engineering and investment approval for new E2G plants, as Corporate E2G manager.

12:20 – 12:40pm GMT - Presentation 5
Sugarcane Agricultural Residues (SAR) alternative processing
Dr. Regis Leal (CNPEM, Brazil)
Dr. Manoel Regis Lima Verde Leal has been at LNBR – Brazilian Biorenewables National Laboratory of CNPEM – Brazilian Center for Research in Energy and Materials (CNPEM) since 2009. Initially as Coordinator of the Sustainability Program. His work in the past three decades has been focused on the study of potential evolution of the technologies applied in the exploiting sugar cane as energy source for the production of ethanol and electricity aiming at the improvement of the Sustainability indicators of bioethanol. Before that he worked at Copersucar Technology Center (CTC) from 1986 to 2004 and Promon Engenharia from 1974 to 1986. Prior to that, he held teaching positions at the Aeronautical Institute of Technology (ITA) and Federal University of Ceará. He was the ISSCT (International Society of Sugar Cane Technologists) Co-Products Commissioner during three periods and he was the National Team Leader representing Brazil in the Task 38 (Greenhouse Gas Balances and Bioenergy Systems) of the IEA (International Energy Agency) Bioenergy, from 2009 to 2015. He is an ISSCT Honorary Life Member. He graduated in Aeronautic Engineering at the Instituto Tecnológico de Aeronática (Brazil) and holds a PhD in Mechanical Engineering from Kansas State University (USA).

12:40 – 1:00pm GMT - Presentation 6
Integrated scheme for the thermal and biochemical use of sugarcane harvesting residues in the Colombian context
David Palacios (CENICAÑA, Sugarcane Research Centre, Colombia)
David Palacios-Garcia is a Chemical Engineer with a Master degree in Sustainable Energy Technologies from University of Twente in Netherlands. Over the last 7 years, He has been working as a researcher in the Colombian Sugarcane Research Center (Cenicaña) giving support to sugar and fuel ethanol production plants in Colombia. His experience is associated with the field of chemical and biochemical transformation of lignocellulosic biomasses,

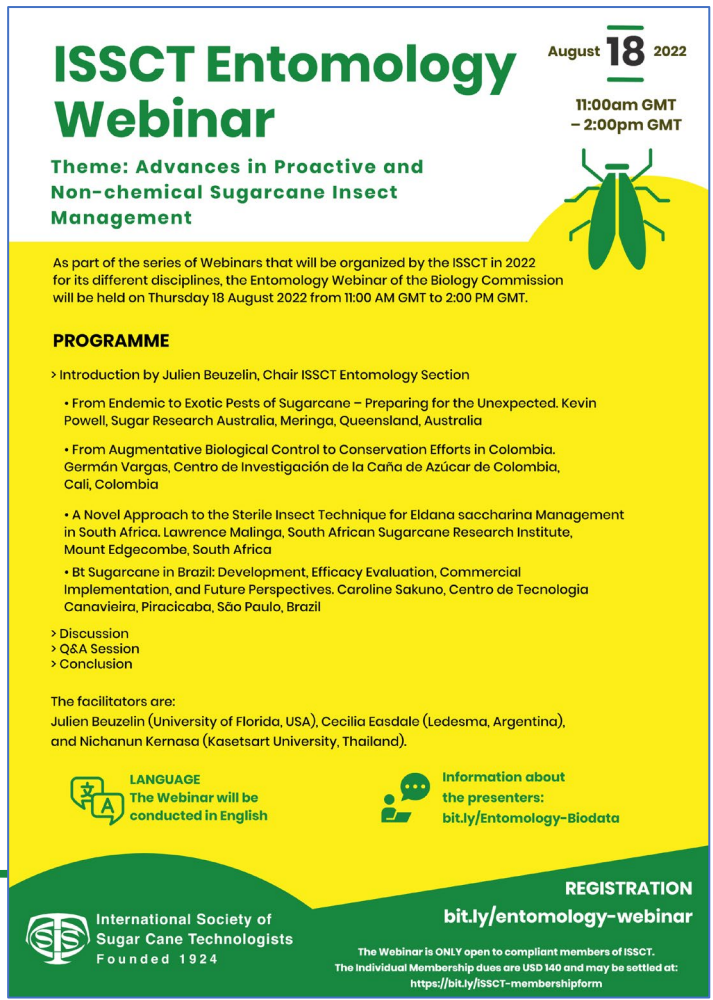
production of 1G ethanol, and life cycle assessment of sugar and fuel alcohol from sugarcane.

1:00 – 1:20pm GMT - Presentation 7
Unlocking the Real Potential of Black Soldier Fly Larvae Protein and Lipid Derivatives from Cane By-products as Animal Feed
Dr. Giovanna Aita (Audubon Sugar Institute, Louisiana State University, USA)
Dr. Giovanna M. Aita is a tenured Professor at the Audubon Sugar Institute at Louisiana State University Agricultural Center with adjunct appointments in the School of Nutrition and Food Sciences and in the Department of Biological and Agricultural Engineering. She has over 20 years of research experience focusing on the bioconversion of renewable biomass (agricultural and woody residues) and sugarcane by-products into alternative chemicals, with applications in the sugar, food, nutraceutical, and pharmaceutical industries. Dr. Aita's research has resulted in over 80 peer-reviewed publications and book chapters, and in the recruitment and mentoring of graduate students, research associates, postdoctoral fellows, and visiting scholars, as well as recognition from both industry and academia. Dr. Aita has received research funding from federal agencies, state agencies, non-profit organizations, and industry totaling USD$14M. She holds B.S. (biology) and M.S. (food microbiology) degrees from Clemson University, and a Ph.D. degree in microbiology from the School of Nutrition and Food Sciences at Louisiana State University.
General Discussion
Conclusion

ISSCT Entomology Webinar

THEME:
Advances in Proactive and Non-chemical Sugarcane Insect Management
Thursday 18 August 2022, 11:00 AM GMT

As part of the series of Webinars that will be organized by the ISSCT in 2022 for its different disciplines,
the **Entomology** Webinar of the



Biology Commission will be held on Thursday 18 August 2022 from 11:00 AM GMT to 2:00 PM GMT.

Registration
The Registration Form for the Webinar may be accessed through this link.

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

Programme
Introduction by Julien Beuzelin, Chair ISSCT Entomology Section

- **From Endemic to Exotic Pests of Sugarcane – Preparing for the Unexpected.** Kevin Powell, Sugar Research Australia, Meringa, Queensland, Australia

Abstract: The Australian sugarcane industries major insect pests are the canegrubs, comprising 20 species. Most of the species are endemic and have been controlled primarily using insecticides. However, the industry relies solely on the use of a single neonicotinoid, imidacloprid, for control of the larvae. This product has been used for two decades and has been very successful. However, neonicotinoids are under scrutiny and other alternatives including biorationals are being explored. Screening of such alternatives needs to occur to provide sufficient scientific evidence of efficacy, persistence and reduced environmental consequences. In Australia, a new 4-year research project is currently focusing on developing rapid in situ and in field screening methods to improve the selection of sustainable alternatives to imidacloprid.

In 2012 a newly described cane disorder called Yellow Canopy Syndrome (YCS) was described from Cairns in Far North Queensland. Despite multiple research projects the direct cause of YCS has yet to be determined. However, there is increasing evidence, most notably from both insecticide and variety trials, that invertebrates are likely to be involved in YCS expression. Recent studies on YCS have utilised novel and existing sampling procedures to determine which invertebrates are likely to be involved and how climatic conditions impact their

abundance. These studies have highlighted for the first time not only potential invertebrates involved in YCS but also the diversity of invertebrates present in the sugarcane ecosystem. Some of the effective monitoring methods developed will be utilised to ensure that future management approaches are utilised only as and when required.

With the exception of canegrubs, the Australian Sugarcane industry has relatively few endemic pests of economic significance but due to its close proximity to other cane growing countries is at risk of exotic pest incursions through either wind dispersal or movement of infested plant material. Strict biosecurity regulations and regular monitoring in Far North Queensland have so far limited this risk. However, the fall armyworm (FAW), *Spodoptera frugiperda*, was detected in 2020 in Queensland and is now established in various Australian states. FAW has so far caused no economic loss to cane but this incursion highlights the risk of future exotic Lepidopteran incursions such as sugarcane moth borers. Australia is also concerned about potential future incursions of Hemipteran vectors of pathogens. The focus of Australian research on exotic pest threats has included both on shore and offshore work (with collaborators in Asia and the Pacific) on preparedness including optimising diagnostic and detection techniques and incursion management approaches.

An overview of the SRA entomology research program and its highlights in relation to endemic and exotic pests and their sustainable management will be provided.

- **From Augmentative Biological Control to Conservation Efforts in Colombia.** Germán Vargas, Centro de Investigación de la Caña de Azúcar de Colombia, Cali, Colombia

Abstract: The sugarcane stem borers, *Diatraea* spp., are considered the most important pests in sugarcane in Colombia and management is achieved by releasing egg and larva parasitoids. In general, *Diatraea saccharalis*, is the species with the widest distribution in the Western Hemisphere and can be found infesting sugarcane from the U.S. to Argentina. In Colombia, the main species in sugarcane are *D. saccharalis*, distributed all over the country; *D. indigenella*, recorded in western regions, *D. busckella*, found all over the country; *D. lineolata*, recorded in the departments of Tolima, Magdalena, Valle and Choco; and *D. tabernella*, registered in western areas of Colombia and relatively recently in the Cauca River Valley (CRV).

In many sugarcane growing areas in the neotropics, the main component for pest management has been biological control since the introduction of *Lixophaga*

diatraeae from Cuba to Louisiana in 1915, which, even though unsuccessful, was followed by several successful examples in other countries in the region. In Colombia, there have been efforts towards the biological control of *Diatraea* spp. since the early 1970s. *Trichogramma* spp. were the first parasitoids to be released, followed by releases of *Cotesia flavipes* that did not show adaptation to the conditions of the CRV and by the importation several tachinid flies. Some parasitoids showed interesting results whereas others never adapted to the Colombian conditions and particularly to the CRV, which is the most industrialized sugarcane growing area of the country. After the 1980s and up to this date, the study of losses under the CRV conditions, population dynamics, sampling procedures, and alternative methods of control has contributed to the development of a biological control program that has allowed to respond to unexpected population changes and to keep *Diatraea* spp. at population levels minimizing their economic impact.

This presentation will provide an overview of sugarcane stem borer ecology under the conditions of the CRV in Colombia and discuss the experiences accumulated over four decades of implementing augmentation biological control as the main tool of IPM. This presentation will also discuss possible future actions to face climate change and changes in production practices while promoting conservation biological control. In this regard, the behaviour of the wild larval parasitoid of sugarcane borers in Colombia, *Genea jaynesi,* was observed under manipulation of broadleaf flowering weeds growing on field edges. It was found that conservation of broadleaf flowering plants was associated with higher abundance of *G. jaynesi* adults. In addition, field collections of *Diatraea* spp. larvae across the CRV between 2015 and 2019 revealed that 50% of all parasitized individuals of the four borer species (*D. saccharalis, D. indigenella, D. busckella* and *D. tabernella*) were attacked by *G. jaynesi*; indicating its importance and prevalence in the natural regulation of these pests. A series of concerted efforts have been implemented to demonstrate to sugarcane growers the advantages of maintaining plant shelters, hedge rows, and areas of preservation as source of food for natural enemies and conserving associated fauna to promote conservation biological control as an alternative to augmentation biological control for a more environmentally friendly sugarcane production system.

- **A Novel Approach to the Sterile Insect Technique for *Eldana saccharina* Management in South Africa.** Lawrence Malinga, South African Sugarcane Research Institute, Mount Edgecombe, South Africa

Abstract: In South Africa, the stalk borer *Eldana saccharina* (eldana) is an indigenous pest that significantly reduces sugarcane yield. Severe economic

losses due to eldana in the South African sugarcane industry are estimated at approximately US$60 million annually. Researchers at the South African Sugarcane Research Institute (SASRI) have conducted research over many years to develop tools to enable sugarcane growers to sustainably manage this pest according to integrated pest management principles, with the sterile insect technique (SIT) being one of these tools.

SIT is a species-specific and environmentally benign method of insect control that depends on the release of sterile insects. The success of the SIT programme around the world can be ascribed to the fact that it has been based on an understanding of the developmental stages, behaviour, and population dynamics of the target species. Before embarking on area-wide integrated pest management programmes involving suppression of insect pests using SIT, consideration of the technical and economic feasibility of the approach is essential.

The SIT is commonly implemented by releasing partially sterile male insects into the wild. These partially sterile males then compete with wild males for mating with the wild females. After mating, the wild females that mated with the sterile male will produce some fertilized F1 eggs. F1 generation adults in the field are then sterile, and this is known as F1-inherited sterility. This will result in the eradication, reduction, containment, or prevention of the targeted pest population. Irradiation of the insects is done using gamma-ray or x-ray that irradiates the insects' reproductive cells.

SASRI has been involved in the rearing of eldana since the 1970s, and for nearly two decades, the institute has been conducting SIT research on eldana control. Due to the unavailability of a nearby irradiation facility, SASRI is pioneering a novel approach to SIT. Instead of irradiating moths and releasing these directly, as in traditional SIT, the first-generation offspring are mass-reared and released. Significant progress has been made in understanding the factors and variables affecting the quality and the field performance of released moths. Valuable lessons learned from the preliminary SIT research have revealed that: (i) male moths irradiated at the dose of 200 Gy are as sexually competitive as wild males; (ii) the F1 population has a desirable male bias and greater 'fitness' than its irradiated parent; (iii) long-distance transportation for irradiation has no impact on pupal emergence; and (iv) weekly release of sterile F1 male moths in controlled cages reduces eldana populations and their damage to sugarcane. With a successful proof of concept, the SIT programme has the potential to be a viable control measure for eldana in sugarcane production.

- **Bt Sugarcane in Brazil: Development, Efficacy Evaluation, Commercial Implementation, and Future Perspectives.** Caroline Sakuno, Centro de Tecnologia Canavieira, Piracicaba, São Paulo, Brazil

Abstract: Sugarcane is cultivated on about 26 million ha in more than 100 countries worldwide and Brazil is the largest producer of sugarcane, with a projected contribution of 37% to the world's production by 2028. The production of this crop has increased in recent decades and consequently, losses from attacks by the sugarcane borer, *Diatraea saccharalis*, the main pest of the crop, have also increased. In 2017, the Center of Sugarcane Technology (Centro de Tecnologia Canavieira [CTC], Piracicaba, São Paulo, Brazil) released commercially the first genetically modified (GM) sugarcane variety in Brazil. This variety, CTC20BT, produces the Cry1Ab protein for the control of *D. saccharalis*. The commercial process to develop a GM crop has been broadly established through the last decades after the first GM crop approval in 1994. This process has continuously evolved to adapt to technological advances, such as genome editing tools. A commercial pipeline to develop a GM crop includes five phases: I) gene discovery: prospect and evaluate candidate genes for desirable traits, II) proof of concept: vector design, crop transformation and transgene tests for agronomic features and efficacy (greenhouse and field), III) early development: commercially transformation and selection of events with the desirable trait and equivalent of superior characteristics as the conventional crop variety, IV) advanced development: risk assessment studies and dossier preparation and V) pre-launch: regulatory submission, product development, and pre-marketing.

Since the first release, four sugarcane varieties have been approved commercially. To confirm the efficacy of this material, we conducted evaluations under field and greenhouse conditions using natural and artificial infestations with *D. saccharalis*, which showed evidence of control of the borer. In addition, bioassays with fresh leaf tissues and 25-fold dilution bioassays were performed in the laboratory throughout the crop cycle. Molecular mechanisms involved in cry resistant plants were accessed by global expression analysis (RNAseq) indicating differentially expressed pathways involved in the induction of proteins related to insect defence. Assessment of environmental effects of Bt sugarcane by analysis of soil microbial communities showed that the use of GM plants did not affect the structure and diversity of these communities, further emphasizing the biosafety of Bt sugarcane. These proof-of-concept studies allowed the assessment of efficiency in embryogenesis and plant regeneration, transformation efficiency, control efficiency and recovery of events, and performance relative to conventional sugarcanes indicating the reliability of Bt technology for this crop. Lessons from the use of other Bt crops have provided clear evidence that implementing an effective insect resistance management (IRM) strategy is the

key to delaying the evolution of resistance. Therefore, since the commercial launch, monitoring has been conducted using sentinel plots and F2 screen to detect resistant genotypes in field insect populations. In addition to the frequent monitoring of commercial technologies, efforts are currently focused on the launch of new varieties with new modes of action, resistance to other pest complexes, and tolerance to herbicides. Thus, the result of these technologies is a lower production cost compared to conventional sugarcane, meeting the industry's demand for higher quality and yield.

The facilitators are:
Julien Beuzelin (University of Florida, USA), Cecilia Easdale (Ledesma, Argentina), and Nichanun Kernasa (Kasetsart University, Thailand).

- **Discussion**
- **Q&A Session**
- **Conclusion**

Language
The Webinar will be conducted in English.

Further information
For further information, please contact Julien Beuzelin at jbeuzelin@ufl.edu or the ISSCT Secretariat at issct@intnet.mu

Please click here for short biodata on the presenters

Sugar Cane News

How Food Waste Will Propel IndyCar As Shell Switches To 100% Renewable Fuel In 2023

Forbes	**Forbes**	**June 27, 2022**	**https://www.forbes.com/sites/brucemartin/2022/06/27/how-food-waste-will-propel-indycar-as-shell-switches-to-100-percent-renewable-fuel-in-2023/**

Of the many business-related announcements that were made prior to last month's 106th Indianapolis 500, one of the most far-reaching was Shell extending its commitment to IndyCar and the Indianapolis Motor Speedway.

Beginning in 2023, Shell will replace Speedway, a Marathon OilMRO +0.4% brand, as the official fuel of

IndyCar. Pennzoil will extend its partnership as the official motor oil and lubricant partner of Indianapolis Motor Speedway and the NTT IndyCar Series. Pennzoil will continue to sponsor the Pennzoil 150 at the Brickyard, a Nascar Xfinity Series race in July.

The second-generation ethanol will be sourced from Raízen, a Brazilian Joint-Venture created in 2011 by Shell and Cosan. Raízen is one of the largest sugarcane ethanol producers in the world and owner of the first commercial second-generation ethanol plant.

Seat sensors, new lights and sugar cane - how will future aircraft cabins look?

Aerotime Hub	**June16, 2022**	**https://www.aerotime.aero/articles/31318-aircraft-interiors-new-cabin-concepts**

From sensors to monitor whether you're securely strapped in during turbulence right through to "Jedi" reading lights, bionic windscreens and a wealth of inflight entertainment (IFE) options, there was plenty on show at the Aircraft Interiors Expo in Hamburg.

Supplier FACC unveiled what it termed a "radically new" cabin concept at AIX, promising more sustainability and passenger comfort.

The company said it has spent several years developing a new lightweight material derived from sugar cane, which it said is well-suited for use in aviation because it is extremely robust and resistant to heat and chemicals.

Are 'natural' products better than synthetic ones?

BBC	**June 20, 2022**	**https://www.bbc.com/future/article/20220614-synthetic-or-natural-which-is-best-for-climate-and-health**

From sharks' livers to endangered plants – some claims about "natural" products should be interpreted with caution. Anna Turns investigates whether we should be more willing to use synthetic alternatives.

Scientists at a Californian biotech company called Amyris have developed pharmaceutical-grade synthetic equivalents made from ethically sourced sugar cane certified by BonSucro. Squalane is "nature's best moisturiser" according to Mike Rytokoski, president of technology access for Amyris, which now produces more than half of the squalane used in beauty products across the world.

Making synthetic squalane using a fermentation-based process guarantees greater purity, a longer shelf life and a more stable price compared to sourcing from sharks or olive trees. "The latest advances in biotechnology enable us to meet the growing demand for clean, sustainable ingredients not by depleting scarce natural resources, but through the creation of bio-identical ingredients through clean chemistry," said Rytokoski who expects green biotech to transform the beauty industry over the coming decade. "The most powerful driver for this transition [to greener chemistry solutions] is the consumer," he added. "Today's consumers are looking for products made with ingredients that are safer, more sustainable, ethically sourced and don't compromise on performance."

Following several fallow decades, herbicide companies are searching for new modes of action

Chemical and Engineering News	**June 17, 2022**	**https://cen.acs.org/environment/pesticides/crop-protection-herbicide-mode-action-glyphosate/100/i22**

The first herbicide-resistant weeds started showing up on Keith Miller's farm about 18 years ago. He grows sorghum, wheat, alfalfa, and soybeans on 4,000 hectares in western Kansas. Amaranthus, often called pigweed, is his biggest problem.

Spraying weeds with the workhorse herbicide glyphosate does virtually nothing these days, Miller says. A combination of dicamba, 2,4-D, and glyphosate will sometimes work, but the weeds are becoming harder to control, and it's starting to affect his bottom line.

"I'm having to change the crops that I produce because I can't find herbicides that will take care of the weed problem," he says.

The problematic weeds in Miller's fields are the result of natural selection. A few popular herbicides—especially glyphosate, which is used on nearly all the corn, cotton, and soybeans grown in the US—are applied liberally to kill weeds on farms the world over. Over time, weeds have evolved ways to thwart the biochemical mechanisms, known as modes of action, that those herbicides use to kill them.

Genome editing can be useful for climate adaptation of crops, say scientists

Newsroom Odisha | **July 14, 2022** | **https://newsroomodisha.com/genome-editing-can-be-useful-for-climate-adaptation-of-crops-say-scientists/**

Advocating genome editing, some scientists have said the target traits should be for genetic improvement of rice, wheat, pulses, oil seeds and even sugarcane to address the issues of climate adaptation of crops, optimisation of shrinking natural resources, and combating malnutrition.

For instance, genome editing of rice can be done for water use efficiency, nitrogen use efficiency, abiotic stress tolerance, grain quality and productivity or, for that matter, green gram in pulses can be genome edited for drought and heat tolerance.

The scientists have also said it is desired that emphasis will be given more to pulses and oilseed crops for raising productivity levels, improving nutritional quality and developing new varieties resistant to heat and drought stresses, pests and pathogens, to help reduce India's dependency on imports.

Genome editing allows modifications in an organism's native DNA at a pre-determined genomic locus in a precise and targeted manner. In many countries, genome-edited crops are treated as non-GMOs because of the absence of foreign DNA in the final product, i.e., the improved crop variety is foreign DNA-free.

The Centre recently exempted the SDN1 and SDN2 categories of genome edited crops from bio-safety assessment under the relevant rules of the Environment (Protection) Act, 1986.

Scientists K.C. Bansal from the National Academy of Agricultural Sciences, Viswanathan Chinnusamy from Indian Agricultural Research Institute (ICAR) and Kutubuddin A. Molla from ICAR National Rice Research Institute in their paper 'Genome editing: a boon for plant biologists, breeders and farmers' published on July 10 in Current Science said this is a real boon for Indian plant biologists and breeders to use genome editing tools for basic research in functional genomics and gene discovery as well as translational research for developing high-yielding crop varieties and hybrids to meet the modern day challenges.

Sugar already provides loads of renewable energy to the grid, so why won't it do more? [Australia]

	ABC News	**June 14, 2022**	**https://www.abc.net.au/news/rural/2022-06-15/volatile-market-harming-sugar-industry-expansion-into-energy/101150166**
	Sugar could be part of the answer to the current energy crisis, but fluctuating prices and an uncertain market means it could pose too big a risk in an expansion. *Just one single mill operated by Australia's second largest sugar milling company, Mackay Sugar, has the capacity to power about 30 per cent of the regional city of Mackay. But just 12 months ago, negative prices would have eroded profit. "Obviously there is a good return right now," Mackay Sugar chief executive Jannik Olejas said.*		

Petrobras and Raízen sign agreement for biomethane production [Brazil]

	BN Americas	**June 15, 2022**	**https://www.bnamericas.com/en/news/petrobras-and-raizen-sign-agreement-for-biomethane-production**
	Petrobras and Raízen signed an agreement to jointly evaluate potential deals involving the production, purchase and sale of biomethane, a 100% renewable fuel produced by Raízen from sugarcane waste (vinasse and filter cake), generated in the agro-industrial operation of the company's energy bioparks. *The partnership also provides for studies for the development of logistics solutions for the delivery of biomethane, which make its use in Petrobras' refining operations feasible. With characteristics similar to natural gas, the product integrates a new generation of sustainable fuels (such as R5 diesel, with renewable content, and BioQAV), in line with Petrobras' decarbonization strategy and the development of new business opportunities with less carbon intensity.*		

EID Parry's inks partnership with Nutrition Innovation to make healthy sugar [India]

	The Economic Times	**June 28, 2022**	**https://economictimes.indiatimes.com/industry/cons-products/food/eid-parrys-inks-partnership-with-nutrition-innovation-to-make-healthy-sugar/articleshow/92517067.cms**
	Sugar and nutraceutical producer EID Parry has signed a commercial partnership with food technology company Nutrition Innovation to manufacture Nucane low GI sugar, a statement released by the companies said. S. Suresh, managing director at EID Parry said in a statement: "Our partnership with Nutrition Innovation gives us access to Nucane low GI sugar technology to produce naturally low glycemic raw sugar which extends our existing range of products and supports the growing global trend for less processed, less refined, brown sugars." *Nutrition Innovation is a Singapore-based company founded by Australian scientist Dr David Kannar. "By partnering with EID Parry we can jointly give more consumers access to natural brown sugar solutions which can improve both and choices in the market," Dr Kannar said in the media release. The process uses natural occurring polyphenols in cane sugar that have been proven and tested to consistently lower glycemic response of sucrose when consumed, the statement added.*		

Working on diesel-ethanol tech, says Praj [India]

THE TIMES OF INDIA	**The Times of India**	**July 1, 2022**	**https://timesofindia.indiatimes.com/business/india-business/working-on-diesel-ethanol-tech-says-praj/articleshow/92582553.cms**

The CEO and MD of the city-based bio-energy and enzymes firm Praj Industries, Shishir Joshipura, said in an interaction with TOI that the company is working with multiple stakeholders to work on technology to blend diesel with ethanol, which will help reduce diesel-related emissions, while reducing consumption and imports.

Praj is one of the major suppliers of ethanol-production technology in India, with a number of sugar mills working with the firm to develop ethanol from crushed cane, and Praj rolled out its Bio Syrup technology to help sugar mills store cane syrup for longer periods of time, in order to process ethanol during the lean sugarcane season.

Are biofuels finally coming of age? [India]

MONGABAY	**Mongabay**	**July 13, 2022**	**https://india.mongabay.com/2022/07/explainer-are-biofuels-finally-coming-of-age/**

Fossil fuels kickstarted the industrial age for humanity. However, humans now face the possibility of running out of these fuels by the end of this century. So, where do industries that are heavily dependent on such fuels look to for equivalent energy sources? The answer lies in the global movement towards utilising renewable energies provided by solar, hydro, and wind-power, along with biofuels.

The main advantages of biofuels over conventional fossil fuels is that the world is unlikely to deplete its sources of biofuels, as they are renewable. In addition, most biofuels have lower greenhouse gas emissions than fossil fuels. For many countries such as India, domestic biofuel production can reduce the consumption of imported fossil fuels, which provides economic gains, in addition to shielding against supply disruptions and fuel price fluctuations. Despite these advantages, the environmental sustainability of biofuel production due to its negative effects on food security and land-use changes, remains unclear.

If India is to expand its biofuel sector, the approach needs to be multipronged and rooted in sustainability, recommend experts.

CBN okays sugarcane facility for farmers [Nigeria]

THE NATION	**The Nation**	**June 16, 2022**	**https://thenationonlineng.net/cbn-okays-sugarcane-facility-for-farmers/**

The Central Bank of Nigeria (CBN) is processing a loan facility to enhance farmers' sugarcane production and stop its importation.

National President, Sugar Cane Producers and Marketers Association of Nigeria, Rtd Colonel Abdulmumuni Aminu disclosed this yesterday in Lafia during a workshop to train 80 sugarcane farmers in Nasarawa State.

The one-day event was themed "Adopting good agricultural practices of sugarcane value chain addition for export."

Self-Sufficiency: Dangote Sugar On Course To Deliver 9,800mt

Per Day In Numan [Nigeria]

Daily Trust	**Daily Trust**	**June 24, 2022**	**https://dailytrust.com/self-sufficiency-dangote-sugar-on-course-to-deliver-9800mt-per-day-in-numan**
	Dangote Sugar Refinery Plc is an integral part of the Federal Government of Nigeria's National Sugar Development Master Plan. In 2012, Dangote Sugar committed to becoming an integrated sugar business, serving local and export markets from integrated sugarcane plantations and factories across Nigeria, over the next 10 years. *The company's goal is to achieve the capacity to produce 1.5 million tonnes of refined sugar annually from sugarcane plantations covering more than 150,000 hectares of land across a number of sites in Nigeria.*		

Govt urged to tailor a policy to modernise agriculture sector [Pakistan]

Daily Times	**Daily Times**	**July 1, 2022**	**https://dailytimes.com.pk/960672/govt-urged-to-tailor-a-policy-to-modernise-agriculture-sector/**
	Chairman Pakistan Hi Tech Hybrid Seed Association Shahzad Ali Malik Thursday urged the government to tailor a viable strategy for rapid modernisation of agriculture sector on scientific lines for higher yield to meet food staple needs of population in the wake of Russia-Ukraine conflict and climate change. *Chairing an executive committee meeting of association here, he said agriculture sector is a backbone of the country's economy and is expected to boost to 3.9pc during upcoming year.* *He said agriculture sector posted growth of 4.4pc against the last year growth of 3.5pc while production of important crops including sugarcane, rice and maize achieved record production with impressive increase in per acre yield by using quality hi tech hybrid seeds.*		

Latest Research

Systematic review of life cycle assessments applied to sugarcane bagasse utilization alternatives



Sugarcane bagasse makes a valuable biobased resource with several reported applications. Different applications are evaluated with tools like life cycle assessment (LCA), quantifying their environmental impacts to support decisions involving comparison or substitution. However, the results of such studies often diverge because of the biases induced by differences in LCA methodological choices. Thus, individual case studies with distinct differences in the results pose a significant challenge to address. This study aimed to collate and assess the LCA studies on various bagasse utilization alternatives to identify the underlying analogies using qualitative and quantitative assessments. The review clearly indicated the variabilities in life cycle inventory data and LCA results. The main source of variabilities was identified in the lack of uniformity in the product system boundaries. Inclusion of broad range of environmental impact indicators was suggested for comprehensive comparison of bagasse valorization routes. Further, methodological propositions for harmonization of LCA studies were outlined for sugarcane bagasse product systems. Results of harmonized LCA studies would make reliable source of information to support decision

makers. Moreover, the propositions would be amenable to other bio-based systems.

Published March 2022

> **Link**

Bioenergy siting for low-carbon electricity supply in Australia



In the context of renewable energy (RE) generation, biomass resources are different to other renewable resources because they can be stored and transported. These characteristics make bioenergy a dispatchable renewable energy source. While this property is recognised as being very important in supporting the global energy transition, the potential of bioenergy in renewable electricity generation systems is not well understood owing to coarse assumptions around the distribution and availability of the resource.

To address this limitation, this study derived a new database of prospective new bioenergy sites in Australia based on a geographic information system (GIS)-bioenergy siting algorithm. The optimised site selection relies on high-resolution biomass resource maps, resources transport distance and other key spatial constraints.

Specifically, we present biomass resources maps for bagasse, forestry and cropping residues at a spatial resolution of 5 × 5 km. Australia is on one of the top global producer of sugar cane and as such bagasse was included as feedstock for bioenergy generation. The study identified potential utilisation of 1.0, 16.6 and 28.7 million tonnes of bagasse, forestry and stubble residues respectively at over 223 prospective sites.

The new biomass site database is the most comprehensive and up-to-date compilation of prospective bioenergy sites in Australia. Moreover, by considering the real-world spatial constraints, this new data set allows for a reliable appraisal of potential biomass resource utilisation. While our study is focussed on Australia the approach is broadly applicable to other jurisdictions worldwide.

Journal published: August 2022, article available now

> **Link**

Production of biodegradeable plastic by Bacillus sp. using sugarcane bagasse

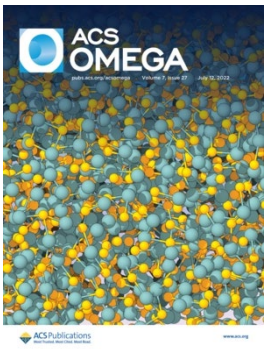
Plastic materials originated from petrochemicals causes serious environmental problems due to their non-degradable nature. Bio based polymers or biodegradable polymers are found to be better solution in terms of protecting the environment from petroleum based plastic products. Polyhydroxybutyrates (PHBs) are synthesized and deposited as cytoplasmic inclusions in various bacteria like Bacillus sp. Biodegradable plastic have been available for many years in the market, however, their high cost has meant they have not replaced the traditional non-degradable plastics. The aim of this research is to produce biodegradable plastic by Bacillus sp. using sugarcane bagasse. Pure culture of different isolates obtained from soil, were screened by sub culturing in a modified nutrient agar medium containing glucose and Nile Blue A stain to confirm that the isolated strain were capable of producing PHB. The strain was identified as Bacillus velezensis when subjected to molecular characterization. Optimization of growth parameter such as substrate concentration (0.5, 1, 2, 3 and 4%) and temperature (30, 35, 40, 45

and 50) for production of bioplastic, was further conducted. The maximum PHB accumulation when pretreated sugar cane bagasse was used as carbon source was at 30°C and pH 8.0 after 48h incubations with total yield of 50.23%. Biodegradability test showed that soil borne organism are capable of utilizing the PHB. The results of this study confirmed that cheaply available agro-residues can be used for the production of PHB.

Published July 2, 2022

> **Link**

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



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

Published June 29, 2022

> **Link**

Assessing Agriculture Sustainability in Mexican States

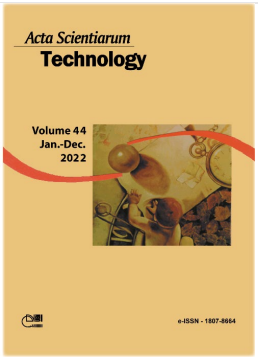
This paper shows an assessment of the agriculture sustainability level in Mexico, centered in the behavior of regularly measured agricultural variables, by direct analysis, and through the creation of a composite indicator named "Index of Sustainability in Agriculture" (ISA). The index is based on four indicators: agricultural yield, economic yield, water investment and water revenues (water productivity). The study considers 32 Mexican states, divided in two regions: coastal and non-coastal states, in which yearly historic information from 1980 to 2019 (median value) was used considering all the planted crops, and for year 2017, the 10 more important crops for each state in term of their economic value. Irrigation (I) and rainfed (R) conditions are also considered in the analysis. The ISA values allowed to establish four qualitative classifications of sustainability: unsustainable, low sustainability, medium sustainability and sustainable. Considering the historic information, non-coastal states show an average ISA=0.39 (low sustainability), while the coastal states show a mean ISA=1.02 (medium sustainability). For the year 2017 data, the corresponding scores were: ISA=0.56 (non-coastal states) and ISA=0.75 (coastal states), in both cases a low sustainability status. At state level, for the year 2017, considering exclusively the top 10 crops according with their economic value, the average ISA scores goes from 0.99 (Baja California) to 0.30 (Hidalgo). For the five crops that are planted the most in the

states of Mexico, only 2 present sustainability levels (ISA values between 2 and 3): tomato in 5 of 19 states and sugar cane in 3 of 14 states. Regarding the historic information, 67% irrigated crops in non-coastal states are "unsustainable" and 18% in coastal states. For rainfed conditions these percentages goes down to 27% and 6% respectively. From a sustainability perspective, the Mexican agricultural practices pose serious challenges that need to be tackled through and integral approach.

Journal published July 4. 2022

> Link

Treatment of vinasse by adsorption on activated carbon from sugarcane bagasse agglomerated with Al2O3



The objective of this work was to produce and characterize activated carbon from sugarcane bagasse agglomerated with Alumina (Al2O3) and apply it in treatment of vinasse pretreated by coagulation-flocculation to reduce the toxics parameters of vinasse. The adsorbent was characterized from textural analysis, XRD, pHZPC, SEM and EDS. Adsorption isotherms, adsorption kinetics and thermodynamic parameters of the process were obtained. The Langmuir isotherm model fitted the experimental data better and the pseudo-first-order model best represented the adsorption kinetics. The process was spontaneous, exothermic and with increased entropy. The combined coagulation-flocculation/adsorption process was efficient in reducing the parameters of color, turbidity, COD, TOC and toxicity of the vinasse with removal rates of 73.50, 96.06, 72.65, 76.08, 78% respectively.

Journal published July 6, 2022

> Link

Economic Evaluation for Bioproducts Production from Carbohydrates Obtained from Hydrolysis of Sugarcane Bagasse



The growing worldwide demand for energy and chemicals has triggered a series of academic research papers related to the conversion of carbohydrates contained in lignocellulosic biomass to biofuels and value-added substances. One of the main compounds obtained from biomass is 5-hydroxymethylfurfural (HMF), which is formed by dehydration of hexoses in acid medium and used in the synthesis of biofuels and chemicals, such as 2,5-furandicarboxylic acid, 2,5-bishydroxymethylfuran, 2,5-dihydroxymethyl-tetrahydrofuran, formic acid, and levulinic acid. HMF production from a renewable source is a promising strategy for the development of biofuels and chemicals in biorefineries. However, industrial-scale production of HMF is still limited. Therefore, this study aimed to perform a simulation and assess the economic feasibility of unit operations for HMF, levulinic acid, and formic acid production in aqueous medium using sugarcane bagasse as feedstock. Simulations of three processing steps (sugarcane bagasse pretreatment, conversion of cellulose to HMF, and product separation) were performed using Aspen Plus software version 11 (Aspen Technology Inc., USA). Economic feasibility was analyzed using equipment cost data provided by Aspen Technology and the spreadsheet proposed by Peters et al. (2003). The economic parameters assessed were return on investment, payback period, and net return. For simulations, solids yield data for the pretreatment step were obtained experimentally, reaching 56.2% with hydrothermal pretreatment and 42% with alkaline pretreatment. Chemical composition analysis of the pretreated material showed a cellulose content of 93.6%. Economic

analysis indicated that the process is not economically viable. Pretreatment and product separation were the most expensive steps, accounting respectively for 43.44% and 38.6% of the total costs for equipment and installation.

Published: June 30, 2022

> **Link**

Novel alleles linked to brown rust resistance in sugarcane



Sugarcane brown rust, caused by Puccinia melanocephala, is a severe foliar disease that occurs in almost all countries where sugarcane is grown. The main control strategy is the use of resistant cultivars. The aim of this work was to identify molecular markers linked to genomic regions associated with a novel brown rust resistance source in sugarcane. An F1 progeny of 300 clones was obtained from a cross between TUC 00–36 and RA 87–3, highly susceptible and highly resistant to brown rust, respectively. A total of 60 F1 clones with extreme phenotype, either highly susceptible or highly resistant to brown rust, were selected. This "pooled tail" population was tested for reactions to brown rust under natural infection in the field during two crop seasons and under artificial infection in the greenhouse. Whole-genome profiling was performed by DArT-seq technology. Phenotypic data under both conditions and 23,299 single-nucleotide polymorphisms (SNPs) obtained from genotyping were analysed to identify markers linked to the resistance trait. Single mapping analyses and subsequent multiple regression showed that 34 SNP markers were significantly linked to resistance alleles. These SNPs jointly explained 69% and 66% of the total phenotypic variation (R2) observed for field and controlled conditions, respectively. The mapping of the 34 SNP sequences revealed that 19 markers aligned to the sugarcane genome, whereas 12 markers aligned to the sorghum genome, all grouped on chromosome 5 with some functional annotations related to vegetal defence response. These marker loci could contribute to the development of molecular tools for molecular marker-assisted breeding.

Published: June 25, 2022

> **Link**

Identification of Host Proteins Interacting with RNA Silencing Suppressor of Sugarcane Streak Mosaic Virus

Sugarcane streak mosaic virus (SCSMV) is a major pathogen of sugarcane mosaic disease. P1 protein encoded by SCSMV is an RNA silencing suppressor, which plays a key role in suppressing the host's RNA silencing defense. However, its mechanism is not yet clear. Interaction with host proteins is one of the main pathways for RNA silencing suppressors to exert the suppression functions. Therefore, identifying host proteins that interact with viral RNA silencing suppressors is an important method to study the mechanism of suppressors. In order to explore the mechanism of SCSMV P1 suppressing the host RNA silencing, in this study, SCSMV P1 was ligated to the plasmid pGBKT7 to construct the bait plasmid pGBKT7-P1, then pGBKT7-P1 was tested for toxicity and self-activation, and finally pGBKT7- P1 was used as a bait to screen the host proteins that interact with P1 from the sugarcane cDNA library by yeast two-hybrid technology. The results showed that the bait plasmid pGBKT7-P1 was successfully constructed. After the pGBKT7-P1 bait plasmid was transferred into the Y2H Gold yeast strain, the yeast strain grew well in the SD/-Trp plate and liquid medium, indicating that the pGBKT7-P1 bait plasmid was non-toxic to the Y2H Gold yeast strain. The yeast strain containing the pGBKT7-P1 bait plasmid grew white rather than blue colonies on the SD/-Trp/X-α-Gal plate, and did not grow on the SD/-Trp/X-α-Gal/AbA

and SD/-Trp/-Leu/X-α-Gal/AbA plates, indicating that the pGBKT7-P1 bait plasmid had no self-activation activity. The sugarcane cDNA library was screened with pGBKT7-P1 bait plasmid. After screening on SD/-Trp/-Leu/X-α-Gal/AbA plate once and SD/-Trp/-Leu/-His/-Ade/X-α-Gal/AbA plate three times, 42 positive yeast clones were obtained. The positive yeast plasmids were extracted and introduced into Escherichia coli for amplification. After sequencing and blastx comparison analysis, a total of 13 host sugarcane proteins that may interact with SCSMV P1 were obtained, namely auxin-responsive proteins IAA1, IAA15, transcription factors NAC, GATA4, OFP4, eukaryotic translation initiation factor eIF5A, chaperone DnaJ, co-chaperone SBA1, heavy metal-associated isoprenylated plant protein HIPP35, suppressor of mec-8 and unc-52 protein homolog SMU2, outer envelope pore protein OEP24, and two uncharacterized proteins. Based on the functions of the proteins, it was speculated that P1 may interact with host proteins to regulate the expression of host defense response-related genes, and/or interact with host proteins to affect the synthesis, processing, or transport of host RNA silencing-related proteins, thereby exerting the RNA silencing suppressor function of P1. The research results would lay an important foundation for the subsequent in-depth analysis of the RNA silencing suppression mechanism of P1.

Published: June 25, 2022

> **Link**

Diffusion of technologies: a longitudinal analysis of the Brazilian agricultural machinery sector



The importance of adopting technology innovations, mainly in food production contributing to food safety, is significant. This study aims to analyze the diffusion of agricultural production technologies in Brazil, mainly the use of wheel tractors, grain and sugarcane harvesters by producers. A quantitative approach is used to understand the market-level factors that influence the adoption of technologies. A supply response is estimated based on the Bass diffusion model. Data were collected from the National Association of Vehicle Manufacturers (Anfavea), which includes Brazilian monthly sales information for wheel tractors, grain and sugarcane harvesters. For each agricultural machine, 700 months of sales records were collected. The imitator's coefficients were higher than innovators for all types of machines studied. The data showed that, for wheel tractors and grain harvesters, the diffusion curve presented S format (S-curves). However, sugarcane harvesters had a different pattern of diffusion. The distribution of the investigated technologies in Brazil was an imitation process; the market saturation was observed for wheel tractors and grain harvesters. This study helps to comprehend the supply response of agricultural machinery and presents suggestions for the diffusion of agricultural production technologies in Brazil. The experience has shown that several factors can constrain technology adoption, such as lack of credit, limited access to information and inputs, and inadequate infrastructure.

Preprint published: June 6, 2022

> **Link**

Events

AMERICAN SUGAR ALLIANCE	**American Sugar Alliance Symposium** *American Sugar Alliance* **29 July - 3 August 2022**

	Vail, Colorado > **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**
	**SugarEx Thailand 2022** *Tecnicaña* **8 - 9 September 2022** **KICE, Khonkaen, Thailand** > **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**
	**Sugar & Ethanol Asia** *Informa Connect* **20-22 September 2022** *Join the 15th anniversary of Sugar & World Asia in person this September! Meet sugar millers and ethanol producers from across the Asia-Pacific including Thailand, India, Pakistan, Philippines and Indonesia.* **Sheraton Grande Sukhumvit Hotel, Bangkok, Thailand** > **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**
	**Bonsucro Global Week** *Bonsucro* **17-20 October 2022** **Ribeirão Preto, Brazil** > **Link**
	**25th World Ethanol & Biofuels** *Informa Connect* **8-10 November 2022** **Steigenberger Wiltcher's Hotel, Brussels & digital** > **Link**
	**31st ISO International Seminar 2022** *International Sugar Organization* **22-23 November 2022** **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**
