February 2022 International Society of Sugar Cane Technologists Founded 1924 Bulletin

Welcome to the ISSCT Bulletin for February 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

Organisation of webinars by ISSCT 3

ISSCT XXXI Congress: Important Dates 4

Lead Article 4

Do Sugar Market Fundamentals Justify Continuing Price Optimism in 2022? 4

Sugar Cane News 9

Bonsucro launches new Production Standard 9

Crushing season starts at sugar factory of NSI [India] 10

Foreign consortium eyes Tk5,500cr investment in 3 new sugar mills [Bangladesh] 10

The digital transformation of Brazil biofuel giant Raízen [Brazil] 10

More Sugarcane Farmers Benefit From Drainage Programme [Fiji] 11

Phaltan To Get Asia's Largest Ethanol Plant | Pune News [India] 11

World Bank Report on the Sugar Cane Sector Review released [Mauritius] 11

Ellah Lakes, Montserrado to Build Sugar Processing Plant [Nigeria] 12

'The most modern machine we had was the tractor': Tech startups are turning Pakistan's farms around [Pakistan] 12

Minister for use of modern technology in agri research to achieve food self sufficiency [Pakistan] 12

ZSF to Support Zanzibar Sugarcane Farmers [Tanzania] 13

Ancom to capitalise on paraquat ban in Thailand, Brazil [Thailand/Brazil] 13

New Israeli irrigation technology could save water for Arizona farms [USA] 13

Microsoft and Shell are betting on a company making greener jet fuel [USA] 14

How sweet! Street bollards made from sugar cane are latest weapon in war on pollution [UK] 14

Latest Research 16

Improving sugarcane growth simulations by integrating multi-source observations into a crop model 16

In silico identification of sugarcane (Saccharum officinarum L.) genome encoded microRNAs targeting sugarcane bacilliform virus 16

Post-harvest biology and recent advances of storage technologies in sugarcane 17

Advancing anaerobic digestion of sugarcane vinasse: Current development, struggles and future trends on production and end-uses of biogas in Brazil 17

Developing an operational framework to diagnose yield gaps in commercial sugarcane mills 18

Population dynamics of Melanaphis sacchari (Zehntner), the aphid vector of sugarcane yellow leaf virus under tropical conditions in India 19

Mapping Sugarcane in Central India with Smartphone Crowdsourcing 19

Addressing scale and seasonality in the design of sugarcane to ethylene glycol biorefineries 20

Sustainable planning and decision-making model for sugarcane mills considering environmental issues 20

Incidence and Distribution of Four Viruses Causing Diverse Mosaic Diseases of Sugarcane in China 21

A novel approach for determining nitrogen requirement based on a new agronomic principle—sugarcane as a crop model 21

Can biogas-producing sugarcane biorefineries techno-economically outperform conventional ethanol production? Deciphering the way towards maximum profitability 22

Events 23

7th IAPSIT International Sugar Conference & Sugarcon-2022 23

The Dubai Sugar Conference 23

2022 S.I.T. Orlando Conference 23

2022 Australian Society of Sugar Cane Technologists Conference 23

ASSCT Annual Florida & Louisiana Joint meeting 23

XVI International Congress on Sugar and Cane Derivatives: Diversification 2022 24

American Sugar Alliance Symposium, Seattle, WA 24

28ª Feira Internacional da Bioenergia 24
XII Congreso Tecnicaña (XII Tecnicaña Congress) 25
31st ISO International Seminar 2022 25
ISSCT XXXI Congress 25

News from ISSCT

Organisation of webinars by ISSCT

As already mentioned in our previous issues and in the end of year circular, the ISSCT will be organizing a series of webinars in 2022 covering each Section/Commission. Ten webinars will be organized during the year. Only compliant ISSCT members will be able to register for the webinars. The webinars will be using the Zoom platform for which the ISSCT Secretariat has acquired a specific license.

Details on the first webinar of the Factory Commission are given below:

Theme of webinar

The contribution of the cane sugar industry for decarbonization

Main topics

- The zero steam factory
- Drying of bagasse feedstocks
- Energy management

Date/Time

Tuesday 29 March 2022 at 11:00-13:00 GMT+1 (2-hour duration)

The facilitators/organisers are:

- Dr. Boris Morgenroth, IPRO Industrieprojekt GmbH, Germany
- Dr. Geoff Kent, Queensland University of Technology (QUT), Australia
- Rainer Talanda, Illovo Pty. Ltd, South Africa
- And other Engineering Section members

A specific announcement will be sent to all ISSCT members shortly detailing procedures for registration.

ISSCT XXXI Congress: Important Dates

Important dates for the ISSCT XXXI Congress, Hyderabad, India, 20-23 February 2023:

- **28 February 2022** – Deadline for emailing the title and outlines for full-length and poster papers to the Editor using the Intent to Submit form available on the ISSCT website.
- **15 April 2022** - Authors have received confirmation to proceed to prepare the paper/poster.
- **15 June 2022** – Deadline for receipt of the manuscripts of full-length papers and posters.
- **30 November 2022** – Deadline for finalisation of all papers and posters. Any received after this deadline will not be included in the proceedings and will not be accepted for presentation at congress.

Lead Article

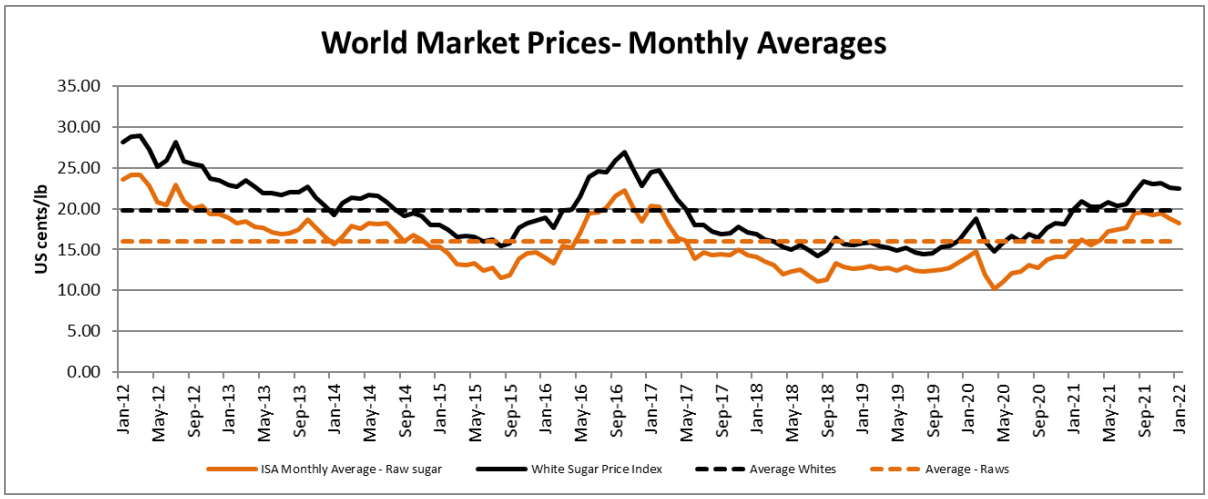
Do Sugar Market Fundamentals Justify Continuing Price Optimism in 2022?

Lindsay Jolly*

Director, We Know Sugar Consulting (WKS), Brisbane, Australia

www.wks-weknowsugar.com

Despite the on-going COVID-19 pandemic and its initial blow to world sugar prices (causing a melt-down to a low of 9.05 US cents/lb for raw sugar in late April 2020), today prices are relatively high and remunerative for the world's most efficient producers and exporters. In short, sugar has been in a bull market for more than 18 months; spurred to varying degrees by price hikes across the broader commodities board, tighter supplies, strong import demand, speculative interest and in the later months of 2021 by a poor cane crop in Brazil, hit hard by dry weather and frosts. Raw sugar futures (New York), as measured by the ISO's ISA price, averaged 18.81 US cents/lb in December 2021, up 34% from 14.01 US cents/lb a year earlier **(see graph)**. The monthly average price had earlier peaked in September at 19.57 US cents/lb (with daily quotations rising above 20 US cents/lb). Prices in 2021 consistently out-performed the 10-year average (16.09 US cents/lb for raw sugar). So far in January 2022, raw sugar prices have averaged lower at 18.32 US cents/lb. Prices initially eased with significant Fund selling (a technical sell-off) and new-crop supplies have entered the physical market from key cane sugar producers in the northern hemisphere.



When considering price prospects going forward, the fact of the matter is raw sugar prices, after their bull-run, have since last August mostly traded in an relatively high 18-20 US cents/lb range. Analysts are looking at the broader market fundamentals for the 2021/22 year to ascertain the potential for prices to challenge the upside of the range, and also if there are substantive downside risks that could see the low-end of the range violated in coming months.

Sugar Market Fundamentals are Positive

A global deficit sets the general market tone in 2021/22. This is the second year of deficit (indeed some analysts suggest it's the third consecutive year of deficit) with forecast consumption growth exceeding an expected modest uptick in world production. The ISO is projecting a deficit of almost 2.6 mln tonnes, which follows a 2.0 mln tonne deficit the previous year. Global stocks are contracting (if still relatively high) and the trade balance is tight. So, the upside of the price range could well be susceptible to a bull-run reignited for example by a weather-induced production hit or should speculators act to retake long positions as an inflation hedge. That said, there are potential downside risks for prices in the short term from larger-than-expected crops in Thailand and India, a further weakening of the Brazilian Real and fears that the ongoing /COVID-19 pandemic could slow down the global economic recovery and kill projected sugar consumption growth.

Consumption Continues Rebound, but Vulnerable

Many analysts are forecasting higher world consumption in 2021/22 and this predicted consumption gain (ISO projection is for a 1.2% gain to 173 mln tonnes) is significant in the context of stagnant or even shrinking global consumption seen in the 3 years prior to the onset of the COVID-19 pandemic. This was big news given world sugar consumption had seen consistent growth for many years up to the 2017/18 season.

Sugar consumption has been falling on a per capita basis for years in some advanced economy countries, meaning consumption gains have been centred in developing countries (Asia and Africa in particular). But recently, sugar consumption has been falling in a diversity of countries, reflecting mainly the impact of the ongoing anti-sugar campaign and a wave of taxes on sugar-containing beverages and foodstuffs as governments looked to combat obesity and diabetes. Not only that, but the Covid-19 first wave impact on sugar consumption in 2019/20 was considerable. But society was quick to adapt and soon became accustomed to the impacts of Covid on their daily life and so consumption -at a global level - rebounded in the later part of 2020/21. Whilst that rebound is expected by analysts to continue in 2021/22, there does remain considerable uncertainty around the ongoing impact of the Covid-19 pandemic, and which countries will be affected most, and potentially this is one of the biggest demand side uncertainties for the 2021/22 outlook. To the extent Omicron or any new variant of the coronavirus hits global economic activity, then there is real potential for sugar consumption growth to be pared back.

Constructive Fall in Stocks to Use Ratio

A projected fall in the stocks to use ratio in 2021/22 is constructive. The rise in global consumption, together with a drawn down in stocks, due to two deficit years, drives a contraction in the ratio for a consecutive second year. The ISO for instance forecasts the stock to consumption ratio to stand at 53.7% in 2021/22, compared to a peak of over 58% only two seasons earlier. The global stocks to consumption ratio is a key indicator of the future direction of world sugar prices. Historically, world market prices have tended upwards with a fall in the stocks to consumption ratio.

Pivotal Production Drivers are Critical

At the global level, production is set to rise only slightly. The ISO suggests less than a 1% rise in 2021/22 to 170.5 mln tonnes. Beet sugar production is up (especially in the EU and Russia) and while good weather ensures another large cane crop in India and a sharp rebound in Thailand, this does not make-up for anticipated lower sugar production in Brazil, even under a "sugar maximum" scenario (i.e. millers choose to maximise sugar production for export at the expense of ethanol for primarily the local market).

Thailand Rebounds

The cane crushing campaign in Thailand is advancing well. The to-date cane crush tonnage reached 41.0 mln tonnes on January 24th, up 26% year-on-year and sugar output reached 3.37 mln tonnes, up 24% year-on-year. Commentators note that the daily

crushing pace had reached peak capacity of over 1.1 mln tonnes in the most recent fortnight. These latest data confirm expectations held by most analysts for Thailand's cane crush to recover to at least 85 mln tonnes this season. A sharp drop in output the previous two seasons led to a scramble among millers for scarce cane, leading to higher cane prices paid to farmers than the state-set minimum price. This is believed to have taken area back from competing field crops such as cassava. If realised, sugar output may recover to 10.0 to 10.5 mln tonnes, with exports rebounding too. The country is on the way to becoming the globe's second largest exporter in 2021/22.

India to Export Less

Good monsoon rain ensured India's cane crop would be very large again, and sugar production should remain above 30 mln tonnes, even after taking account that additional cane juice will be directed to India's fuel ethanol program (as much as 3 mln tonnes sugar equivalent). The sugarcane harvest in India started at a rapid pace in November, and the strong crushing pace saw 504 operational mills producing 15.1 mln tonnes of sugar for the season to date to mid-January, up 5.6% against the same time last year. There is a general expectation that India will export significantly less than the 7 mln tonnes seen last season. The drop in exports – possibly to 5.5 mln tonnes is driven by two factors. The first is the absence of government support to offset freight and logistic costs, which was provided for around 6 mln tonnes of exports during the 2020/21 season. The second is that Thailand's production recovery will provide strong export competition in key Asian markets. In any case, the final level of exports hinges on the world sugar prices trending towards the higher end of the price range.

Brazil – Can We Really Assume a Maximums Sugar Scenario?

Developments in Brazil are crucial to the world market fundamentals. A key knock-on effect of unfavourable weather there was very poor sugarcane production in the Centre/South region in 2020/21. The Centre/South saw the lowest agricultural yields of the decade, down by around 14% year-on-year. Total cane production fell to 522mln tonnes as of 1st January 2022, down from 597 mln tonnes (down 13%) at the same time last season and a final season tally at the end of March of 605 mln tonnes. With the sugar allocation down slightly to 45% (from 46.2% the prior season), sugar production retreated by 16% from 38.2 mln tonnes to 32.8 mln tonnes during the same period, whilst sugar output for the full 2020/21 year tallied 38.46 mln tonnes. Export availability shrunk accordingly, but India stepped-in to make-up shortfalls by both Brazil and Thailand.

For the next season (Brazil's April 2022/March 2023 season), there is a perception that the world market will need maximum sugar production out of the Centre South. But the emerging stronger crude oil/ethanol price outlook suggests the maximum sugar assumption could easily be threatened (the nexus between sugar and oil prices remains centred in Brazil, and with India's boosted ethanol program this nexus can only become stronger). Those concerns aside, the weather again is the key for the upcoming season. La Niña was confirmed in Brazil in December, so drier weather patterns for the early phase of the Brazilian crop in 2022 were anticipated – specifically a dry intercrop period in the Centre-South. This was the last thing CS Brazil needed following the 2021/22 drought. The first 3 months of 2022 is an essential period for cane development, so poor rains would limit any potential rebound. But Brazil seemingly dodged the La Niña bullet with steady rainfall since the beginning of December. That said, weather in the first quarter of 2022 remains critical to the ultimate cane supply for the CS 2022/23 crushing season. There is a broad range of forecast for the cane crush of between 520-580 mln tonnes (intercrop period cane development is looking increasingly patchy according to some observers and Indications of scattered good rain throughout parts of Centre South Brazil, are tempered by the fact that the lasting effects of last year's droughts and frosts on new-planted cane is yet to be seen). Added to the already complicated recipe of crop development, sugar content, and the incentives (or lack of) for millers to maximise sugar output is another key variable – Brazil's exchange rate. Brazil's currency movements in 2022 are even more difficult to pin-down because of political machinations associated with Brazilian voters going to the polls in October 2022, which overlays an outlook for weak economic prospects for the country. A continuing weak Brazilian Real against the USD will maintain the boost to returns from the sugar export market in local currency terms.

Positive Tones for 2022 Price Prospects

Whilst other key drivers such as the dynamics for raw sugar imports by key destination refineries in MENA and Asia (especially China) in particular, have not been addressed in this short article, on balance, sugar price prospects in 2022 are developing in the context of positive fundamentals. It's never easy to judge market prospects, and even now in the past few days prices (early February) have tested the bottom side of the price range, especially with ongoing beneficial rain in CS Brazil and little indication of the Funds rekindling interest in sugar futures. Even so, going forward, the positive fundamental tones remain and a bullish scenario – should it occur – would see room for higher prices with the possibility of the top end of the current 18-20 US cents/lb range being approached. This would be even more likely if speculative buyers are finally drawn back to the futures market on the basis of a major bullish event.

** This is a WKS Opinion Piece and whilst data and statistical projections are reported from the International Sugar Organization, the views and opinions expressed in this article in no way represent those of the ISO or of any of its Members. Readers seeking the latest ISO Outlook assessment should visit www.ISOSUGAR.org or contact publications@isosugar.org*

Sugar Cane News

Bonsucro launches new Production Standard

	Bonsucro	**January 17, 2022**	**https://bonsucro.com/strengthening-sustainability-in-sugarcane-with-bonsucros-new-production-standard/**

In January, Bonsucro, the leading global sustainability platform for sugarcane, has published its revised Production Standard with new requirements to address critical global risks such as greenhouse gas emissions, water, biodiversity, and respect for workers' rights in the sugarcane sector.

The Bonsucro Production Standard is the most globally recognised framework for sustainable sugarcane production. It is a comprehensive, metric tool that enables farmers and millers to improve and certify their practices as sustainable – and offers buyers assurance when sourcing sugarcane and its derivatives.

Certification data demonstrates that Bonsucro certified sugarcane producers consistently reduce their greenhouse gas emissions and water use, whilst increasing crop yields and creating safer working conditions. The Standard demands that producers respect human rights. It also has zero tolerance of child or forced labour on sugarcane farms and mills.

Bonsucro members represent 27% of sugarcane producers and 20% of sugar buyers, including some of the world's biggest consumer brands.

The new Standard is available now and comes into force from September 2022.

Danielle Morley, CEO of Bonsucro said, "Our new Production Standard builds on ten years of success and learning. We have improved it to address pressing sustainability issues such as deforestation, water use and living wages. I'm proud of the changes we've made to the Standard and confident it will drive notable positive impact in sugarcane production."

Liz Foggitt
Communications and Events Manager
Bonsucro Ltd

liz@bonsucro.com

Crushing season starts at sugar factory of NSI [India]

THE TIMES OF INDIA	**Times of India**	**February 2, 2022**	https://timesofindia.indiatimes.com/city/kanpur/crushing-season-starts-at-sugar-factory-of-nsi/articleshow/89285964.cms
	Kanpur: Crushing season 2021-22 commenced at the Experimental Sugar Factory of the National Sugar Institute (NSI), Kanpur on Tuesday. The factory is operated to provide hands on training to the students of Sugar Technology course, whereas, the students of Sugarcane Productivity & Maturity Management learn the basics of identifying sugarcane varieties, preparing harvesting schedules and channelizing sugarcane supplies. This is the only unit in the country which has two distinct techniques of decolorization of sugar syrup based on ion exchange resins and powdered active carbon.		

Foreign consortium eyes Tk5,500cr investment in 3 new sugar mills [Bangladesh]

THE BUSINESS STANDARD	**The Business Standard**	**January 18, 2022**	https://www.tbsnews.net/economy/foreign-consortium-eyes-tk5500cr-investment-3-new-sugar-mills-358999
	A joint consortium of companies from Thailand, Japan and the United Arab Emirates has offered to inject Tk5,500 crore worth of investment for three new sugar mills in partnership with the government. *Although the state-funded sugar mills have received foreign aid before, the recent partnership offer from the Sugar International Co is first of its kind for the industry, according to sources at the Bangladesh Sugar and Food Industries Corporation (BSFIC).* *"The consortium has proposed jointly establishing three new state-of-the-art sugar mills," Md Arifur Rahman Apu, the BSFIC chairman, told The Business Standard.*		

The digital transformation of Brazil biofuel giant Raízen [Brazil]

bnamericas | 25	**BNamericas**	**February 2, 2022**	https://www.bnamericas.com/en/features/the-digital-transformation-of-brazil-biofuel-giant-raizen
	Efficiency, cost reduction and faster time-to-market. These are the core drivers of the digital transformation and innovation investments of Brazilian sugarcane and ethanol producer Raízen, according to its CIO José Eduardo Massad. *The company, a 50:50 joint venture between Shell and Cosan, is investing in virtualizing its workloads, advanced analytics and artificial intelligence, as well as partnerships with startups.* *"Our strategy is very much customer-centric. We want to be lean and digital, but in a way that really makes sense for our business," Massad (in photo) told BNamericas.*		

More Sugarcane Farmers Benefit From Drainage Programme [Fiji]

	Fiji Sun	**January 27. 2022**	https://fijisun.com.fj/2022/01/27/more-sugarcane-farmers-benefit-from-drainage-programme/
	Sugarcane farmers who were unable to afford infarm drainage and road works can now seek assistance from Labasa Cane Producers Association (LCPA). *This is after the Non-Government Organisation launched its infarm drainage subsidised programme in Labasa yesterday.* *Assistant Minister for Sugar George Vegnathan officiated the launch at Pravin Chand's farm at Sarava of Waiqele sector.*		

Phaltan To Get Asia's Largest Ethanol Plant | Pune News [India]

	The Times of India	**January 16, 2022**	https://timesofindia.indiatimes.com/city/pune/phaltan-to-get-asias-largest-ethanol-plant/articleshow/88924242.cms
	Pune: Agro-tech firm Swaraj Green has announced that it would commission Asia's largest ethanol manufacturing plant at Phaltan in Maharashtra. It will be commissioned in two stages, using technology patented by city-based energy firm Praj Industries that extends the shelf-life of sugarcane juice, a key input in ethanol. *The first phase of the plant, which will be commissioned by the end of the year, will have an ethanol production capacity of 500 kilolitres per day (KLPD). The second phase of the project is scheduled to enhance the capacity to 1100 KLPD, the promoters said in a statement*		

World Bank Report on the Sugar Cane Sector Review released [Mauritius]

	African Business	**February 5. 2022**	https://african.business/2022/02/apo-newsfeed/world-bank-report-on-the-sugar-cane-sector-review-released/
	The World Bank (WB) Report on the Sugar Cane Sector Review was released, this morning, in the presence of the Attorney General, Minister of Agro-Industry and Food Security, Mr Maneesh Gobin, during a workshop held at the Caudan Arts Centre, in Port Louis. *The Acting Country Representative of the World Bank Group, Mrs Brinda Devi Dabysing, the Chief Executive Officer (CEO) of the Mauritius Cane Industry Authority (MCIA), Mr Satish Purmessur, and other personalities were present.* *The half-day workshop brought together stakeholders of the sugar cane sector to discuss the Report which provides the main recommendations for public policy and programmes for the future*		

	development of the sugar cane sector. *The half-day workshop brought together stakeholders of the sugar cane sector to discuss the Report which provides the main recommendations for public policy and programmes for the future development of the sugar cane sector.*

Ellah Lakes, Montserrado to Build Sugar Processing Plant [Nigeria]

	Business Post	**February 7, 2022**	https://businesspost.ng/economy/ellah-lakes-montserrado-to-build-sugar-processing-plant/
	A sugar processing plant capable of refining 600 Tons of Cane per Day (TCD) is to be built by Ellah Lakes Plc in collaboration with Montserrado Investment Limited. *The sugar refinery is expected to run on 100 per cent renewable power and the period from construction to completion and commissioning is estimated to be two years.* *According to Ellah Lakes, the facility is in support of the National Sugar Master Plan (NSMP) championed by the National Sugar Development Council (NSDC), which is geared towards "Accelerating the development and growth of the local sugar industry to achieve national self-sufficiency."*		

'The most modern machine we had was the tractor': Tech startups are turning Pakistan's farms around [Pakistan]

	Fin24	**January 30, 2022**	https://www.news24.com/fin24/economy/the-most-modern-machine-we-had-was-the-tractor-tech-startups-are-turning-pakistans-farms-around-20220130
	Agriculture entrepreneurs are bringing the digital age to Pakistan's farmers, helping them plan crops better and distribute their produce when the time is right. *Until recently, "the most modern machine we had was the tractor", Aamer Hayat Bhandara, a farmer and local councillor behind one such project told AFP in "Chak 26", a village in the agricultural heartland of Punjab province.* *Even making mobile phone calls can be difficult in many parts of Pakistan, but since October, farmers in Chak 26 and pilot projects elsewhere have been given free access to the internet — and it is revolutionising the way they work.*		

Minister for use of modern technology in agri research to achieve food self sufficiency [Pakistan]

	The Nation	**February 4, 2022**	https://nation.com.pk/04-Feb-2022/minister-for-use-of-modern-technology-in-agri-research-to-achieve-

			food-self-sufficiency
	PESHAWAR - Federal Minister for Food Security and Research Syed Fakhar Imam here Thursday said that use of latest technology in agriculture research was imperative to achieve self-sufficiency in food services. *Talking to media persons here at Agriculture Institute (ARI) Tarnab before getting briefing on the Prime Minister's National Agriculture Emergency Programme and progress on Agriculture Transformation Plan, the minister said that China had made rapid progress because of the use of modern technology and Pakistan had the potential to achieve new heights of economic development and achieve autarky in food by using latest techniques, innovations, mechanization and modern technology especially in agriculture and livestock sectors to earn maximum capital.* *He said the country needed quality scientists and new researches in agricultural development, adding that the great responsibilities rest on our scientists and PhD scholars of agriculture universities and colleges to prepare students for modern day challenges.*		

ZSF to Support Zanzibar Sugarcane Farmers [Tanzania]

	AllAfrica	**February 3, 2022**	https://allafrica.com/stories/202202030100.html
	THE Zanzibar Sugar Factory (ZSF) intends to support sugarcane farmers to move from traditional subsistence farming to commercial agriculture so that they could increase production and upturn their income. Sugarcane farmers and stakeholders-community (Shehas) and religious leaders from three regional administrations of Mjini-Magharib, North and South heard about the good news during a meeting with ZSF management who encouraged them so that they adopt modern commercial farming. *Mr Mahesh Patel, the Chairperson of ZSF said traditional farming and lack of skills have led many farmers to remain poor despite directing their efforts in sugarcane cultivation.*		

Ancom to capitalise on paraquat ban in Thailand, Brazil [Thailand/Brazil]

	The Edge Markets	**January 31, 2022**	https://www.theedgemarkets.com/article/ancom-capitalise-paraquat-ban-thailand-brazil
	ANCOM Bhd is hoping to capitalise on a ban on paraquat use in Thailand and Brazil as it believes its products to be good substitutes and well accepted in those markets. *After the toxic chemical was banned in Thailand and Brazil in 2020, a huge vacuum was created in the two big markets, observes Ancom group CEO Lee Cheun Wei.* *"Paraquat was banned in these countries because it was classified as class-1 poison. This is a favourable situation for us because we see tremendous opportunity in these replacement markets," he tells The Edge in an interview.*		

New Israeli irrigation technology could save water for Arizona farms [USA]

	Phoenix Business Journal	**January 14, 2022**	https://www.bizjournals.com/phoenix/news/

			2022/01/14/irrigation-technology-arizona-farms.html
	TONOPAH – The Central Arizona Project, which delivers Colorado River water to more than 80% of Arizona's growing population, is taking a three-pronged approach to the megadrought that has resulted in the first water cutbacks to Arizona farmers. *One of those approaches is N-Drip, which converts flood-irrigated fields into a drip system that uses gravity, with no external form of energy. Developed by an Israeli company, the system is being tested to grow sorghum in Australia, sugar cane in Thailand and now cotton and alfalfa in Arizona.* *Chuck Cullom, the Colorado River programs manager for the CAP, said managers are focused on water conservation, desalination and recycling as well as irrigation efficiency.* *"We're optimistic that over the next five to 10 years we'll have a new array of tools to improve the water supply in Arizona," he said.*		

Microsoft and Shell are betting on a company making greener jet fuel [USA]

	CNBC	**February 1, 2021**	https://www.cnbc.com/2022/02/01/microsoft-shell-invest-in-lanzajet-sustainable-jet-fuel-start-up.html
	Chicago-based start-up LanzaJet is trying to address the problem by producing an alternative to petroleum-based conventional jet fuel that has lower carbon emissions and works with existing airline industry infrastructure. *The company, formed in 2020, hasn't generated any revenue yet, but it's gotten plenty of funding to get going. It recently received $50 million in funding from Microsoft, adding to previous investments from Shell and a handful of other energy companies and airlines, and the U.S. Department of Energy has invested $14 million in a subsidiary of the company to build LanzaJet's first plant in Georgia. By 2023, that plant is expected to be producing tens of millions of gallons of sustainable jet and diesel fuels.* *For the plant in Soperton, Georgia, LanzaJet will use ethanol made from low-carbon-intensity sugarcane; corn crop residues including corn kernel fiber and corn stover; biogas; and waste gas from industrial processes.*		

How sweet! Street bollards made from sugar cane are latest weapon in war on pollution [UK]

	Mail Online	**January 28, 2022**	https://www.dailymail.co.uk/news/article-10450323/Council-trials-non-crete-bollards-sugar-cane.html
	It could lead to some sticky situations for careless drivers. Trials are taking place using traffic-calming street bollards made of sugar cane. *The 'non-crete' posts are designed to be an eco version of the traditional barriers, the manufacture*		

	of which produces large amounts of CO2. They also weigh less, are easier to install and cheaper – costing £150 each compared with £190 for concrete.

Latest Research

Improving sugarcane growth simulations by integrating multi-source observations into a crop model



Accurate crop growth simulations and yield estimation play a crucial role in agricultural development and food security. Incorporating multi-source observations into crop growth models could reduce the prediction uncertainty propagated from input data and model parameters. However, the value of different data sources varies. Incorporating redundant data into models not only increases computational cost, but also introduces additional prediction uncertainties. The objective of this study is to investigate the value of three common agronomy variables (plant height, PH; leaf area index, LAI; and soil moisture, SM) for sugarcane growth simulations and explore which variable(s) have the largest information content and hence should be included in data assimilation system. The measurements of PH, LAI and SM data are collected through a two-year sugarcane experiment (in 2016–2017) at Chongzuo station (Guangxi, China). Results show that the value of SM is the lowest among all three variables for sugarcane yield estimation if the spatial heterogeneity of water and nutrient both exist. When sugarcane plots have relatively homogeneous cultivation density, it is preferable to incorporate PH data into the model. In contrast, assimilation of LAI might be more suitable when the cultivation density and tiller number contain strong spatial variability. Moreover, compared with traditional LAI & SM fusion strategy, the fusion of LAI and PH data is recommended to obtain more robust sugarcane simulation results. Furthermore, observations during the elongation period provide the most valuable information for sugarcane growth simulation and yield estimation, while those in the emergence and tillering period are less informative.

Journal published January 2022, article available online now

> Link

In silico identification of sugarcane (Saccharum officinarum L.) genome encoded microRNAs targeting sugarcane bacilliform virus

PLOS ONE

Sugarcane bacilliform virus (SCBV) is considered one of the most economically damaging pathogens for sugarcane production worldwide. Three open reading frames (ORFs) are characterized in the circular, ds-DNA genome of the SCBV; these encode for a hypothetical protein (ORF1), a DNA binding protein (ORF2), and a polyprotein (ORF3). A comprehensive evaluation of sugarcane (Saccharum officinarum L.) miRNAs for the silencing of the SCBV genome using in silico algorithms were carried out in the present study using mature sugarcane miRNAs. miRNAs of sugarcane are retrieved from the miRBase database and assessed in terms of hybridization with the SCBV genome. A total of 14 potential candidate miRNAs from sugarcane were screened out by all used algorithms used for the silencing of SCBV. The consensus of three algorithms predicted the hybridization site of sof-miR159e at

common locus 5534. miRNA–mRNA interactions were estimated by computing the free-energy of the miRNA–mRNA duplex using the RNAcofold algorithm. A regulatory network of predicted candidate miRNAs of sugarcane with SCBV—ORFs, generated using Circos—is used to identify novel targets. The predicted data provide useful information for the development of SCBV-resistant sugarcane plants.

Journal published 20 January 2022

> Link

Post-harvest biology and recent advances of storage technologies in sugarcane

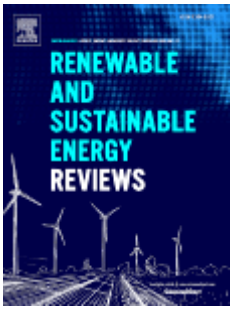


Sugarcane deteriorates at a quick rate, just like other perishable crops. The quick loss of sucrose content in sugarcane from the time it is harvested has a significant impact on sugar recovery. This problem of post-harvest sucrose losses in sugarcane is a serious concern in cane-producing countries, as it not only leads to low sugar recovery in mills, but also to poor sugar refining. Unreasonable delays in cane transportation from the fields to the mill are frequently linked to a number of problems related to primary or secondary sucrose losses, all of which contribute to a significant reduction in cane weight and sugar recovery. In sugar mills, the processing of damaged or stale canes also presents a number of challenges, including increased viscosity due to dextran generation, formation of acetic acid, and dextrans due to Leuconostoc spp. invasion, and so on. The combination of all of these variables results in low sugar quality, resulting in significant losses for sugar mills. The primary and secondary losses caused by post-harvest sucrose degradation in sugarcane are enlisted. The employment of physico-chemical technologies in farmers' fields and sugar mills to control and minimize these losses has also been demonstrated.

Journal to be published: March 2022, article available online now

> Link

Advancing anaerobic digestion of sugarcane vinasse: Current development, struggles and future trends on production and end-uses of biogas in Brazil



Anaerobic digestion (AD) is a multipurpose technology. One of the AD outcomes is biogas that can be used to supply a local thermal demand, electricity generation or upgraded to fuel vehicle. Brazil has the largest potential for producing biogas, due to its extensive agroindustrial production plus the fact that the country has a population of over 210 million inhabitants. The Brazilian Association of Biogas and Biomethane (ABiogás) reports a potential biogas production of 41.4 billion m3 per year in the sugar-

energy sector. However, less than 2% of this is achieved, indicating that the biogas is still chemically, economically, and politically invisible. The current technologies for the production, purification and end-use of biogas/biomethane were reviewed and presented in the context of sugarcane biorefineries. One of the major findings has indicated a thermal efficiency of 85% and a national grid surplus of 74–121 kWh.ton-1 sugarcane when steam boilers connected to electricity generators are used. Alternatively, a quarter of the vinasse generated by a medium-size sugarcane mill (600 m3 d-1) would be enough to supply the diesel consumption of on agricultural operations. The motivation of this review came from the fact that normally renewable energy does not reach its potential due to the lack of references on technological, regulatory and management in their productive arrangements: essential aspects to make them feasible. Therefore, it is expected to strengthen the panorama of research in the biogas system to properly fit with the current expansion and diversification of the Brazilian energy matrix.

Journal to be published: April 2022, article available online now

> Link

Developing an operational framework to diagnose yield gaps in commercial sugarcane mills



Yield-gap analysis provides farmers and crop consultants with key information to identify low-performance fields and tune agronomic practices to increase yield. The objective of this study was to develop an operational framework that allows quantification of yield gaps in individual sugarcane commercial fields (referred to as 'blocks') and identification of their causes. We provide proof of concept about application of our framework using a sugarcane mill in southern Brazil that manages ca. 8000 blocks per year as a case study. Water-limited yield potential (Yw) was estimated for each block using a crop model coupled with local weather, soil, and crop management data, and the yield gap was estimated as the difference between Yw and actual yield. To further illustrate application of the framework, causes for yield gaps for nine individual blocks were determined based on field measurements in combination with yield-loss models derived from the literature. Average yield gap was 34 Mg ha-1, which represented 33% of simulated Yw, indicating room for increasing sugarcane yields. Across the nine blocks where causes of yield gaps were assessed, nutrient limitations, insect damage, and sprouting failures accounted for 70% of the current yield gap. In contrast, weeds and diseases were less important. Causes for yield gaps can be categorized into those associated long-term management, such as inappropriate harvest practices leading to sprouting failures and soil compaction, and those related with short-term management such as nutrient application and control of insects, pests, and diseases. The study provides an operational framework that allows sugarcane mills to diagnose yield gaps across their blocks and identify opportunities to increase yield via better agronomic management.

Journal to be published: March 2022, article available online now

> Link

Population dynamics of Melanaphis sacchari (Zehntner), the aphid vector of sugarcane yellow leaf virus under tropical conditions in India

Sugarcane yellow leaf disease (YLD) has emerged as a serious threat to sugarcane cultivation worldwide, particularly in India. The aphid, Melanaphis sacchari, has been proved to be the vector for the causative agent sugarcane yellow leaf virus (ScYLV) across the world. However, the population dynamics of the aphid are not established under field conditions. Hence, this study was conducted with the aim of studying the population dynamics of M. sacchari for four consecutive years (2015–2019) under the typical tropical conditions. The sugarcane aphid starts colonizing the crop in April, reaches its maximum in June–July, starts declining in August, and almost vanishes in September. Thus, the 5–7-month-old crop supports higher aphid population irrespective of the varieties, provided the climatic conditions are near-normal. A significant variation in the climatic conditions observed in 2016–2017 significantly altered the population dynamics of the aphid on sugarcane varieties. In 2016–2017, the aphid appeared late in May and extended till December. It was interesting to note that the aphid population was recorded to be higher in the diseased plants as compared with the healthy ones of the same variety. Further, the YLD-susceptible cvs CoC 671, Co 86032, Co 86010, CoPant 84211, and B38192 were recorded with comparatively higher numbers of aphid during the peak season in all the 4 years. The colonization of aphid was observed to be aggregate in nature and not uniform in all the plants of a variety and leaves of an infested plant. Increased levels of aphid infestation was found between + 5 and + 7 leaves in sugarcane plants, across the seasons and varieties, and rainfall was negatively associated with the build-up of aphid colonization. The study provides new findings on the dynamics of M. sacchari under tropical climate in India for the first time and contributes to the understanding of the disease epidemiology.

Published: 17 January 2022

> Link

Mapping Sugarcane in Central India with Smartphone Crowdsourcing

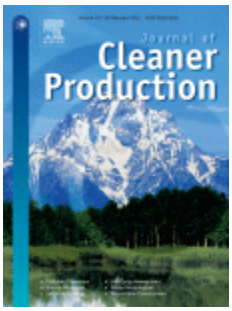
In India, the second-largest sugarcane producing country in the world, accurate mapping of sugarcane land is a key to designing targeted agricultural policies. Such a map is not available, however, as it is challenging to reliably identify sugarcane areas using remote sensing due to sugarcane's phenological characteristics, coupled with a range of cultivation periods for different varieties. To produce a modern sugarcane map for the Bhima Basin in central India, we utilized crowdsourced data and applied supervised machine learning (neural network) and unsupervised classification methods individually and in combination. We highlight four points. First, smartphone crowdsourced data can be used as an alternative ground truth for sugarcane mapping but requires careful correction of potential errors. Second, although the supervised machine learning method performs best for sugarcane mapping, the combined use of

both classification methods improves sugarcane mapping precision at the cost of worsening sugarcane recall and missing some actual sugarcane area. Third, machine learning image classification using high-resolution satellite imagery showed significant potential for sugarcane mapping. Fourth, our best estimate of the sugarcane area in the Bhima Basin is twice that shown in government statistics. This study provides useful insights into sugarcane mapping that can improve the approaches taken in other regions.

Published: 2 February 2022

> Link

Addressing scale and seasonality in the design of sugarcane to ethylene glycol biorefineries



An appropriate techno-economic assessment of biorefineries is essential for consolidating a bio-based economy. Herein, the effects of scale and seasonality on the design of a sugarcane to ethanol biorefinery were assessed using an extensive process simulation and economic modeling methodology. Four sub-processes were simulated for eight different scales: ethanol from sugarcane, ethanol dehydration to ethylene, ethylene to mono ethylene glycol (MEG), and electricity and steam generation from bagasse. Models for capital expenditure and minimum selling price versus product capacity were developed for ethanol, bio-ethylene, and MEG. The integrated biorefinery was analyzed for 200 kt/yr and 440 kt/yr bio-ethylene capacities, considering three regions of Brazil: Northeast, South-central, and São Paulo/Paraná. Seasonality effects were mitigated by establishing a storage park alongside the biorefinery. The results indicated that the selling price of bio-MEG must be at least 20–30% higher than the fossil-based MEG to ensure competition. The 440 kt/yr biorefinery located in the South-central region had the lowest bio-MEG selling price, however, it required an outsized distillery. Moreover, scale and seasonality had a significant impact on the competitiveness of the biorefinery. The bio-MEG selling price might vary by up to 22%, depending on the specific combination of these factors.

To be published: 20 February 2022, article available online now

> Link

Sustainable planning and decision-making model for sugarcane mills considering environmental issues



Many companies and organizations are pursuing "carbon footprint" projects to estimate their own contribution due to growing concerns about global climate change and carbon emissions. Measures such as carbon taxes are the most powerful means of dealing with the threats of climate change. In recent years, researchers have shown a particular interest in modelling supply chain networks under this scheme. Disorganized disposal of by-products from sugarcane mills is the inspiration of this research. In order

to connect the problem with the real world, the proposed sustainable sugarcane supply chain network considers carbon taxes on the emission from industries and during transportation of goods. The presented mixed-integer linear programming modelling is a location-allocation problem and, due to the inherent complexity, it is considered a Non-Polynomial hard (NP-hard) problem. To deal with the model, three superior metaheuristics Genetic Algorithm (GA), Simulated Annealing (SA), Social Engineering Optimizer (SEO) and hybrid methods based on these metaheuristics, namely, Genetic-Simulated Annealing (GASA) and Genetic-Social Engineering Optimizer (GASEO), are employed. The control parameters of the algorithms are tuned using the Taguchi approach. Subsequently, one-way ANOVA is used to elucidate the performance of the proposed algorithms, which compliments the performance of the proposed GASEO.

Published: 1 February 2022

> Link

Incidence and Distribution of Four Viruses Causing Diverse Mosaic Diseases of Sugarcane in China

Mosaic diseases of sugarcane caused by various viruses have been reported in most sugarcane planting countries and threaten global sugar production. There is a lack of extensive, systematic investigation of mosaic diseases and their causal viruses in China. In this study, a total of 901 leaf samples showing mosaic symptoms were collected from commercial fields in eight provincial regions in China and tested for sorghum mosaic virus (SrMV), sugarcane mosaic virus (SCMV), sugarcane streak mosaic virus (SCSMV), and maize yellow mosaic virus (MaYMV) using RT-PCR with four specific primer pairs. Of 901 tested samples, 38.5% (347/901) of samples were infected with one of the four viruses alone. Infection by two or more viruses was seen for 42.6% (384/901) of samples. The highest incidence of virus-causing sugarcane mosaic disease was SrMV (70.1%), followed by SCMV (33.4%) and SCSMV (30.3%), and the lowest incidence was seen for MaYMV (5.1%). Three viruses (SrMV, SCMV, and SCSMV) were found in eight sugarcane-planting provinces, whereas MaYMV was only found in Fujian, Guangxi, and Sichuan provinces. Mixed infections of the three main viruses, particularly for SrMV + SCMV and SrMV + SCSMV, were commonly found in the sugarcane samples. Our systematic determination of the occurrence and distribution of four RNA viruses associated with sugarcane mosaic diseases can provide evidence to guide the development of strategies for the prevention and control of sugarcane mosaic diseases in China.

Published: 25 January 2022

> Link

A novel approach for determining nitrogen requirement based on a new agronomic principle—sugarcane as a crop model

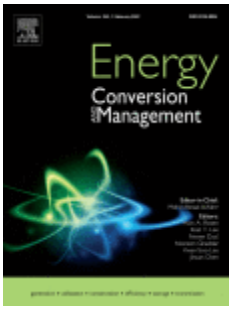
There are growing evidence that nitrogen (N) recommendation based on the expected yield concept developed by Stanford in 1973 lacks in agronomic principles, despite it

widespread use worldwide. In Brazil, the main sugarcane producer worldwide, for example, a fixed N factor of 1 kg N per Mg-1 of stalk is used. However, literature demonstrates that sugarcane responsiveness to N is much higher in sandy soils rather than in clayey soils, whereas the recommended N is usually higher in clayey soils because of its improved yield potential. We investigated 146 response curves of sugarcane (Saccharum spp.) to N to define a better approach for determining N rates instead of using exclusively the expected yield concept. First, we found no correlation between the economically optimal N rate (Nopt, kg ha-1) and the yield (Mg ha-1) obtained in Nopt. Second, we calculate the N requirement (Nreq, kg N Mg-1 stalk) as the quotient between Nopt and the yield, for each response curve. There was a negative correlation between yield at control plot and Nreq, demonstrating that higher N rates are required to maximize yield in sandy (low yield) sites. The Nreq was 1.3, 0.9, 0.7 and 0.6 kg N Mg-1 stalk for expected yields < 69, 69–84, 84–102, and > 102 Mg ha-1, respectively, differing from the standard 1 kg N Mg-1 stalk currently used. The method proposed here is based indirectly on the N-supplying power of the soil and should be tested for other crops to deliver an improved N recommendation system.

Published: 29 January 2022

> Link

Can biogas-producing sugarcane biorefineries techno-economically outperform conventional ethanol production? Deciphering the way towards maximum profitability



Energy transition patterns point towards a gas-fueled society in coming decades, whereby natural gas plays an initial leading role. Naturally, biogas will become the primary energy source once gas reserves are depleted, which motivates investigating approaches to efficiently supply biogas-fueled facilities. Sugarcane biorefineries have the potential to become leading biogas producers, based on recent successful experiences on the anaerobic digestion (AD) of primary sugarcane byproducts, such as molasses. This study assessed the techno-economics of operating AD-based sugarcane biorefineries producing electricity or biomethane as alternatives to conventional ethanol production. Scenarios including the processing of molasses or combining juice and molasses in single- and two-stage (acidogenesis + methanogenesis) AD were considered. Detailed energy balance analyses demonstrated that biogas production/processing is much more efficient than ethanol production, with energy return on investment levels (4.33–8.67) at least 4-fold higher than in the case of ethanol (1.06–1.32). Despite the relevant energetic contribution of H2 from substrate fermentation in some cases (up to 9%), extremely high production costs eliminated any trace of economic competitiveness for H2-producing biorefineries (internal rate of return – IRR < 16%) compared to ethanol plants (IRR = 24.9%). However, investing on substrate fermentation (without H2 production) coupled to NaOH-supplied methanogenesis could maintain electricity- (IRR = 26.9%) or biomethane- (IRR = 25.1%) producing plants economically more attractive than ethanol production. While relatively minimum increments in the price of electricity would be necessary to support the first plants, both reducing investment costs coupled with valorizing biomethane would be essential in the latter. Hence, biogas-producing biorefineries may be more than a match for ethanol facilities, and sugarcane has a great potential to play the role of a leading feedstock

within the context of energy transition. **Published: 15 January 2022** > Link	

Events

 	**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
	**The Dubai Sugar Conference** *Dubai Sugar Conference* 13-16 March 2022 **InterContinental Dubai Festival City** > Link
	**2022 S.I.T. Orlando Conference** *Sugar Industry Technologists* 17-19 April 2022 **Orlando, Florida, USA** > Link
	**2022 Australian Society of Sugar Cane Technologists Conference** *Australian Society of Sugar Cane Technologists* 19-22 April 2022 **Mackay MECC, Queensland, Australia** > Link
	**ASSCT Annual Florida & Louisiana Joint meeting** *American Society of Sugar Cane*

	Technologists 14-16 June 2022 Hyatt Regency Coconut Point Bonita Springs FL USA > Link
	XVI International Congress on Sugar and Cane Derivatives: Diversification 2022 *AZCUBA Sugar Group, the Cuban Association of Sugar Technicians and the Cuban Institute of Research on Sugarcane Derivatives* 20-24 June 2022 Cuba > Link
	American Sugar Alliance Symposium, Seattle, WA *American Sugar Alliance* 29 July - 3 August 2022 Seattle, WA, USA > Link
	94th SASTA Congress 2022 *SASTA – South African Sugar Technologists' Association* 16-18 August 2022 ICC, Durban, 45 Bram Fischer Rd, Durban, 4001 South Africa > Link
	28ª Feira Internacional da Bioenergia *Fenasucro & Agrocana* 16-19 August 2022 Centro de Eventos Zanini, Sertãozinho, Brazil > Link

XII CONGRESO tecnicaña EVOLUCIÓN DE LA AGROINDUSTRIA DIGITAL DIVERSIFICADA SOSTENIBLE	**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
ISO	**31st ISO International Seminar 2022** *International Sugar Organization* 22-23 November 2022 • *Congress: 20-23 February* • *Pre-congress tour: 17-18 February* • *Post-congress tour 24-28 February* **East Wintergarden, Canary Wharf, London, UK** > Link
International Society of Sugar Cane Technologists Founded 1924	**ISSCT XXXI Congress** *International Society of Sugar Cane Technologists / The Sugar Technologists' Association of India (STAI)* February 2023 • *Congress: 20-23 February* • *Pre-congress tour: 17-18 February* • *Post-congress tour 24-28 February* **Hyderabad International Convention Centre (HICC), India** > Link