

Welcome to the ISSCT Bulletin for November 2021, 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

We wish to inform you that a second virtual meeting of the Executive Committee and Technical Programme Committee (TPC) was held on Thursday 28 October 2021.

The main outcomes of the meeting were as follows:

- **XXXI Congress**

The XXXI Congress scheduled for December 2022 will be held in February 2023 with the following programme:

- a. Congress 20–23 February with Pre-congress tour 17–18 February and Post-congress tour 24–28 February
- b. The format of the Congress will combine conventional sessions (2 days) with sectional workshops (2 days)
- c. The call for the papers and posters for presentation at the Congress will be sent out by the ISSCT Editor in early 2022.

1. **Workshops**

No conventional in-person workshops will be held prior to Congress. However, a schedule of webinars on specific and enticing themes with hybrid attendance and online virtual participation will be circulated in early 2022. Attendance at these events will be restricted to current ISSCT members, i.e. those who have paid their membership dues for the period 2019–2022.

2. **The Mid-Term Meeting**

The Mid-Term Meeting of the Executive Committee and TPC, which will also involve Congress Organizing Committee, will be held online in late February – early March 2022.

3. **Strategic Initiatives 2019–2022**

The seven strategic initiatives will be addressed in the proposed webinars/on-line workshops, at congress workshop sessions, and/or through position papers delivered at congress. These Strategic Initiatives are:

- Globalization of ethanol research
- Sugar and health
- Organic sugar production
- Sugarcane streak mosaic virus
- Agro-ecological approaches in sugarcane farming systems
- Utilization of bagasse (and green harvest residues) for alternative products
- Updating of the Guidelines of the Safe Movement of Sugarcane Germplasm

4. **Centennial Congress**

Various proposals concerning the holding of the XXXII “Centennial” Congress were discussed and will be finalized at the Mid-Term Meeting. They will then be communicated to ISSCT members.

5. **COVID-19 Situation**

The incidence of the COVID-19 pandemic in various countries was reviewed at the meeting. The general conclusion was that the incidence of the pandemic was decreasing, especially with the intensification of the vaccination campaigns, and that there were practically no more travel restrictions, provided travellers were

vaccinated with WHO-approved vaccines and were negative for the virus by PCR. This situation was conducive to the holding of the ISSCT XXXI Congress in early 2023 as mentioned above.

6. **ISSCT Bulletin**

Contributions to the ISSCT monthly bulletin are invited from members who are encouraged to communicate information on their research and events taking place at institutional, national and international levels in sugarcane.

7. **Further communications**

Communications on the schedule of webinars, congress format, rules for presentation of communications at webinars and congress will be made in early 2022 and after the Mid-Term Meeting in March 2022.

If you need further information or clarification, do not hesitate to contact us at issctsecretariat@gmail.com or at issct@intnet.mu.

Kind regards

Jean Claude Autrey
General Secretary

Sugar Cane News

Pilot plant turning sugarcane waste into jet fuel, diesel, plastics prepares to flick switch [Australia]

	ABC	October 15, 2021	https://www.abc.net.au/news/rural/2021-10-15/pilot-plant-biorefineries-mackay-trial-renewables/100541364
	<p>As politicians fight over climate change in Canberra, a plan to turn sugarcane waste into fuel is powering on in the heart of cane and coal country. Just metres from a sugarcane mill that is supplying them with a byproduct from the crushing process, the pilot plant is about to flick the switch for the first time.</p> <p>US company Mercurius has teamed up with the Queensland University of Technology (QUT) to trial the technology onsite in Mackay.</p>		

Rio Tinto develops unique biomass technology for steelmaking

	Bioenergy Insight	October 19, 2021	https://www.bioenergy-news.com/news/rio-tinto-develops-unique-biomass-technology-for-steelmaking/
	<p>Rio Tinto, a multinational metals and mining corporation, is developing innovative new technology to deliver low-carbon steel using sustainable biomass in place of coal.</p> <p>Over the past decade, Rio Tinto has developed a laboratory-proven process that combines the use of raw, sustainable biomass with microwave technology to convert iron ore to metallic iron during the steelmaking process.</p> <p>The use of raw biomass in the firm's process - which includes agriculture by-products such as wheat straw, corn stover, barley straw, sugar cane and bagasse - could also avoid the inefficiencies and associated costs of other biomass-based technologies that first convert the biomass into charcoal or biogas.</p>		

Artificial intelligence accelerates search for markers of resistance to sugarcane yellow leaf disease

	Phys.org	October 28, 2021	https://phys.org/news/2021-10-artificial-intelligence-markers-resistance-sugarcane.html
	<p>Yellow leaf disease, a major sugarcane pest in Brazil, is caused by a virus resistant to thermal treatment. An infected plantation can be saved only by growing plantlets in tissue culture in the laboratory and planting them out, a time-consuming process that requires specialized infrastructure and personnel.</p> <p>According to a group of scientists who have long studied the problem, the most effective way to control the disease is to develop varieties that are resistant to the sugarcane yellow leaf virus. This is the purpose of a project that is being conducted with FAPESP's support.</p>		

La Niña Could Cut Brazil's Sugar Production in 2022

	GRO Intelligence	October 27, 2021	https://gro-intelligence.com/insights/articles/la-nina-could-cut-brazils-sugar-production-in-2022
✈️ Gro Intelligence	<p><i>La Niña is back, and it could result in another poor sugarcane crop in Brazil. As Brazil supplies about 40%-50% of the world's sugar exports, favorable sugarcane growing conditions in Thailand and India might be key to averting global supply problems in sugar next year.</i></p>		
	<p><i>To ensure a decent harvest next year, Brazil's sugarcane crop will need about 1,000 mm of rainfall between now and March, according to a Gro analysis of 20 years of rainfall. This past year had cumulative rainfall 30% below the average. Even as Brazil's rainy season gets underway, the Gro Drought Index for Sao Paulo currently sits at 2.75, indicating "severe" drought.</i></p>		
	<p><i>La Niña conditions have brought sufficient rain to India and Thailand's sugarcane crops in recent months. Gro analytics displaying NDVI for sugarcane in Thailand and sugar beets in the EU currently show that both producers will likely harvest a good crop this year, and this has caused the rise in sugar prices.</i></p>		

Chinese farm technologies 'to flow into Pakistan'

	The Express Tribune	October 19, 2021	https://tribune.com.pk/story/2325497/chinese-farm-technologies-to-flow-into-pakistan
THE EXPRESS TRIBUNE	<p><i>Chinese Foreign Ministry Spokesperson Zhao Lijian on Monday said that as the China-Pakistan Economic Corridor (CPEC) entered its second phase, more Chinese agricultural technologies will follow suit and head toward Pakistan.</i></p>		
	<p><i>"China-Pakistan cooperation in cultivating rice, corn, soybean, sugarcane and other crops has yielded fruitful results and play the important role in promoting the development of our bilateral relations and deepening friendship between our people," he said while responding to a question asked by this agency during his regular briefing.</i></p>		

Burning cane has 'detrimental effects' [Fiji]

	The Fiji Times	October 21, 2021	https://www.fijitimes.com/burning-cane-has-detrimental-effects/
The Fiji Times	<p><i>Burning cane makes harvesting look "easy" but has detrimental effects on the soil, says Sugar Research Institute of Fiji (SRIF) chief executive officer Professor Santiago Mahimairaja.</i></p>		
	<p><i>"Trash burning and burning for harvesting means you are killing the soil as the temperature rises above 400 degrees Celsius," he said. Prof Mahimairaja said canefarmers in Fiji should put an end to this practice. When we burn the soil, the nutrient is reduced thus affecting soil health and cane quality with millions of microorganisms in the soil dying out in the process that actually are involved in maintaining the soil fertility."</i></p>		

CEO: Fertiliser recommendation needs to change [Fiji]

	The Fiji Times	October 21, 2021	https://www.fijitimes.com/ceo-fertiliser-recommendation-needs-to-change/
The Fiji Times	<p>Cane farmers in Labasa. ugar Research Institute of Fiji (SRIF) chief executive officer Professor Santiago Mahimairaja says current fertiliser recommendation that canefarmers in Fiji use is 30 years old.</p> <p>The current fertiliser recommendation that canefarmers in Fiji use is 30 years old, says Sugar Research Institute of Fiji (SRIF) chief executive officer Professor Santiago Mahimairaja. "The fertiliser recommendation needs to be changed and SRIF is already working towards it," he said.</p> <p>Prof Mahimairaja said the team at SRIF had planned to conduct field experiments in various cane belt sectors such as Ba, Lautoka, Rakiraki and Labasa in order to come up with a new fertiliser recommendation. "In many parts of the country, we have observed soils having micronutrients deficiency and these nutrients, if increased even slightly, would boost yield."</p>		

'80pc soil in cane belts acidic' [Fiji]

	The Fiji Times	October 20, 2021	https://www.fijitimes.com/80pc-soil-in-cane-belts-acidic/
The Fiji Times	<p>More than 80 per cent of soils in Fiji's cane belt areas is acidic, says Sugar Research Institute of Fiji (SRIF) chief executive officer Professor Santiago Mahimairaja. Prof Mahimairaja said the acidic nature of the soils were affecting sugarcane production.</p> <p>"The pH values are very, very low, ranging between 3 and 5 pH in cane belt areas thus affecting sugarcane production to a large extent," he said. Prof Mahimairaja added that the acidic nature of soil affected nutrient cycling in the soil thus ultimately affecting soil health. "This is a major challenge because then, the soil would not be able to provide the needed nutrient requirements to the sugarcane crop and it will also cause a decline in the soil health."</p>		

How a mill in arid Marathwada motivates cane farmers to opt for better water management system [India]

	The Indian Express	October 10, 2021	https://indianexpress.com/article/cities/pune/how-a-mill-in-arid-marathwada-motivates-cane-farmers-to-opt-for-better-water-management-system-7562959/
 The Indian EXPRESS	<p>In drought-prone Marathwada region, water is a precious commodity. Annual rainfall recorded in the region is only around 780 mm and farmers have to rely on groundwater to tide over the hot summer months and keep their crops alive.</p> <p>Natural Sugar and Allied Industries Limited, a private mill located in Kalamb taluka of Osmanabad district, has managed to bring more than 6,000 of its total 10,000 hectares of sugarcane area under drip irrigation.</p> <p>Bhairavnath B Thombare, chairman and managing director of the mill, claimed that this was the largest area of cane under drip irrigation in Marathwada region. Thombare says this is because of the mill's decision to pay Rs 10/quintal more to farmers who grow their crop with drip irrigation.</p>		

Earthshot prize winner recognised for innovative effort to tackle northern India's smog crisis

	Independent	October 18, 2021	https://www.independent.co.uk/climate-change/news/earthshot-prize-prince-williams-india-takachar-b1940251.html
<p>Satellite images of northern India in the past week have revealed a hellish phenomenon oddly specific to the country during winter months. The grey haze engulfing the region's otherwise green agricultural land marks the start of a yearly struggle against air pollution that can begin from September and stretches well into the winter, as rice-growing farmers are compelled to burn agricultural waste to make space for their next batch of crops.</p>			
<p>It's a mammoth challenge to fix, but one that Kevin Kung and Vidyut Mohan have taken on regardless. Their bio-tech solution to tackle the phenomenon has been awarded the 2021 Earthshot Prize and given £1m by Britain's Prince William and the Duchess of Cambridge on Sunday.</p>			
<p>Mr Mohan and Mr Kung are the co-founders of Takachar, a mission that aims to convert crop residue into valuable products for the consumer market. Both of them have spent the better part of the last three years running multiple pilot projects across India, Kenya and the US to find out how they can better tackle the disposal of \$120bn (£87.4bn) worth of crop residue that they say is burned across the world every year.</p>			

Why the sugarcane-crushing season is set to start on a bitter note [India]

	The Hindu Business Line	October 6, 2021	https://www.thehindubusinessline.com/data-stories/data-focus/why-the-sugarcane-crushing-season-is-set-to-start-on-a-bitter-note/article36858583.ece
<p>Sugar mills in India gear up to start the new crushing season this month with a concern. Sugar production has grown at an annual growth rate of 5.6 per cent over the past two decades, while consumption has grown at 2.4 per cent per annum. In the last five years, consumption of sugar has remained relatively static at about 25 million tonnes, while production has increased by about 2.4 per cent per year leading to surplus sugar stocks.</p>			

Sustainable water management practices in Karnataka [India]

	Deccan Herald	October 31, 2021	https://www.deccanherald.com/specials/insight/sustainable-water-management-practices-in-karnataka-1045867.html
<p>Even though drip irrigation can reduce water usage by 60%, there are few takers in Kuruburu village in T Narasipura, Mysuru district.</p>			
<p>Having witnessed the advantages, Siddesh, a sugarcane farmer, explains that it not only saves water but also, "saves on labour, improves yield and doesn't damage the soil." Drip irrigation is not new to T Narasipura. Yet, just six or seven out of 300 farmers have taken advantage of the system. The reason? "This is an irrigated area, with plenty of water. So people don't feel the need," Siddesh says.</p>			

Sugarcane nursery transplanter makes an entry, may change appearance of fields [India]

	The Indian Express	October 26, 2021	https://indianexpress.com/article/cities/jalandhar/sugarcane-nursery-transplanter-makes-an-entry-may-change-appearance-of-fields-7590834/
	<p>Sugarcane is a C4 plant like maize, and sorghum which needs more air and light to grow a plant in a healthy way. With this transplanter, where there is proper plant-to-plant and row-to-row difference, the thickness and height of the cane would be at its maximum level.</p> <p>As there is a shortage of expert labourers in sugarcane cultivation, the sugarcane growers do not get the potential yield per hectare. Keeping this in mind, the cane department has introduced a sugarcane nursery transplanter which will provide relief to the cane growers in terms of labour cost and input cost and increase the yield by 20% to 25%.</p> <p>With these nursery transplanters, 4,000 to 6,400 single-bud nursery plants are required to be sown in one-acre field which adds up to 5 to 7 quintals against around 35 quintals of buds in the traditional method. If the row-to-row and plant-to-plant difference is 5 feet and two feet respectively, then 4,000 young plants are required and if it is 4x2 (row-to-row 4 feet and plant-to-plant 2 feet) then 6,400 nursery plants are required. "The seed costs around Rs 360 per kg which goes up to around Rs 12,600 per acre in traditional methods and Rs 1,800 to Rs 2,520 per acre," said an expert.</p>		

Sugar refinery initiative to boost revenue goes in vain [India]

	The Business Standard	October 04, 2021	https://www.tbsnews.net/economy/sugar-refinery-initiative-boost-revenue-goes-vain-311143
<p>The government took up the project in 2014 to generate power through co-generation and refine raw sugar at North Bengal Sugar Mills Limited, aiming at making the chronic loss-maker mills profitable.</p> <p>With just six months remaining before the extended tenure of a seven-year project – albeit it made only 16% progress – ended, the planners flip-flopped on it, stating it not feasible, and suggested a new assessment to take up a fresh project instead.</p> <p>But in January this year, the Project Evaluation Committee (PEC) of the Planning Commission in a meeting suspended the project titled "Power Generation in co-generation method and installation of Sugar Refinery at North Bengal Sugar Mills" and came up with a directive to conduct a new feasibility study.</p>			

Farmers To Benefit From A New Information System [Kenya]

	Kenya News Agency	October 18, 2021	https://www.kenyanews.go.ke/farmers-to-benefit-from-a-new-information-system/
<p>The County Government of Kericho has signed a Memorandum of Understanding (MOU) with Precision Agriculture for Development (PAD), to provide farming information to farmers and complement efforts by Agricultural Extension Services.</p> <p>The County's Ministry of Agriculture, through PAD, will use a two-way SMS information system that</p>			

provides actionable and customized farming advice to the farmers for free.

Over 10,000 farmers will benefit from this technology, where lead representatives will be trained on how to manage, appreciate and use the new information system, to provide bulk SMS to farmers, exchange relevant questions on their farming and challenges they are undergoing.

Sugarcane to help fill energy gap in Nigeria through \$2M GEF funding

ESI Africa

November 2,
2021

<https://www.esi-africa.com/industry-sectors/generation/sugarcane-to-help-fill-energy-gap-in-nigeria-through-2m-gef-funding/>



The federal government in Nigeria will expand its bioenergy and biofuel potential through its 'minigrids based on renewable energy (biomass) to augment rural electrification' project. The objective of the project is to promote renewable energy as an alternative to diesel-based energy generation systems.

Leadership reports that the United Nations Industrial Development Organisation (UNIDO) has already secured a \$2 million funding facility from the Global Environmental Fund (GEF) to implement the project.

This is to help reduce and avoid greenhouse gas (GHG) emissions from the energy sector in Nigeria.

PARC introduces bud-chip technology for sugarcane cultivation [Pakistan]

The Nation

October 30,
2021

<https://nation.com.pk/30-Oct-2021/parc-introduces-bud-chip-technology-for-sugarcane-cultivation>



Pakistan Agriculture Research Council (PARC) has introduced bud-chip technology for sugarcane planting in order to enhance per-acre crop output of major cash crop, besides enhancing the farm income of the growers and reducing the cost of input.

The innovative technology was developed by National Sugar and Tropical Horticulture Research Institute of PARC, which was step to introduce modern trend in agriculture sector, said a Director General South Agriculture Research Center of PARC Dr Attaullah Khan.

South Africa sugar cane growers welcome cotton as a rotational crop

Farmer's Weekly

October 29,
2021

<https://www.farmersweekly.co.za/agri-news/south-africa/sa-sugar-cane-growers-welcome-cotton-as-a-rotational-crop/>



Sugar cane growers have expressed optimism about using cotton production as part of a diversification strategy

This emerged in a recent study conducted as part of the Sugar Value Chain Master Plan, according to Andrew Russell, chairperson of the South African Cane Growers' Association.

In recent years, the sugar industry had faced a range of challenges from drought and plunging global sugar prices, to the threat of cheap imports and the tax on sugar-sweetened beverages, commonly referred to as the sugar tax.

Taiwan firm converts sugarcane into face masks

	Focus Taiwan	November 7, 2021	https://focustaiwan.tw/scitech/202111070010
	<p>Taiwan-based polyester and textiles producer Far Eastern New Century Corp. (FENC) has developed a bio-based material derived from sugarcane bagasse that can be used in the production of face masks.</p> <p>The company plans to team up with major domestic mask makers to use the material for making medium- and high-end face masks, FENC told CNA recently.</p> <p>While the qualities of bio-based fiber materials and petroleum-based synthetic fibers are similar, biodegradable materials are easier on the skin and have good moisture and water absorbing properties, the company said.</p>		

'Built to meet this moment': Inside Allbirds' \$5.5b Nasdaq debut

	The Sydney Morning Herald	November 5, 2021	https://www.smh.com.au/business/companies/built-to-meet-this-moment-inside-allbirds-5-5bn-nasdaq-debut-20211104-p5963x.html
	<p>Allbirds, a Kiwi-born, Silicon Valley-based shoe startup, makes carbon-neutral sneakers from merino wool and natural materials. It turns sugarcane (a renewable resource) into foam soles, and makes its shoelaces from recycled bottles.</p> <p>But co-founder Tim Brown doesn't want you to think of it as a 'green' company. "We've never set out to be a sustainable brand, or make sustainable products. We want to be a great public company ... a great 100-year brand,"</p>		

Lignocellulose: how nature's wonder material could help the energy transition

	World Economic Forum	October 29, 2021	https://www.weforum.org/agenda/2021/10/lignocellulose-how-natures-miracle-material-could-help-the-energy-transition/
	<p>Each year, plants convert some 100 billion tons of carbon dioxide into biomass. That's 5% of all the carbon dioxide emitted by humans since the Industrial Revolution. Most of that carbon is converted into lignocellulose, the most abundant organic material on Earth – trunks, stems, leaves and other plant structures.</p> <p>This fantastic product of evolutionary engineering has long shown potential as a highly sustainable, renewable source of fuels and materials.</p> <p>Neste, the world's leading producer of renewable diesel and sustainable aviation fuel, estimates (based on analysis by McKinsey) that 300 million metric tons of oil equivalent could be produced every year from lignocellulosic biomass in agricultural and forestry residues alone. "Large amounts of waste and residues from existing forestry and agricultural production remain underutilized and could</p>		

	be transformed into valuable and highly sustainable new raw materials,” says Markus Rarbach, Vice-President, Business Platform, Lignocellulosics at Neste.
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Latest Research

Effect of Installation Depths and Emitter Spacing on Water Productivity and Yield of a Subsurface Drip Irrigated Sugarcane

In the present investigation the effect of drip lateral installation depths and emitter spacing on sugarcane crop water productivity and yield was studied by installing laterals at 15, 20 and 30 cm depths from surface, while the emitters were spaced at 50, 60 and 75 cm. A factorial experiment in the form of randomized complete block design was carried out at the Sugarcane Research and Training Institute of Khuzestan in South-West of Iran. Sugarcane quantity specifications results showed there was significant difference between treatments in terms of drip emitter spacing and lateral installation depths and their interactions at 1% probability level. Similar trends were also observed in case of quality traits of sugarcane. Investigating the water productivity index for sugarcane and sugar yield it showed that treatments were significant in terms of the space between emitters at 1% probability level. The maximum sugarcane yield was observed in the treatment with a space between emitters of 50 cm, and 20 cm of installation depth. At 60 cm space the emitters of 60 cm and the installation depth of application of 20 cm, the highest water productivity was obtained, reaching 7.18 and 0.87 kg/m³ for produced sugarcane and sugar respectively.

Published: 17 August 2021

> [Link](#)

Journal of Food Technology &
Nutrition Sciences



Sugarcane Ratooning Ability: Research Status, Shortcomings, and Prospects

Sugarcane is an important sugar crop and it can be subjected to ratooning for several years. The advantages of ratooning include quality improvement, efficiency enhancement, and reduced costs and energy use. The genotype, environment, cultivation management, and harvesting technology affect the productivity and longevity of ratoon cane, with the genetic basis being the most critical factor. However, the majority of research has been focused on only limited genotypes, and a few studies have evaluated up to 100 sugarcane germplasm resources. They mainly focus on the comparison among different genotypes or among plant cane, different selection strategies for the first and second ratoon crops, together with screening indicators for the selection of stronger ratooning ability. In this paper, previous studies are reviewed in order to analyze the importance of sugarcane ratooning, the indicative traits used to evaluate ratooning ability, the major factors influencing the productivity and longevity of ratooning, the genetic basis of variation in ratooning ability, and the underlying mechanisms. Furthermore, the shortcomings of the existing research on sugarcane ratooning are highlighted. We then discuss the focus of future ratoon sugarcane research and the technical methods that will shorten the selection cycle and increase the genetic gain of ratooning ability, particularly the development of linked markers. This review is expected to provide a reference for understanding the mechanisms underlying the formation of ratooning ability and for breeding sugarcane varieties with a strong ratooning ability.

Published: 15 October 2021

> [Link](#)



biology

A Brief Overview for the Development of Herbicide-Resistant Sugarcane Transformation Approaches

NUST Journal of Natural Sciences

Weeds are the undesirable and unwanted plants in the wrong place in a situation that can significantly decrease the yield of desirable plant such as sugarcane. One solution to tackle this problem is the development of herbicide resistant crops like sugar cane that are highly resistant to several herbicides or broad-spectrum herbicides which is done in most cases by genetic transformation, site-directed mutagenesis, and plant breeding. Sugarcane (*Saccharum officinarum*) is the 2nd vital cash crop of Pakistan, placed at 6th position in world cane acreage and 15th in sugar production. Hence, sugarcane occupies a crucial position in the economy of Pakistan and acts like a backbone in economic development of country.

There are several reasons for the lower sugarcane yield in Pakistan but the most important is the large number of weeds that covered most of the area of sugarcane cultivated fields which results in major loss of sugarcane yield in terms of quality and quantity. Broad spectrum herbicide resistant plants are produced to tackle this issue by the insertion of CP4 EPSPS (Glyphosate tolerant gene; 5-enolpyruvylshikimate-3-phosphate synthase from *Agrobacterium tumefaciens* strain CP4) into sugarcane which provides them the ability to survive after the spray of glyphosate but weeds do not survive in this condition.

The most common herbicide resistant technology is Glyphosate resistant technology which gives broad-spectrum weed control feasibility along with the flexibility in the application time of herbicide. There are numerous methods of transformation which are available now-a-days for insertion of foreign DNA into plant cells like *Agrobacterium*-mediated transformation, micro-projectile bombardment (gene gun) and protoplast transformation. Glyphosate tolerant gene expression is showed by three sugarcane cultivars (CPF-213, SPF-234 and HSF-240). Transgenic sugarcane plants showed these expressions are most stable against herbicide to control weeds. Several farmers in many countries have rapidly and extensively utilized herbicide-tolerant crops due to low production and labour costs, huge profit, increased weed control and many environmental benefits.

Published: 3 November 2021

> [Link](#)

Gene Editing Technologies for Sugarcane Improvement: Opportunities and Limitations

 Springer Link

Plant-based biofuels present a promising alternative to depleting non-renewable fuel resources. One of the benefits of biofuel is reduced environmental impact, including reduction in greenhouse gas emission which causes climate change. Sugarcane is one of the most important bioenergy crops. Sugarcane juice is used to produce table sugar and first-generation biofuel (e.g., bioethanol). Sugarcane bagasse is also a potential material for second-generation cellulosic biofuel production. Researchers worldwide are striving to improve sugarcane biomass yield and quality by a variety of means including biotechnological tools.

This paper reviews the use of sugarcane as a feedstock for biofuel production, and gene manipulation tools and approaches, including RNAi and genome-editing tools, such as TALENs and CRISPR-Cas9, for improving its quality. The

specific focus here is on CRISPR system because it is low cost, simple in design and versatile compared to other genome-editing tools.

The advance of CRISPR-Cas9 technology has transformed plant research with its ability to precisely delete, insert or replace genes in recent years. Lignin is the primary material responsible for biomass recalcitrance in biofuel production. The use of genome editing technology to modify lignin composition and distribution in sugarcane cell wall has been realized. The current and potential applications of genome editing technology for sugarcane improvement are discussed. The advantages and limitations of utilizing RNAi and TALEN techniques in sugarcane improvement are discussed as well.

Published: 15 October 2021

> [Link](#)

Analysis of the T-DNA Flanking Sequence and Event-specific Detection for Insect-resistant Transgenic Sugarcane BtG-2



Sugarcane BtG-2 is an insect resistance transgenic sugarcane strain, developed by introducing the Cry1Ac-2A-gna fusion gene into 'ROC22' with the Agrobacterium-mediated method. It has strong insect resistance and excellent agronomic traits. In order to clarify the molecular characteristics and detection of transgenic sugarcane BtG-2, and promote biological safety evaluation, the T2 generation of BtG-2 was selected, and the copy number of foreign genes in the transgenic sugarcane genome was detected by Southern hybridization. The flanking sequence of the insertion site of the foreign gene was isolated using the chromosome walking technology, and an efficient specific PCR detection method of the strain was established.

The results showed that the foreign T-DNA insertion of BtG-2 strain was a single copy. After three times amplifications of thermal asymmetric interlaced PCR, 984 bp of the left flanking sequence and 705 bp of the right flanking sequence of the foreign gene T-DNA were obtained. According to the flanking sequences, three pairs of detection primers were designed respectively, then the event-specific PCR detection for transgenic sugarcane BtG-2 was established. The primer pairs with the highest amplification efficiency were LS011/LA451 and RS160/RA588, with 440 bp and 428 bp specific amplified fragments respectively. Among them, the pair of primers LS011/LA451 designed on the left side of T-DNA had high sensitivity and specificity for detection, and this method could detect the genetically modified ingredients in samples containing 0.1% genomic DNA of sugarcane BtG-2. This study completed the molecular characteristics and event-specific detection of the transgenic strain BtG-2, which provided a technical basis for the detection and identification of the transgenic sugarcane and its derivatives.

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> [Link](#)

Origin, Genetic Diversity, Conservation, and Traditional and Molecular Breeding Approaches in Sugarcane

Modern sugarcane cultivars are highly polyploid and have giant genomes (10 giga

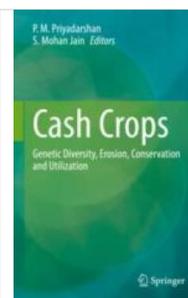
bases (Gb)) derived from interspecific hybridization between the cultivated species *S. officinarum* L. and the wild species *S. spontaneum* L. Genetic resources could be useful for developing new varieties, and therefore, plant breeding programs are assembling a germplasm collection to increase the number of possible novel gene combinations. The use of wild relatives in sugarcane breeding started at the beginning of introgression during the nobilization process, and it is still used in breeding programs primarily to search for varieties that are more tolerant to biotic and abiotic stresses. The success of a traditional sugarcane-breeding program relies on several factors, among which the appropriate parental selection must be made to maximize the chance of genetic enhancement.

This choice will be determined by the short- and long-term goals, the availability of materials, flowering synchronism, breeding values, and the amount of data available from any parent or combination. In general, the process of developing a new cultivar is long and complex. Genetic resistance to diseases has been successfully achieved through traditional breeding, although this approach is challenging and takes a long time. Several studies have been conducted to unravel and understand the genetic basis of disease resistance and complex traits (e.g., sugar and fiber, among others) through QTL and association mapping. In recent decades, important advances have been made in understanding the sugarcane genome and the gene expression associated with agronomic traits. Furthermore, transgenic sugarcane has been produced in several countries, and there have been numerous initiatives to employ genome editing technology.

New breeding technologies and strategies are required to boost genetic improvements significantly in future crop cultivars. Genomic selection has the potential to increase the rate of genetic gain significantly in sugarcane, primarily by (1) reducing the breeding cycle length, (2) increasing the prediction accuracy for clonal performance, and (3) increasing the accuracy of the breeding values for parent selection. This chapter describes the origin, genetic diversity, conservation, and traditional and molecular breeding approaches associated with sugarcane.

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> [Link](#)



Development of multiple inhibitor tolerant yeast via adaptive laboratory evolution for sustainable bioethanol production

The present research work aimed at developing robust yeast cell factory via adaptive laboratory evolution (ALE) for improved cellulosic bioethanol production. *Kluyveromyces marxianus* JKH5, a newly isolated thermotolerant ethanologenic yeast, was engineered by serial passaging for 60 generations in medium supplemented with gradually higher concentration of inhibitors (acetic acid, furfural, and vanillin) that are generated during dilute acid pretreatment. The improved strain *K. marxianus* JKH5 C60, showed 3.3-fold higher specific growth rate, 56% reduced lag phase and 80% enhanced fermentation efficiency at 42 °C in comparison to parent strain in inhibitor cocktail comprising medium. Bioethanol production by simultaneous saccharification and fermentation of sequential dilute acid-alkali pretreated sugarcane bagasse in presence of inhibitors, resulted in ethanol titre and yield, respectively, 54.8± 0.9 g/L and 0.40 g/g. The adapted yeast can be used to ferment unwashed pretreated biomass, thereby, reducing overall cost, time, and wastewater generation, hence making bioethanol production sustainable.

Published: 2 November 2021

> [Link](#)

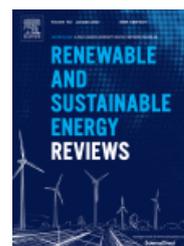


Evaluation of the potential feedstock for biojet fuel production: Focus in the Brazilian context

The Brazilian aviation sector aiming to reduce its greenhouse emissions up to 37% by 2030 and up to 43% by 2050 (compared to 2005) using alternative fuels. For this reason, the evaluation of potential feedstock was made for the biojet fuel production focused in the Brazilian context. Four biomass types were proposed (Sugarcane, Jatropha, Soybeans and Eucalyptus), considering three factors: feedstock abundance (without negative impact in population foods), advances in conversion technology, and blend limit already approved by the ASTM International for the use of biojet fuels into fossil jet fuel. Based on this study, it is concluded that Brazil has a great number of available lands for the culture of feedstock from which aviation alternative fuel can be produced, with possible substitution of up to 10% vol. Of fossil jet fuel consumed in the country. However, conversion technologies are still a challenge. Only, Synthetic Paraffinic Kerosene (SPK) obtained by both Fischer Tropsch (FT) process and Alcohol to Jet (ATJ) process offer competitive prices compared to petroleum-based jet fuel. Considering sugarcane as the main feedstock, a self-sustained integrated process was evaluated aiming to increase the production performance of biojet fuel. Four biojet fuels were obtained by this process (ATJ – SPK, FT – SPK, Farnesane and Hexanol), allowing the reduction of up to 19.16% in the number of cultivated lands for sugarcane and up to 56.12% for its [forest residues](#). Finally, the payload versus range ratio was described using the Breguet range equation applied to a possible commercial flight, taking into account all biojet fuels produced from the proposed feedstock including their blends.

Published: 13 October 2021

> [Link](#)



Pyrolytic coproduction of bio-char and upgraded bio-oils from abundant agro-industrial wastes

The co-production of bio-char and upgraded bio-oil by fast pyrolysis of raw and sulfuric-acid pretreated agro-industrial wastes (corn cob, sugarcane bagasse and sunflower seed hull) was investigated to valorize wastes as sources of value-added products (VAPs) following the circular bio-economy system.

To this end, proximate and elemental analyses were performed, and adsorption properties were determined in pyrolysis products. Bio-char and bio-oil yields from raw wastes ranged 28–33% and 30–35%, respectively. For all wastes, acid pretreatment increased the solid fraction and caused a reduction of the liquid one, compared to untreated wastes. Pyrolysis of raw wastes led to the co-production of bio-chars and bio-oils with different applications.

Bio-chars could be put in for soil amendment, primarily due to high ashes concentration, mesoporosity, and elevated cation exchange capacity; whereas, bio-oils could be upgraded by water addition, leading to a source for carrying out reforming reactions in the context of hydrogen production. Properties of bio-chars from acid washed biomasses enabled them for pollutant remediation, due to their high specific surface and microporosity features. The corresponding bio-liquid was a stable-to-storage material, being a practical source of furfural. These findings emphasize that lignocellulosic wastes can be envisaged as starting materials for producing VAPs via pyrolysis.

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> [Link](#)



Evaluating the Potential of Culms from Sugarcane and Energy Cane Varieties Grown in Argentina for Second-Generation Ethanol Production

The efficient transformation of lignocellulosic biomass into fermentable sugars is essential for building bioeconomies. Sugarcane is an important agricultural crop in a number of Latin American countries, including Brazil and Argentina. Herein culms from two different sugarcane (SC384 and SC724) and two energy cane varieties (EC3116 and EC3118) bred in Argentina were evaluated for sustainable production of second-generation biofuels and green chemicals.

Changes in the biomass crystallinity, structure, and morphology introduced by pretreatments were investigated using X-ray diffraction (DRX), confocal laser scanning microscopy (CLSM), and scanning electron microscopy (SEM) techniques. Enzymatic hydrolysis yields of untreated and pretreated sugarcane and energy cane culms were determined and correlated with physical analyses and chemical composition characterizations.

Overall, after combined acid and alkali pretreatment, enzymatic convertibility was highly efficient for all studied sugarcane and energy cane varieties, reaching over 97% of theoretical conversion yields. High crystallinity indices and crystallite sizes of pretreated culms and SEM results and CLSM were consistent with the removal of lignin, solubilization of hemicellulose, and amorphous parts of lignocellulose imprinted by the pretreatments. High potential of culms from sugarcane and energy cane varieties cultivated in Argentina for sustainable production of renewable lignocellulosic sugars and their transformation into green chemicals and fuels was demonstrated.

Published: 26 July 2021

> [Link](#)



Events

	<p>30th ISO International Seminar <i>International Sugar Organization</i> 23-24 November 2021 East Wintergarden, Canary Wharf, London</p> <p style="text-align: right;">> Link</p>
	<p>11th Annual Africa Sugar Conference <i>Informa Connect</i> 7-9 December 2021 Online</p> <p style="text-align: right;">> Link</p>
	<p>7th IAPSIT International Sugar Conference & Sugarcon-2022 <i>"Sustainability of the Sugar and Integrated Industries: Issues & Initiatives"</i> <i>Indian Institute of Sugarcane Research</i> 16-19 February 2022 Lucknow, India</p> <p style="text-align: right;">> Link</p>
	<p>2022 S.I.T. Orlando Conference <i>Sugar Industry Technologists</i> 17-19 April 2022 Orlando, Florida, USA</p> <p style="text-align: right;">> Link</p>
	<p>2022 Australian Society of Sugar Cane Technologists Conference <i>Australian Society of Sugar Cane Technologists</i> 19-19 April 2022 Mackay MECC, Queensland, Australia</p> <p style="text-align: right;">> Link</p>
	<p>ASSCT Annual Florida & Louisiana Joint meeting <i>American Society of Sugar Cane Technologists</i> 14-16 June 2022 Hyatt Regency Coconut Point Bonita Springs FL USA</p> <p style="text-align: right;">> Link</p>
	<p>American Sugar Alliance Symposium, Seattle, WA <i>American Sugar Alliance</i> 29 July - 3 August 2022 Seattle, WA, USA</p> <p style="text-align: right;">> Link</p>

 <p>FENASUCRO & AGROCANA <i>ENERGIA QUE MOVE O FUTURO</i></p>	<p>28ª Feira Internacional da Bioenergia <i>Fenasucro & Agrocana</i> 16-19 August 2022 Centro de Eventos Zanini, Sertãozinho, Brazil</p> <p style="text-align: right;">> Link</p>
<p>Sugar & Ethanol Asia</p>	<p>Sugar & Ethanol Asia <i>Informa Connect</i> 1 – 3 December 2021 Bangkok, Thailand (and online)</p> <p style="text-align: right;">> Link</p>
 <p>International Society of Sugar Cane Technologists Founded 1924</p>	<p>ISSCT XXXI Congress <i>International Society of Sugar Cane Technologists / The Sugar Technologists' Association of India (STAI)</i> February 2023</p> <ul style="list-style-type: none"> • <i>Congress: 20-23 February</i> • <i>Pre-congress tour: 17-18 February</i> • <i>Post-congress tour 24-28 February</i> <p>Hyderabad International Convention Centre (HICC), India</p> <p style="text-align: right;">> Link</p>