Welcome to the ISSCT Bulletin for October 2023, in which we collect latest ISSCT updates, along with news, research, and past and upcoming events related to sugar cane technology.

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ISSCT News

Feature: The evolving challenges in sugarcane biosecurity

Biosecurity is the modern term for quarantine and regulatory measures to protect crops. Sugarcane biosecurity has long been a subject of extensive research and

debate, as countries strive to protect their crops from the inadvertent introduction of harmful sugarcane diseases. In 1991, following the 3rd Pathology Workshop of the ISSCT in Mauritius, a project took shape: the production of the FAO/IBPGR Technical Guidelines for the Safe Movement of Sugarcane Germplasm. It was a remarkable accomplishment, resulting from discussions among 21 international pathologists, and led to a significant contribution towards establishing consensual norms in this domain (Frison and Putter, 1993).

Collection, conservation, and utilization of sugarcane genetic resources (varieties, clones, fuzz) and their exchange between research centers are vital for crop improvement and have contributed significantly to meeting various challenges facing the sugarcane industry worldwide. Import of sugarcane varieties by sugarcane-growing entities for evaluation prior to release for commercial cultivation is also very common. Though less frequently, fuzz (or true seeds) are sometimes acquired by private companies.

Although sugarcane disease transmission through true seed is not known, except for a recent report of *Sugarcane bacilliform virus* for such transmission, the movement of sugarcane setts involves risks of accidentally introducing diseases and pests. Though there is also a potential risk of insect pests as well, it is less likely. Damage symptoms and the very presence of the insect pest are more conspicuous than diseases, the latter being microscopic, sub-microscopic, and latent. The *in vitro* plantlets can also be a source of infection if the explant used for tissue culture initiation is infected.



Sugarcane cuttings (left) or tissue culture plantlets are the main planting material used in the movement of germplasm

Vigilance is consequently necessary as the introduction of an exotic pathogen may be very damaging. The quarantine glasshouse is considered an official confinement space of choice for observations of imported germplasm. It is usually of Plant Biosafety Level 2 (BSL-2P), where the plants are maintained under established phytosanitary protocols for monitoring and testing. It provides a means to detect and destroy potential diseases in containment. In general, a sugarcane quarantine cycle lasts two years.

Plant quarantine has shown to be very cost-effective. Even if the introduction of a disease may occur in the long term, delaying its entry as long as possible will bring major economic benefits. The exchange of germplasm has also allowed the dissemination of a number of diseases in the past and possibly even currently, owing to uncharacterized pathogens, latent infection, or when systematic testing for pathogens has not been enforced and where sensitive diagnostics are not available.

The very nature of a quarantine facility therefore requires the setting up of an associated pathology laboratory for disease testing. In applying different conventional techniques, a number of basic laboratory methods such as aseptic techniques, microscopy, and isolation on media are required. Earlier on, electron microscopy and serological tests have also been widely used in the detection and characterization of pathogens.

A further important infrastructure required is a tissue culture laboratory for cleaning infected material. If the various groups of pathogens can be eliminated by hot water treatment of cuttings, viruses are not. However, most of the viruses can be eliminated by micro-meristem culture.

Over the last three decades, sugarcane pathology underwent significant transformations. The etiology of certain diseases, previously unknown, has now come to light. For example, chlorotic streak, recognized in the 1920s, was only recently found to be caused by a cercomonad, a unique pathogen in sugarcane and within the higher plants. Another notable development is the widespread recognition of *Sugarcane streak mosaic virus* as a prevalent disease in Asia, with recent identifications in two African countries. Yet, perhaps the most transformative advancement has been the emergence and widespread adoption of molecular tools in disease diagnosis. These techniques have revolutionized the field of sugarcane pathology, becoming the standard for many diseases not just in sugarcane, but in other plant species.

The number of sugarcane diseases recorded is 120 (Rott *et al*., 2000), of which 28 are critical, referred to as systemic diseases, known to be transmitted by planting

material. The impact represented by them, if introduced, can vary from minor to severe. Therefore, biosecurity procedures are of the essence to prevent their entry when transferring germplasm.

It is important to carry out a 'Disease Risk Analysis' for each country from where planting material is to be imported to predict suspected diseases and apply diagnostic tests for such diseases during the quarantine period. Any material received and upon inspection suspected to carry disease or a pest is destroyed while healthy-looking ones are to be planted in the closed quarantine facility. During the closed quarantine observation period, disease symptoms are to be observed. However, symptoms under quarantine conditions can be easily masked and therefore the use of diagnostic tests, preferably molecular tools, whenever available, is recommended.

The 28 systemic diseases referred to above can be termed the classical diseases of quarantine importance. However, recently, other sugarcane-infecting viruses have been found in other cultivated plants or in non-cultivated hosts (Daugrois *et al*., 2023). They include *Maize striate mosaic virus*, *Maize yellow mosaic virus*, *Sugarcane striate virus*, *Sugarcane white streak virus*, *Sugarcane chlorotic streak virus*, and an umbra-like virus. Along with the *Sugarcane streak mosaic virus*, they represent a new challenge in sugarcane biosecurity with a potentially negative impact on sugarcane production worldwide.

The advent of metagenomics and next-generation sequencing (NGS) as diagnostic applications in the context of biosecurity are major enhancements in the detection and characterization of new and cryptic viruses in sugarcane and in stain identification of pathogens.

Salem Saumtally, Member of ISSCT Executive Committee
Asha Dookun-Saumtally, ISSCT Councillor for Mauritius

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In Memoriam - Brian and Maureen Egan



It is with great sadness that we have learned that Brian Egan, aged 93 had passed away on Wednesday 11 October 2023, two months after his wife Maureen. His funeral took place at St Gerard Majella Catholic Church, Brisbane on Friday 20 October 2023.

After modest beginnings as a cadet at the Bureau of Experiment Station (BSES) in January 1947, Brian rose to become a monument to sugarcane and particularly sugarcane Pathology with a worldwide repute. During his first years at BSES he studied part time for his Senior Certificate and then gained a Bachelor of Science degree majoring in Botany and Plant Pathology at the University of Queensland.

As Pathologist Brian devoted most of his time to initially Chlorotic Streak (CS) and ratoon stunting disease (RSD) and later to Fiji disease, all three taken to be caused by viruses. He devised control measurers although the aetiology of CS and RSD were unknown but came to light much later in his active career at BSES and beyond. In 1956, Brian transferred to the BSES Meringa Sugar Experiment Station at Gordonvale near Cairns. It was there that Brian led one of Australia's most significant sugarcane harvesting research projects. His research identified

two species of the Leuconostoc bacterium. that significantly impacted the sugar content in mechanically harvested cane. Brian found the best way to limit the effects of the bacteria was to ensure the cane was crushed within 12 hours of harvesting. Brian's findings were adopted throughout Australia.

In 1965, he was awarded the President's medal by the Queensland Society of Sugar Cane Technologists (QSSCT), later to become the Australian Society of Sugar Cane Technologists (ASSCT) for two papers titled 'Investigations of chemical control of sour storage rot' and 'The infection process in sour storage rot'.

In 1972, Brian was transferred to Bundaberg amid a major outbreak of Fiji disease which was causing to huge yield losses.

Brian's role was to coordinate and carry out research into the outbreak and how to control it. His recommendations and industry efforts helped control the outbreak using clean planting material and resistant varieties. Brian was recognised as the world expert on Fiji disease. During this time, Brian moved to Brisbane in 1974 and from then and throughout the 1980's that Brian made his other major contribution to the sugar industry in his role coordinating the Cane Pest & Disease Boards throughout Queensland. He was responsible for upgrading the Boards, introducing better training and higher standards of pest and disease control campaigns. Later Brian authored a book detailing the history of these Boards in Queensland and it provided an important record of the successful efforts of researchers, government, and the sugar industry working together.

Brian retired from BSES in 1994 after serving the Institution for some 47 and half years.

While at BSES he became a member of the Australian Society of Sugar Cane Technologists to which he made significant contributions. He attended a majority of ASSCT conferences from 1960 to 2012, presented 25 papers from 1960 to 2002. He was ASSCT Vice-President in 1992 and President in 1993 following which he was Executive Member on several occasions, Editor of ASSCT Proceedings and Chairman Publication Committee for 16 years from 1981 to 1996. He was awarded honorary life membership of the Australian society in 1994.
Brian maintained his association with the Australian and International technical societies throughout his long career attending conferences, presenting papers and holding a number of committee and executive responsibilities. A notable example is the International Society of the Sugar Cane Technologists (ISSCT) which he supported since 1965 when he presented the results of his research at

the ISSCT XII Congress in Puerto Rico. His paper entitled: "Chlorotic Streak disease investigations into host range and possible sources of resistance".

Brian was active at the level of the Pathology Section then Technical Programme Committee (TPC), Executive Committee and became Chair of Council and Executive Committee in 1992. He presided over the ISSCT XXII Congress in Colombia and one of the outcomes was the setting up of the ISSCT Secretariat for which he played an instrumental role. The Secretariat has proved to be of considerable help to the functioning of ISSCT since 1996.

He has had a distinguished record at ISSCT. He was Councillor for Australia in 1989 and attended many workshops and congresses. Thus, he attended nine congresses as part of the Australian delegation from 1965 to 2000, presenting 13 papers. He was Secretary of the Organising Committee for the ISSCT XXIV Congress in Brisbane and contributed significantly to the success of this event which was held in the same week as the tragic 09/11 in New York.

Brian was also one of the editors of the international textbook entitled: "Diseases of Sugarcane – Major Diseases" which was published in 1989 and was sponsored by ISSCT

In recognition of his distinguished contribution to ISSCT, he was awarded Honorary Life Membership in 1995.

Brian was not only active in the sugar cane industry he had a passion for Bushwalking including a longtime involvement with the Friends of Binna Burra (FoBBs) and the National Parks Association of Queensland.

During this time, Brian moved to Brisbane in 1974 which proved very fortuitous as he met Maureen McShane 10 year younger than him through the Adult Catholic Club and after a short engagement they were married in January 1976.

It proved to be a wonderful partnership that lasted 47 years up until just a couple of months ago when Maureen passed away. Over these years they shared a passion for bushwalking, travel, singing and their community. Maureen was also active in ISSCT working for accompanying persons' programmes.

When the news of Brian's passing away came known, testimonies were received from his friends and colleagues from Australian and beyond which reflected the respect and friendships he made throughout his career. Among those we would like to share the following:

Dr Peter Allsopp - Editor, Australian Society of Sugar Cane Technologists
I was very sad to hear of Brian's passing. He certainly is well remembered by us of the old BSES. Brian interviewed me for the position of entomologist in 1987 and for some reason, obviously recommended my appointment! He was a source of incredible information, and I enjoyed his decisive wit and his editorial skill.

Dr Rob Magarey - Principal Research Scientist, Sugar Research Australia, Tully
I joined BSES in 1981 and had a lot to do with Brian. He was the co-ordinator of the BSES consultancy to the PNG sugar industry and in 1994 passed the role onto me. We discussed many disease topics, especially related to the PNG sugar industry. I appreciated his inputs in the early days of my career and his friendship over the years. He was always positive towards me which assists when one is an early career scientist.

Dr. Vic Mason – ISSCT Council and Executive Committee Chair, 1995 – 2007
Brian was a stalwart of the BSES and the agricultural side of the Australian cane industry. My main interaction with Brian was associated with ASSCT and Heather has fond memories of interacting with Maureen during the annual conferences.

Dr. Raul Castillo, Chair ISSCT Council and Executive Committee, 2019-2023
Brian was a great person and I recall him in a visit to BSES (now SRA) facilities as plant breeder invited by Nils Berding. He was a friendly person teaching us all insights of plant pathology and diseases resistance. He spent with us a whole morning and answered all questions very openly that we had. Brian will be deeply missed by all friends and specially the sugarcane community.

Mr. Sanjay Awasthi, Chair ISSCT Council and Executive Committee, 2023-2025
I was greatly saddened upon learning about the passing away of Brian. Although we are in different fields, I have always enjoyed meeting him at ISSCT congresses when we had interesting exchanges of views and through which he showed his knowledge of the sugarcane world beyond pathology. I commend his enormous contribution to the advancement of ISSCT.

Dr. Salem Saumtally, Director Mauritius Sugarcane Industry Research Institute (2012-2021) and Member of the ISSCT Executive Committee
As a pathologist, I knew him very well when he was professionally active. He has left his mark as someone whom we look up to in the profession. I more closely interacted with him when he participated in the 3rd Pathology Workshop in Mauritius in 1991 and the 4th Pathology Workshop in Brisbane in 1994 with a post-tour held in Papua New Guinea. His knowledge and rigor of sugar cane diseases were profound and I have in mind his work on downy mildew, brown rust,

chlorotic steak, and Fiji leaf gall in particular. Brian was very humble and he will be missed.

Dr Jean Claude Autrey, General Secretary of ISSCT
Brian was more than a colleague. He was a great friend and a mentor to me. I have appreciated his professionalism and broad knowledge of sugarcane and beyond. I was in contact with him since the early 1970s but actually first met him in 1986 at the ISSCT XIX Congress in Jakarta, Indonesia. We then had several encounters in Australia and many other countries at ISSCT Workshops, Mid-Term Meetings and Congresses. Our discussions of course were on sugarcane Pathology at first and later on the management of the ISSCT. He had a high sense of duty and ethics and what struck me was his humility. Floryse and I have had a great relationship with both Maureen and Brian. We have been in constant touch through emails, calls and have exchanged Christmas wishes for some 50 years. We have lived memorable moments with them and have loads of souvenirs. They were great company. They hosted us at their house in Brisbane. We visited them at their retirement unit in 2016 where they had settled happily and our last meeting goes back to April 2019 at ASSCT Conference in Toowoomba. We will miss them.

Upon his retirement from BSES Brian reflected:
The sugar industry and BSES have been good to me, and I believe I have been good for them in return. He also said: "The Australian sugar industry and its researchers are held in high esteem internationally, and I am proud to have been a part of it. We are at the forefront in many areas and the industry's future holds great potential."

These words really testified his sincere feelings on his career and his optimism for the R&D of the Australian sugarcane industry.

Expression of condolences have been conveyed to the relatives of Brian and Maureen on behalf of the whole ISSCT membership.

Jean Claude Autrey
General Secretary
On behalf of ISSCT Council and Executive Committee

The assistance of Mr Brendan Egan, nephew of Brian for providing the eulogy at the funeral from which excerpts have been selected for this tribute, is gratefully acknowledged.

Sugar Cane News

A new global framework for chemical management?

	Bonsucro	**September 18, 2023**	**https://bonsucro.com/a-new-global-framework-for-chemical-management/**

Chemical pollution affects everything and everyone. Alongside climate change and biodiversity loss, it is one of the big three planetary crisis of our times.

Across all agricultural sectors, the issue of chemicals use can be complex. How can farmers grow crops in a way that is safe for biodiversity and humans, while meeting the ever-growing pressure for productivity and supporting their own livelihoods?

Incredibly, despite the proliferation and risks of chemical use, there is as yet no global framework for international chemical management. In 2006, the Dubai Declaration set a global goal that by 2020, "chemicals are used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment." Despite international efforts, such as the Strategic Approach to International Chemicals Management (SAICM), coordinated by UNEP, that goal hasn't been achieved yet.

Sugar cane milk may soon be an alternative to dairy, with startups vying for market share

	ABC News	**September 4, 2023**	**https://www.abc.net.au/news/rural/2023-09-05/sugar-cane-milk-may-be-plant-based-alternative-to-dairy-startups/102810124**

Consumers looking for plant-based options to dairy milk have an abundance of choice available from oat, almond, soy and rice to even macadamia milk.

But a product geared to taste almost exactly like dairy milk that would be shelf-stable for up to three years could soon hit the market.

It's milk made from sugar cane, and scientists say the proteins in it are similar to animal proteins.

University of Queensland professor of food microbiology Mark Turner explained that the sugar from cane, molasses, and other by-products would be consumed by yeast, which would in turn produce a protein bioidentical to dairy milk. Professor Turner said many startup companies in Australia and overseas were competing in this area. And while the research is continuing, he's confident it's now at the critical stage where it could be successful.

The complex path to biofuel sustainability

	The Hindu	**September 14, 2023**	**https://www.thehindu.com/opinion/op-ed/the-complex-path-to-biofuel-sustainability/article67304044.ece**

Until a few years ago, working on biofuels called for constant justification in the face of electric

	vehicles (EVs) taking over the world. Today, while there is no doubt that EV adoption has amplified over the years, there is growing awareness of the fact that no decarbonisation strategy is trade-off-free. For instance, for a transition to EVs, existing internal combustion engine (ICE) vehicles and the supporting infrastructure need to be replaced entirely, which is capital intensive. Further, the required batteries and critical minerals used in them need to be imported, adding to environmental concerns on how these minerals are mined, among other issues. Biofuels, on the other hand, can be used in existing ICE engines and infrastructure with little to no modifications (depending on the blending rates) and offer import independence.

Braskem continues investing in the development of its biopolymers in Asia and opens a Tokyo Representative Office

	Braskem	**October 19, 2023**	**https://www.braskem.com.br/usa/news-detail/braskem-continues-investing-in-the-development-of-its-biopolymers-in-asia-and-opened-a-tokyo-representative-officex**
	Braskem, the leading global biopolymer producer, today announces the opening of its Representative Office in Tokyo, Japan one of the key markets for Braskem's I'm greenT bio-based Polyethylene (PE). This expansion reinforces our continuous commitment to the Japanese market and the continued development the biopolymer solutions based on renewable feedstock. *For over 15 years, Braskem has provided biopolymers to the Japanese market as part of its sustainable solutions, in line with the countries goals to become a carbon neutral circular economy.* *Braskem's biopolymer I'm greenT bio-based Polyethylene (PE) delivers an important contribution to a carbon-neutral society and mitigation of climate change as the product has a negative carbon footprint, from the sugar cane crop to polymer production. Through this process, we can remove CO2 from the atmosphere through photosynthesis and stores the carbon in the biopolymer that can be further mechanically or chemically recycled.*		

Honeywell inks SAF partnership with GranBio

	The Digest	**October 11, 2023**	**https://www.biofuelsdigest.com/bdigest/2023/10/11/honeywell-inks-saf-partnership-with-granbio/**
	In Bulgaria, Renewables Now reported that Honeywell International and Brazilian industrial biotechnology firm GranBio Technologies joined forces to produce sustainable aviation fuel. *Under the partnership, Honeywell will combine its ethanol to jet (ETJ) technology with GranBio's patented cellulosic ethanol AVAP technology to produce SAF from biomass residues at GranBio's forthcoming demonstration plant in the US.* *GranBio is working on a demonstration plant that will produce about 2 million of SAF per year using wood chips and sugar cane residue upon its commissioning which is expected in 2026, the report added.*		

Digitisation in agriculture will bring in the next big green revolution: Amitabh Kant

	Agriulture Post	**August 30, 2023**	**https://agriculturepost.com/agritech/digitisation-in-agriculture-will-bring-in-the-next-big-green-revolution-amitabh-kant/**
	Lauding the strides made in digitising agriculture and harnessing technological innovations, which have been central priorities during India's G20 presidency this year, India's G20 Sherpa, Amitabh Kant, underscored the significance of digitisation in agriculture in bringing the next big green revolution and transforming the agriculture sector into a data-driven, adaptive system that can effectively combat challenges of climate change. *Kant was speaking at the G20 India Agritech Summit 2023 held on Monday in Delhi. The Summit showcased India's commitment to driving innovation, collaboration and sustainability in the realm of agriculture. The Summit, hosted as part of India's G20 Presidency, brought together thought leaders, experts and stakeholders from across the globe to explore transformative solutions for the future of farming.*		

Queensland sugar industry's yield breakthrough to help power renewable energy transition [Australia]

	ABC News	**October 15, 2023**	**https://www.abc.net.au/news/rural/2023-10-16/genetic-selection-technology-win-for-queensland-sugar-industry/102977014**
	Queensland's sugar industry has had another taste of success as its research into improved crop yields using genomic selection with major innovation rivals Brazil and India pipped at the post. *The technology, which improves plant breeding outcomes in sugarcane crops through genomic selection, has recently passed an important validation trial.* *The trial confirmed that sugar cane's crop value could be improved by 2 per cent a year without the need for additional farmland, which researchers have said would boost revenue by $24 million in the first year of uptake.*		

Australia's sustainable aviation fuel industry prepares for take-off

	CSIRO	**September 15, 2023**	**https://www.csiro.au/en/news/all/articles/2023/september/sustainable-aviation-fuel**
	A sustainable revolution is growing across the sun-drenched slopes of Australia's agricultural regions. Our future farmlands have the potential to do more than produce food. They could also power the bioeconomy, support our energy transition, buffer farm incomes and promote biodiversity. *Aviation accounts for about 2.5 per cent of global carbon dioxide emissions. With air travel expected to double by 2050, emissions are set to grow quickly. Our Towards Net Zero Mission is paving the runway for Australia's very own sustainable aviation fuel (SAF) industry to help decarbonise aviation.*		

Zilor's ethanol gets certification to be used in SAF production [Brazil]

TheDigest	**The Digest**	**October 4, 2023**	**https://www.biofuelsdigest.com/bdigest/2023/10/04/zilors-ethanol-gets-certification-to-be-used-in-saf-production/**
	In Brazil, Nova Cana reported that local company Zilor announced that it has received certification for its ethanol to be used in low-carbon biofuels for aviation. *The report noted that only four plants in the world are recognized for producing clean ethanol from sugar cane. Among them, two are from Zilor: the Macatuba and Lençóis Paulista units.* *"In addition to placing the Brazilian agroindustry at the global leadership in the production of clean aviation fuel and bringing countless benefits to the environment, it is proof that we can always fly higher when it comes to the best agricultural practices and innovations in sustainability," the firm said.*		

Boeing Opens New Engineering and Technology Center In Brazil

Simple Flying	**Simple Flying**	**October 11, 2023**	**https://simpleflying.com/boeing-opens-engineering-technology-center-brazil/**
	Boeing has opened its 15th global engineering site in Brazil. The center, based in São José dos Campos (SP), where the company began operations in 2014, will employ about 500 engineers and focus on sustainable aviation fuel (SAF) development. *Boeing's new Engineering and Technology Center has a primary focus of working with the State University of Campinas (Unicamp) to develop the third phase of the SAFMaps database. The database aims to understand the feasibility of the most promising inputs for sustainable aviation fuel (SAF) production in specific areas in Brazil. Boeing believes that Brazil can be vital in SAF production and is actively engaged in mapping agricultural opportunities for such via SAFMaps.*		

Experts to help breed sugarcane [Fiji]

The Fiji Times	**The Fiji Times**	**October 17, 2023**	**https://www.fijitimes.com/experts-to-help-breed-sugarcane/**
	Two Indian experts are in the country to provide advice on sugarcane breeding and plant pathology. Indian High Commissioner to Fiji PS Karthigeyan confirmed this after a recent meeting with Sugar Minister Charan Jeath Singh. *Mr Karthigeayn said Fiji and India have had long-standing co-operation in the sugar sector via the provision of soft loans and co-operation on the sugar mills. He said the experts had been in Fiji for almost a year and had extended their stay for another year to continue their collaboration with the local industry.*		

India Expected to Impose Ban on Sugar Exports in the Upcoming Season Starting October [India]

Outlook BUSINESS + MONEY	**Outlook Business + Money**	**September 28, 2023**	**https://business.outlookindia.com/news/india-expected-to-impose-ban-on-sugar-exports-in-the-upcoming-season-starting-october**
	According to government officials, India is expected to ban sugar exports during the upcoming sugar season, which starts on 1 October. This decision has been taken to ensure the domestic		

	market is well supplied and keep prices under control. *The government is likely to issue a notification in the first week of November to formalize this ban. In 2021-22, India sold a record 11 million tonnes of sugar, but for 2022-23, the exports have been restricted to around 6 million tonnes.*

Bonsucro signs MoU with Indian Sugar Mills Association to accelerate sustainability [India]

	Bonsucro	**September 20, 2023**	**https://bonsucro.com/mou-indian-sugar-mills-association/**
	Today, 20th September 2023, our CEO, Danielle Morley and Mr Aditya Jhunjhunwala, President of the Indian Sugar Mills Association (ISMA) signed a Memorandum of Understanding (MoU), that establishes a partnership to share knowledge and develop joint initiatives to accelerate sustainability practices in the Indian sugar industry. *The MoU represents a milestone for our work in India, and an exciting opportunity to collaborate closely with ISMA on a sustainable roadmap.*		

Reforms in sugar industry will boost economy – Dangote Sugar CEO [Nigeria]

	Punch NG	**October 8, 2023**	**https://punchng.com/reforms-in-sugar-industry-will-boost-economy-dangote-sugar-ceo/**
	The Group Managing Director/Chief Executive Officer of Dangote Sugar Refinery Plc., Ravindra Singhvi, is responsible for the sugar business of Dangote Industries Limited. In this Interview with BAMIDELE FAMOOFO, he says the implementation of the Backward Integration Projects in the sugar industry will facilitate economic growth, reduce inflation, conserve foreign exchange and generate employment, among others *"The sugar industry in Nigeria is still at the nascent stage. Lots of efforts have been made to produce sugar in Nigeria, and a leading driver in that regard is the Dangote Group. The Dangote Group acquired Savannah Sugar Company Limited from the Federal Government in 2003 with the intent to embark upon a backward integration plan (to produce sugarcane locally and refine it). This was a major step the Dangote Group took towards sugar self-sufficiency in Nigeria even before the release of Nigerian Sugar Master Plan by the Federal Government in 2013."*		

UK receives first tariff-free sugar shipment from Australia in 50 years [UK]

	Reuters	**September 7, 2023**	**https://www.reuters.com/markets/commodities/uk-receives-first-tariff-free-sugar-shipment-australia-50-years-2023-09-07/**
	The first shipment of raw sugar from Australia to Britain under a new free trade agreement between the two countries has arrived in London, marking the reopening of a valuable market for Australian suppliers. *The shipment carried 33,000 metric tons of sugar worth around $19 million at current prices, said Mark Hampson at Queensland Sugar Limited which sent it.*		

The free trade agreement came into force on May 31, removing tariffs in place since 1973. Before the deal, UK tariffs on Australian sugar were as high as 350 pounds ($435) a ton, or around 64%, the Australian agriculture and trade ministries said in a statement.

Latest Research

Life cycle environmental benefits of recycling waste liquor and chemicals in production of lignocellulosic bioethanol



In recent decades, numerous bioconversion processes and techniques have been developed to utilize lignocellulosic biomass as feedstock in the production of bio-based fuels and materials. However, waste treatment, an important sub-system, is seldom considered in the life cycle assessment of lignocellulose derived products. This study comprehensively investigated the environmental impacts of bioethanol and electricity cogeneration from sugarcane bagasse, with a focus on recycling techniques adopted in waste treatment. A life cycle assessment indicated that high recycle rate of black liquor, acid and waste washing water can substantially reduce the consumption of fresh water, related chemicals and energy by 70–80%. Environmental impacts relating to global warming, acidification potential and primary energy demand can be decreased by 5–10 times or even entirely eliminated. These study outcomes demonstrate significant environmental benefits of integrating waste recycling techniques into lignocellulose biorefinery process, providing a solid foundation for future industrial development.

Journal to be published December 2023, article available online now

> Link

Sugarcane Insect Pests in China: Species, Distribution and Population Dynamics



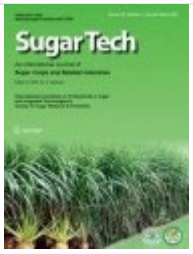
China is a major sugarcane-producing country in the world, and the crop is mainly cultivated in the tropical and subtropical regions of southern China. Pest infestation negatively affects yield and sugar, resulting in huge economic losses. Factors such as the changes in main sugarcane growing areas, climate, farming methods and introduction of new sugarcane varieties and management levels have influenced pest status and a corresponding loss in various sugarcane belts in China. This review focuses on the important insect pest species, distribution of leaf pests, stalk pests and subterranean pests of sugarcane in China and their damage symptoms at different growth stages of sugarcane. The damage potential and factors affecting the population dynamics of main insect pests were reviewed and discussed. This paper is expected to lay a foundation for periodic updates on the sugarcane pest status in China and to provide a baseline for monitoring as well as comprehensive pest management.

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> Link

Evaluation of Sugarcane Yield Response to a Phosphate-Solubilizing Microbial Inoculant: Using an Aerial Imagery-Based

Model



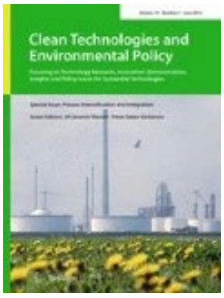
The use of microbial inoculants has become an effective alternative for increasing crop yields, reducing production costs, and improving environmental sustainability. Farmers are very interested in microbial inoculants involved in the solubilization of non-labile phosphorus due to the increasing demand for phosphate fertilizers and the scarcity of natural sources of this nutrient. Thus, the Brazilian Agricultural Research Corporation (Embrapa), in partnership with the Simbiose Company (Rio Grande do Sul, Brazil), has developed a commercial phosphate-solubilizing inoculant combining the Bacillus subtilis CNPMS2084 and Bacillus megaterium CNPMS119 strains. The present work evaluated the effect of different doses of this Bacillus strain inoculant in combination with phosphate fertilization on sugarcane crops in three experimental fields for two successive production seasons (plant cane and first ratoon).

Vegetation indices (VIs) were calculated with the help of aerial images collected regularly during the phenological phases of vegetative growth and ripening and used in association with weather and yield data to develop a predictive model for the effect of the bioinoculant on the sugarcane crop. The results showed that the doses of 500 and 750 mL/ha of Bacillus strain inoculant applied in the planting furrow and during ratoon management were the most effective to increase tons of cane per hectare (TCH) and tons of sucrose per hectare (TSH) compared to treatments without inoculant application. These results agree with the forecast generated by the statistical model developed to predict the impact of the bioinoculant on the increase in sugarcane biomass. Afterward, the fitness of the model to estimate the effect of the Bacillus strain inoculant on the sugarcane yield was demonstrated when field data from commercial areas of sugarcane treated with the bioinoculant were compared to data from control fields without application, confirming the positive effect of the commercial Bacillus strain inoculant for sugarcane crops as well as the model's effectiveness in handling and predicting yield from data obtained from commercial areas.

Published: October 16, 2023

> **Link**

Sustainable methane energy from bagasse treated via bokashi technology: comparative between neural network and mathematical modelling



Bagasse is the major leftover material from the sugarcane industry, and it has significant untapped energy. Biogas production from bagasse is employed as eco-friendly energy but its intricate composition makes it resistant to degradation. This study endeavors to explore the impact of bokashi technology, a technique that applies effective microorganisms on the potential methane production from bagasse. According to findings, bagasse had the ability to produce biogas but applying bokashi technology to bagasse led to getting more methane production. The methane production from treated bagasse for one month via bokashi bran was 243.80 LCH4/kgVS compared to 106.84 LCH4/kgVS only from fresh bagasse which is often attributed to improved fibrous carbohydrates degradation by the pre-treatment process. The reduction of total solids and chemical oxygen demand were more with treated bagasse. Two-dimensional mathematical modeling (TDMM) and artificial neural network (ANN) were utilized to forecast the production of methane through the anaerobic co-digestion process. The main advantage of ANN model is its ability to be constructed and trained for any experiment, regardless of the availability of a pre-existing study or understanding of the underlying phenomena. On the other hand, existence of a mathematical model that accurately describes the behavior of the current experiment is a fundamental requirement for constructing the TDMM model. The TDMM model remains stable in each run, as it relies on the established mathematical equations. On the other hand, ANN model may exhibit variations in each run due to the random initialization of weights.

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> Link

An improved YOLOv5s model for effectively predict sugarcane seed replenishment positions verified by a field re-seeding robot

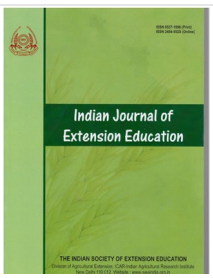


Sugarcane field re-seeding robot is a promising yield-enhancing technology proposed to solve the seedling absences in sugarcane fields. In this study, in combination with developing the sugarcane field re-seeding robot, an improved YOLOv5s model was proposed to detect sugarcane seedlings and predict seed replenishment positions. Firstly, field images of one-month-old sugarcane seedlings were taken at different light conditions as a dataset. Secondly, the Slim-Neck was introduced to replace the Neck network, which can reduce the complexity of the model while maintaining sufficient accuracy. Thirdly, the Efficient Channel Attention (ECA) module was added to the Backbone network to enhance the model's attention on critical feature information of sugarcane seedlings. Fourthly, the SCYLLA-IoU (SIoU) loss function was introduced to speed up the convergence of the proposed model. Lastly, a method for predicting seed replenishment positions was proposed and verified by the field tests. The experimental results showed that the mean average precision (mAP), precision, and recall of the improved YOLOv5s model were 93.1 %, 92.1 %, and 89.9 %, respectively, and the detection speed was 82 frames per second (FPS), which increased the mAP by 1.5 % and the detection speed by 12.3 % compared to the original YOLOv5s model. In addition, compared with Faster R-CNN, SSD, and YOLOv4-tiny models, the improved YOLOv5s model had a higher accuracy, faster detection speed, and less memory consumption. The field test showed that the real-time detection speed of the improved YOLOv5s model was 23 FPS in Nvidia Jetson TX2. The real-time detection precision of sugarcane seedlings was 97.2 %, and the recall was 86.7 %. The mean relative error between the numbers of seed replenishment positions predicted by the robot and that predicted by the human was 18.7 %. Consequently, the improved YOLOv5s model can efficiently and accurately detect sugarcane seedlings and predict seed replenishment positions. This technology provides valuable visual detection support for the sugarcane field re-seeding robot.

Journal to be published November 2023, article available online now

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Effectiveness of Video on Knowledge Gain Regarding Sugarcane Cultivation Practices among the Farmers



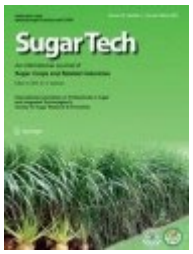
Information and communication technology in agriculture provides solutions to agricultural challenges. The study was conducted in Athani taluk of Belagavi District in Karnataka state during 2020-21. 'Before-After' without control group experimental design was used to determine the effectiveness of video on knowledge gain regarding sugarcane cultivation practices among farmers. Video developed on "Sugarcane cultivation practices" was the subject matter selected for the study and tested for their effectiveness and acted as treatment for the study. 50 Sugarcane growers were selected for the treatment randomly. The results revealed that highest mean difference 3.72 was observed in case of integrated disease management, followed by integrated pest management (3.62) and weed management (2.38). The farming experience, land holding, achievement motivation, risk orientation, scientific orientation and cosmopoliteness were found to be positive and significantly related with knowledge gain. Therefore, efforts should be taken up to disseminate knowledge

about recommended scientific farming practices by using information and communication technology tools especially video to educate farmers and thereby maximizing their benefits. Hence "Video" might be helpful for making the 'sugarcane grower' into 'resource rich farmers'

Published: October 4, 2023

> Link

Optimizing Sugarcane and Water Productivity Through Surface and Subsurface Drip Fertigation in Subtropical India



Declining water levels in North Indian states are largely attributed to unsustainable consumption of groundwater for irrigation. Drip irrigation, categorized into surface drip (SD) and subsurface drip (SSD) irrigation, offers promising opportunity for reducing crop water requirements while sustaining high water and crop productivity. To compare crop and water productivity of SD and SSD irrigated sugarcane, an experiment was conducted during 2017–18 (plant crop) and 2018–19 (ratoon crop) at Faridkot, Punjab, India. Three irrigation schedules i.e., irrigation at 60, 80, and 100% cumulative pan evaporation (CPE) were applied by SD and SSD methods with 80 and 100% of nitrogen (150 kg ha-1 for plant and 225 kg ha-1 for ratoon) as fertigation. Three standard irrigation practices (surface flood irrigation given to paired row trench at 30–30:120 cm, paired row sugarcane at 130–30:120 cm, and flat bed planted sugarcane at 75 cm spacing) were compared as control treatments. Results revealed that under SD and SSD, the mean cane yield 75.4 to 92.7 t ha-1 during 2017–18 (plant crop) and 72.9 to 79.9 t ha-1 during 2018–19 (ratoon crop) were superior over standard practices. Drip fertigation at 100% CPE with 80% N recorded 31.9 to 46.2% higher water productivity and 49.0 to 44.7% lesser irrigation water than controls. Results of the study highlighted for the use of drip fertigation in sugarcane at 100% CPE with 80% N at 3-day intervals for getting high B:C ratio (1:67–2:78 to 3:04–3:53 under SSD and 1:38–2:60 to 2:49–3:33 under SD), better crop and water productivity, and underground water resource conservation.

Published: September 19, 2023

> Link

Predicting Ratooning Ability of Sugarcane Varieties in Selection Trials



Testing sugarcane varieties for ratooning ability (RA) prerelease happens over fewer ratoon crops than those achieved commercially due to inadequate resources and the need to release varieties quicker. The purpose of this study was to model yield potential and RA of sugarcane varieties. To achieve this, yield (cane yield, TCH; sucrose yield, TSH; stalk weight, STM) and quality (sucrose content, SUC%) data for eight test varieties and a control planted on different soil types (good draining and poor draining), harvesting seasons (early, mid and late), and harvested over six successive crops, were subjected to linear mixed model and regression models. The results indicated varieties had significantly different RA suggesting existence of opportunities to identify varieties with good RA. Soil types and harvesting seasons did not have any significant effect on varieties' RA for yield traits, but were significant for SUC% with seasons having a higher impact than soils. M1176/77 was identified as the most preferred for both TCH and TSH due to high yield potential and RA. Varieties M1400/86, M695/69 and M1551/80 were suitable for SUC%. A positive relationship between TCH and STM was observed which needs to be explored further to inform breeding efforts.

Published: September 16, 2023

> Link

The use of sawdust and sugarcane bagasse as low cost adsorbent in wastewater treatment

Recently, as a result of water poverty and the economic conditions that the world is experiencing, the world has turned to using low-cost methods to solve the wastewater treatment problems, which are very important for preserving the environment and human health. On one hand, the study is aimed to use natural materials such as sawdust and sugarcane bagasse (SCB), which are environmentally friendly and low cost. In addition to determining the optimum depth for maximizing the qualities of treated wastewater for irrigation purposes, according to the Egyptian Code for the Use of Treated Wastewater in Agriculture and Egyptian law 48, grade A, water will be used to maintain green landscapes at educational institutions, public and private parks, and fresh fruit crops that can be eaten without peeling. At Zenin wastewater treatment plant, low-cost adsorbents were tested in two identical filters. Using different depth of sawdust media layers, biological oxygen demand (BOD), chemical oxygen demand (COD), and total suspended solids (TSS) were significantly reduced. Using thicknesses of 20 cm, 30 cm, and 40 cm, respectively, BOD decreased by 65.65%, 70.9%, and 73.61%. The COD decreased by 55.07%, 69.96%, and 76.6%. The TSS reduces by 59.4%, 66.6%, and 77.14% respectively. It has been shown that sawdust can effectively remove organic and suspended solids from wastewater when used as an adsorbent in filters. Sugarcane bagasse also demonstrated great result when used as an adsorbent that BOD decreased by 52.25, 56.99%, and 58.82% at depths of 20 cm, 30 cm, and 40 cm, respectively, whereas COD decreased by 51.2%, 56.89%, and 60.64% respectively. The reductions in TSS, 43.93%, and 75% with the respective depths were observed. After selecting the best material and optimum depth for adsorption, sawdust was tested at 40 cm which shows a reduction in BOD by 82.73%, COD by 84.58%, and TSS by 88.235%, there were also reductions in ammonia (NH3), nitrate (NO3), oil, and grease with removal efficiency of 11.6%, 60.27%, and 83.1%, respectively.

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> Link

Biotechnologies to Improve Sugarcane Productivity in a Climate Change Scenario



Sugarcane plays a central role in sugar and ethanol production. Ethanol from sugarcane is considered sustainable since lignocellulosic residues can increase crop productivity without altering planted areas, providing a valuable portion of the compensation for carbon dioxide emissions caused by fossil fuels. In this way, developing biotechnologies applied to increase sugarcane productivity is essential, especially in coping with stressful environments, which may cause a loss of productivity. This review first scrutinizes the literature to analyze the international collaborations among researchers working with sugarcane biotechnology, driven by sugarcane-producing countries, to understand its biochemical and molecular physiology associated with local environmental features. We then examine the literature to highlight some scientific improvements related to genetics and genomics and the use of omics tools for understanding sugarcane physiology. These new technologies have helped improve sugarcane's physiological

performance, addressing increased productivity without expanding the planting area, to important traits for resistance to stresses associated with global climate change. However, one of the most critical challenges remains the sequencing of the sugarcane genome, which still needs to be improved for precise genetic engineering strategies. We conclude that systems biology approaches integrating large amounts of data are essential. We need integration capable of affording specific modifications in the sugarcane genome (e.g., using CRISPR-Cas9 technology) to control plant behavior precisely. Coupled with modeling tools (e.g., Integration Assessment Modeling), this approach could provide the necessary precision control of designed plants to cope with a changing environment.

Published: August 30, 2023

> **Link**

Events

World Ethanol & Biofuels

World Ethanol & Biofuels Conference 2023

InformaConnect

7-9 November 2023

Steigenberger Wilcher's Hotel 71, Avenue Louise / Louizalaan 71, Brussels, Belgium

> **Link**



32nd ISO International Seminar

ISO

21-22 November 2023

East Wintergarden 43 Bank Street, London, United Kingdom

> **Link**



The Sugar Industry Innovation Symposium

AFA – Sugar Directorate Office

5-7 December 2023

Grand Royal Swiss Hotel Kisumu
Riat, Kisumu-Kakamega Highway , Vihiga Road
Kisumu-40100 Kenya

> **Link**



Carbo Solutions 25th International Sugar Conference

Carbo Solutions

24-26 January 2024

Casablanca Marriott Hotel, 100, Avenue des FAR Casablanca, Morocco

> **Link**



SIT Annual Technical Meeting 2024

Sugar Industry Technologists (SIT)

28 April – 1 May 2024

Vancouver, Canada

> **Link**

	ASSCT Annual Conference *Australian Society of Sugar Cane Technologists* **16-19 April 2024** **Townsville Entertainment and Convention Centre, Townsville, Queensland, Australia** > **Link**
	ISSCT 13th Germplasm & Breeding / 10th Molecular Biology Workshop *International Society of Sugar Cane Technologists (ISSCT) / ICAR-Sugarcane Breeding Institute, Coimbatore, India / Society for Sugarcane Research and Development (SSRD)* **8-12 July 2024** **Coimbatore, India** > **Link**
	ISSCT Agriculture Commission Workshop, Agricultural Engineering, Agronomy and Extension Sections *International Society of Sugar Cane Technologists (ISSCT) / Thailand Society of Sugar Cane Technologists (TSSCT)* **19-23 August 2024** **The Zign Hotel, Pattaya, Chonburi, Thailand** > **Link**
	ISSCT XIII Co-Products Workshop *International Society of Sugar Cane Technologists / eRcane* **15-20 September 2024** **Saint-Gilles, La Réunion** > **Link**

	ISSCT XIII Pathology and XI Entomology Joint Workshop *International Society of Sugar Cane Technologists / SATCA* **25-29 October 2024** **Salta, Argentina** > **Link**
	ISSCT XXXII Centennial Congress *International Society of Sugar Cane Technologists / Asociación Colombiana de Tecnicos de la Caña de Azúcar (TECNICAÑA).* **21-31 August 2025** **Centro de Eventos Valle del Pacifico, Cali – Colombia** > **Link**