June 2022

International Society of Sugar Cane Technologists
Founded 1924

Bulletin

Welcome to the ISSCT Bulletin for June 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 **4**

Germplasm & Breeding Section Webinar 4

ISSCT XXXI Congress Website 10

ISSCT XXXI Congress Newsletter 1 10

ISSCT Pathology and Molecular Biology Sections Webinars 11

Sugar Cane News **12**

Queensland researchers search for ingredients in sugarcane [Australia] 12

Cultivating paddy alongside sugarcane? Agri engineers come up with new method [Bangladesh] 12

Brazil's Raizen to invest $390 mln in second generation ethanol plants [Brazil] 12

High energy prices fuel investor interest in Brazil's idle biofuel capacity [Brazil] 13

India, Brazil agree to work towards developing bioenergy and biofuels 13

Azcuba sugar group to intensify sugar cane planting [Cuba] 13

Sugar Cane Growers Fund Will Fund More Modern Technologies For The Sake Of Farmers [Fiji] 14

NSI gets patent for innovative tech [India] 14

Are robots to replace sugarcane cutters in Maharashtra? [India] 14

Research team produces environment-friendly GM sugarcane [Indonesia] 15

Farmdar, a Pakistan based agritech raises $1.3 million in a Seed round [Pakistan] 15

Pakistan, China join hands for agri-mechanisation [Pakistan] 15

Sustainable aviation fuels can be a potential green industry in South Africa 16

A bit of sugar to save the climate: scientists create degradable plastic [UK] 16

Latest Research **17**

Vinasse And Straw Retention Decrease Fungal Diversity And Pathogenicity In Sugarcane Soil / Aplicação De Vinhaça E Retenção De Palha Diminuem A Diversidade E Patogenicidade De Fungos Em Solo Canavieiro 17

Pathway to a land-neutral expansion of Brazilian renewable fuel production 17

Effect of sugarcane trash management techniques on soil fertility, nutrient uptake and yield of sugarcane ratoon in calcareous soil 18

Adoption of biomass for electricity generation in Thailand: Implications for energy security, employment, environment, and land use change 18

Soils and seasons effect on sugarcane ratoon yield 19

Challenges Faced by Farmers in Crops Production Due to Fungal Pathogens and Their Effect on Indian Economy 19

The Time of Day Is Key to Discriminate Cultivars of Sugarcane upon Imagery Data from Unmanned Aerial Vehicle 20

Sugarcane bagasse amendments mitigate nutrient leaching from mineral soils under tropical humid conditions 20

Using Undigested Biomass Solid Leftovers from the Saccharification Process to Integrate Lignosulfonate Production in a Sugarcane Bagasse Biorefinery 21

Regional groundwater sustainability assessment 21

through enhancing conveyance and application 21

efficiencies of irrigation water 21

Events 22

ASSCT Annual Florida & Louisiana Joint meeting 22

XVI International Congress on Sugar and Cane Derivatives: Diversification 2022 22

Conferencia Bonsucro México 2022 22

American Sugar Alliance Symposium 22

28ª Feira Internacional da Bioenergia 22

SugarEx Thailand 2022 23

XII Congreso Tecnicaña (XII Tecnicaña Congress) 23

7th IAPSIT International Sugar Conference & Sugarcon-2022 23

Bonsucro Global Week 23

31st ISO International Seminar 2022 24

ISSCT XXXI Congress 24

News from ISSCT

Germplasm & Breeding Section Webinar

THEME:

Technology use in advancing progress in Germplasm use for the development of improved cane varieties

Thursday 7 July 2022, 11 a.m. GMT



As part of the series of Webinars that are being organized by the ISSCT in 2022 for its different disciplines, the Germplasm & Breeding Section Webinar will be held on Thursday 7 July 2022 at 11 a.m. GMT.

- **Programme**

Introduction by Goolam Badaloo, Chair ISSCT Germplasm and Breeding Section

- **Guest Speaker**

Addressing limits to faster progress in sugarcane breeding, with special reference to using genomic data
By Phil Jackson, Honorary Fellow, CSIRO, Australia

Sugarcane breeding programmes worldwide follow a generally similar overall recurrent breeding cycle and strategy, which has been relatively stable in many programmes for many decades. However, this cycle and strategy has some major constraints to faster gains which may becoming increasingly important, and this will be explained. At the same time, the application of DNA markers has for at least 30 years been touted to attain faster progress in sugarcane breeding, but significant impact on actual cultivar development appears still yet to widely happen. Problems and complications in the past in application of DNA markers to sugarcane breeding, and important lessons learnt to date, will be briefly reviewed in the presentation. However, it will be argued that past problems have been

largely overcome with on-going advances in technology and knowledge, such that obtaining and using genomic data could likely significantly, and cost effectively, now speed up gains in sugarcane breeding programmes. This view will be detailed in relation to the constraints in the traditional sugarcane breeding cycle previously described. Some potential future trends in genomics technologies with relevance to sugarcane breeding will also be outlined.

Use of latest analytical tools in simplifying variety selection at advanced stages in Mauritius

By Deepack Santchurn, MSIRI, Réduit, Mauritius

With the advent of computers in the 1960s, the Mauritius Sugarcane Industry Research Institute (MSIRI) was among the first to automate data recording, statistical analysis and selection. Modules were developed that integrated ANOVA techniques to analyse advanced selection trials involving individual and combined crop cycles within locations. Those automated analyses represented a major breakthrough towards fast generation of objective statistical results. These modules are still being used in the analysis and interpretation of selection data. At the advanced variety evaluation trials, each genotype from each trial is scrutinised individually and the available t-differences compared to commercial checks to help to identify the best varieties within trials. Adaptation to different agro-climates, stability analysis of new varieties and ratooning ability are, however, determined through a synthesis of observations across trials using direct differences between individual test genotypes and the commercial controls. These approaches are lengthy, cumbersome and, generally, highly demanding in terms of manpower and assimilation capacity of breeders. In recent years, new statistical techniques involving Spatial analysis, Biplots and Linear Mixed Model (LMM) analyses have been progressively used in controlling variability in field, combining different sets of trials data and interpretation of genotype by environment interactions (GEI). At the MSIRI, attempt has been made to run combined analysis of all advanced variety trials implemented in the last decade using LMM algorithm and compare the results with the conventional approach. The preliminary models used included all pre-conceivable genetic and environmental main effects prevailing in Mauritius and all first and second order interactions. The results looked highly promising as not only the best screened promising varieties using conventional method appeared in the top list but also the ranking and genetic gain with released commercial varieties could be assessed. The analysis also provided a range of GEI outputs that would alternatively take considerable time and resources to determine. The preliminary model will be refined in due course and run in parallel with the conventional approach in the near future until the best and parsimonious model reflecting the

local conditions is obtained and adopted. The new techniques available remain fundamental in further improving breeding and selection efficiency at the MSIRI.

New and old technology to improve breeding

[1]Sugar Research Australia, 71378 Bruce Highway, Gordonvale Qld, [2] 30962 Bruce Highway, Brandon Qld, [3] 26135 Peak Downs Highway, Mackay Qld, [4] B314 Pashleys Road Bundaberg North Qld

Jason Eglinton1, Felicity Atkin1, Fengduo Hu2, Xianming Wei3, George Piperidis3 and Roy Parfitt4

By George Piperidis, SRA, Australia

Plant breeding is the largest single investment made by SRA on behalf of the Australian sugarcane industry. Varieties are one of the most tangible and highly valued R&D outputs, and levy payers expect an enduring pipeline of improved varieties which make a significant contribution to increasing productivity and profitability. The market share of new varieties was 36% of commercial production in 2005 and steadily decreased to 3% in 2020. A total of 71 new varieties were released during that period. This has resulted in people thinking there is a variety adoption problem, accompanied by criticism of variety release decision making, appropriateness of variety performance information, variety marketing, and clean seed programmes. Improvements in these key parts of the adoption pipeline can (and are) being made but they are not the root cause of the low market share of new varieties. Adoption rates of Q240A in the Central and Burdekin regions, and adoption speed of Q253A in the Herbert and Northern regions demonstrate that the current system does support successful adoption for varieties with improved performance. The reality is that most of the 71 varieties released did not offer growers a better value proposition. There was no single factor responsible for the modest performance of plant breeding during this period. The incursion of smut disease had a significant impact on the germplasm pool and parent selection, and added a new breeding target, however work on incorporating smut resistance started over 20 years ago. There were important changes in personnel appointed to plant breeder positions which can impact genetic gain. The breeding programme had also operated under a highly formulaic approach that was unchanged for a very long time. A technical review in 2017 defined a significant change plan to systematically improve genetic gain and develop better varieties. These changes will be detailed in the presentation.

The Confirmation of the Status of Elite Parents for Brix within the Variety Improvement programme at WICSCBS

By Morexa Martin-Gardiner, West Indies Central Sugar Cane Breeding Station (WICSCBS, Barbados)

With every batch of crosses made at the West Indies Central Sugar Cane Breeding Station (WICSCBS), attention is given to identifying parents which seem to show signs of high general combining ability based on the rate at which their progeny/families are identified as superior. Parents that consistently contribute to good selections are identified as elite and are tagged as such in our database thus given priority for use in crosses. The study was designed to determine whether the elite label is a genuine indicator of superiority. It is generally accepted that under normal circumstances, the progeny mean should be distributed about the mid-parent value. For the purposes of this study, a parent will be considered truly elite if the distribution of the progeny is superior to the mid-parent value. A trial was planted containing crosses made using elite parents. Each batch of crosses were planted in 3 replicates, each containing 200 seedlings. The individual parents were also planted in each block. The seedlings and parents were Brixed for each of 3 crop cycles. Observations on vigour were also recorded. Scatter plots were prepared for each family with a line inserted to indicate the mid-parent value.

Benefits of Mixed Models in Sugarcane Breeding
By Jean Yves Hoarau (eRcane, Réunion Island)

The use of Linear Mixed Models (LMM) and its Best Linear Unbiased Prediction (BLUP) methodology is becoming increasingly popular with a broad community of research scientists. Development of computer power and user-friendly statistical software allows them to be used more frequently. This presentation will give an overview of the benefits of the flexible LMM/BLUP framework to analyse experimental data collected in sugarcane breeding programmes to make efficient breeding and selection decisions, or to study genetic properties of traits of agronomic interest. Several applications of mixed models will be presented. Their common feature is to exploit some co-variances existing between some experimental data. Depending on applications, the nature of co-variances differs and may be related either to spatial, temporal and/or genetic considerations, with possible nested effects. In all cases, the methodology has the advantage of providing unbiased statistical inferences and predictions likely supporting objective conclusions in the scientific issues investigated.

Use of spatial variability and analysis at early selection stages in Brazil
By Danilo Eduardo Cursi1 and Luciana Gonçalves Chaves Castellani1
1Centro de Tecnologia Canavieira, CTC, Brazil

Large experimental trials in early selection stages are often needed to assess progeny and clonal performance in sugarcane breeding programmes. In these stages, spatial variability can be partly controlled by using an appropriate experimental design. Technologies that support the systematic removal of the source of variation in the residual variance have great potential for application in those stages since a small-scale detection would have great potential to improve the selection accuracy. This ability of identify of variation in the field has proved to be useful in cultivar selection experiments. In this presentation, different approaches to model the effects of spatial variability, among them the use of proximal field sensing methods, will be discussed. An increase in the selection accuracy will be presented when environmental covariates from the different approaches are employed as an adjustment method while analysing the genetic potential of each family/genotype under experimentation.

Standing on the shoulders of giants

By Anna Hale and James Todd (USDA-ARS Sugarcane Research Unit, Houma, LA)

In Louisiana, germplasm enhancement has been an integrated component of the sugarcane breeding programme since its infancy. Through a steady and steadfast approach, incremental increases in sugar yields, disease resistance, cold tolerance, ratooning ability, and yield stability have been achieved through the incorporation of wild germplasm into newly developed parents which are actively utilised in the commercial breeding programme. All contemporary commercial varieties in Louisiana are derived from the introgression programme, and each successive generation builds on work from the past. The sugarcane variety HoCP 14-885 was released in 2021 by the USDA-ARS Sugarcane Research Unit in Houma, LA, The American Sugarcane League of the U.S.A., Inc., and the Louisiana State University Agricultural Center. This variety is early maturing with excellent sugar per hectare, and a good disease package, fibre percent cane, and stalk weight. It is aggressive with early shading ability and a good planting ratio and harvestability. Most notable is the excellent ratooning ability of this high early sugar and high tonnage variety. The variety results from introgression events involving multiple Saccharum spontaneum accessions and represents the ongoing impact of the basic breeding programme in Louisiana.

BLUP analysis in sugarcane breeding

By Marvellous Zhou, South African Sugarcane Research Institute (SASRI), South Africa)

Best Linear Unbiased Prediction (BLUP) was first used in animal breeding to estimate breeding values in animal breeding. BLUP analysis has been used to

estimate breeding values in sugarcane breeding. Sugarcane breeding stages in South Africa are Mini-Lines, Single Lines and Variety Trials. Data from Mini-Lines trials are used to determine family and breeding values while that from Single Lines and Variety Trials estimate genetic values used to select genotypes for advancement and commercial release. The objective of this presentation is to demonstrate how BLUP analysis can be applied to analyse cane yield data derived from Mini-Lines, Single Lines and Variety Trials, stages that have equivalents in other sugarcane breeding programmes. Data used for this case study were from irrigated breeding programme trials in South Africa and analysed using SAS software. The Mini Lines BLUP showed significant ($P<0.0001$) yield differences among families, female ($P<0.001$) and male parents ($P=0.0006$) suggesting elite families and parents with higher breeding values can be selected. For Single Lines, there were significant ($P<0.0001$) BLUP values indicating significant differences among genotypes. For Variety Trials, there were significant ($P<0.0001$) BLUP values indicating significant genotype differences. Elite families and genotypes showed significant positive values while low yielding families and genotypes produced significant negative values, providing an easy statistic to guide selection. BLUP analysis is a robust method that can be used to analyse unbalanced data due to missing values, partial replication or different number of replications or crop-years in plant breeding trials. BLUP analysis can also be used for analysing data across breeding cycles providing a mechanism to estimate cultivar genetic gains over breeding cycles.

The facilitators/organizers are:

Dr Goolam Badaloo, Ag Research Manager, MSIRI, Mauritius
Dr Danilo Cursi, CTC, Brazil
Dr Marvellous Zhou, SASRI, South Africa
Dr Jean Yves Hoarau, CIRAD/eRcane, Réunion
and other Germplasm & Breeding Section members
Discussions

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

Language: The Webinar will be conducted in English.

Registration

The Registration Form for the Webinar may be accessed through the following link:

https://us06web.zoom.us/meeting/register/tZIocO-qqj4jGdw3_e6TWbHpQK83t18cV5_b

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

http://members.issct.org/appform/issct_india_2022.aspx

Further information

For further information, please contact the ISSCT Germplasm and Breeding Section Chair, Dr Goolam Badaloo (goolam.badaloo@msiri.mu) or the ISSCT Secretariat at issct@intnet.mu

Please click here to access the short biodata on the Presenters.

ISSCT XXXI Congress Website

The Congress website is now operational and may be accessed through the following link:
https://issctcongressindia2023.in/

The website contains all relevant information on Registration for Congress, Pre and Post Congress Tours, Social Programme, Trade Exhibition and other aspects.

ISSCT XXXI Congress Newsletter 1

As previously mentioned in the April issue of the ISSCT, the Congress Newsletter 1 may be accessed through the following link.

https://issct.org/2022/04/18/issct-xxxi-congress-newsletter-1/

It contains detailed information on the Congress itself and the related activities i.e. Pre and Post Congress Tours, Social and Cultural events, Accompanying Persons'

Programme, Trade Exhibition, Hotel Accommodation, Visa, Call for Papers and Posters, Registration Fee and the composition of the various committees that have been set up to organize and manage the Congress.

ISSCT Pathology and Molecular Biology Sections Webinars

As already advised, two Webinars will be organised by the Pathology Section on **23 June and 30 June 2022 from 1:00pm GMT – 3:30pm GMT** and one by the Molecular Biology Section on 2 August 2022

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The First Announcements for these three webinars may be accessed on the ISSCT website at https://issct.org/activities/webinars/

Other webinars are scheduled for the Agriculture and Co-Products Commissions and the Entomology Section. Further information will be circulated at the end of June.

Sugar Cane News

Queensland researchers search for ingredients in sugarcane [Australia]

	Food Processing	**May 24, 2022**	**https://www.foodprocessing.com.au/content/food-design-research/news/queensland-researchers-search-for-ingredients-in-sugarcane-1241957215**

The Queensland University of Technology (QUT) will be a key partner in the Trailblazer Universities Food and Beverage Accelerator (FaBA) program, which is focused on supporting the growth of new food manufacturing industries.

The University of Queensland-led FaBA program was recently awarded a $50 million grant, spread across four years, to commercialise food and beverage development, with an additional $110 million coming from other partners. A consortium of 18 organisations will be working through FaBA to bring research projects to market.

Cultivating paddy alongside sugarcane? Agri engineers come up with new method [Bangladesh]

	The Daily Star	**May 24, 2022**	**https://www.thedailystar.net/news/bangladesh/agriculture/news/cultivating-paddy-alongside-sugarcane-agri-engineers-invent-new-method-3030901**

Agriculture engineers of Bangladesh Sugarcrop Research Institute (BSRI) have come up with a new technology of cultivating paddy as co-crop with sugarcane.

This is the first time in Bangladesh that the agricultural engineers have become successful in the two-crop cultivation in the same field.

The research has been conducted at the BSRI testing field in Pabna's Ishwardi upazila this year, expecting bumper yield of both crops.

"Earlier, scientists were successful in vegetable and lentil production, as co-crop with sugarcane, but never thought about paddy cultivation with sugarcane. Because both are different type of crops," said Dr Md Anisur Rahman, principal scientific officer and an agricultural engineer at BSRI.

Brazil's Raizen to invest $390 mln in second generation ethanol plants [Brazil]

	Reuters	**May 12, 2022**	**https://www.reuters.com/article/brazil-raizen/update-1-brazils-raizen-to-invest-390-mln-in-second-generation-ethanol-plants-idINL2N2X33AG**

Brazilian sugar-maker Raizen approved on Wednesday a 2 billion reais ($389.29 million) investment to build two second-generation ethanol plants, as part of the company's strategy to expand its portfolio of renewable fuel.

	The new plants, which are going to be located in its energy parks in Sao Paulo state, will add a capacity of 164 thousand cubic meters of biofuel per year and are expected to start operation in 2024. *The company already operates one second generation ethanol plant and is in the construction phase of another. All four plants will have total capacity of 280 thousand cubic meters per year, of which 80% was already commercialized in long-term contracts.*

High energy prices fuel investor interest in Brazil's idle biofuel capacity [Brazil]

	Reuters	**June 8, 2022**	**https://www.reuters.com/markets/commodities/high-energy-prices-fuel-investor-interest-brazils-idle-biofuel-capacity-2022-06-08/**
	High ethanol and sugar prices have investors looking into merger deals in Brazil, where a lot of idle biofuel capacity could be put to work to help boost tight global fuel and food supplies. *"Brazil is the Saudi Arabia of sugarcane, there is inexpensive unused capacity. That is the investor dream," said Craig Tashjian, managing partner at U.S. investment fund Amerra, which has been expanding into Brazil's sugarcane and corn-ethanol sector.* *Brazil is the world's largest sugar producer and second largest in ethanol, but nearly 30% of its sugarcane crushing capacity is idle because of financial difficulties faced by smaller companies. Investors and bankers said numerous deals are being negotiated, with large companies hoping to snap up struggling smaller players that are running below capacity.*		

India, Brazil agree to work towards developing bioenergy and biofuels

	ChiniMandi	**May 5, 2022**	**https://www.chinimandi.com/india-brazil-agree-to-work-towards-developing-bioenergy-and-biofuels/**
	India and Brazil have agreed to work towards developing an Indian- Brazil Alliance for bioenergy and biofuels. This happened during the recent visit of Bento Albuquerque, Brazilian Minister of Mines and Energy to India. *Indian Minister of Petroleum & Natural Gas Hardeep Singh Puri along with Albuquerque reviewed the long list of bilateral and international activities and initiatives undertaken in the biofuels sectors in recent years, including the exchange of technical visits, the two editions of the Brazil-India Ethanol Talks, Symposium on Aviation Biofuels, launching of the Joint Working Group on Bioenergy Cooperation, Roundtable on India-Brazil Collaboration in Biofuels in the Automobile Sector.* *India is the world's third-biggest oil importer and consumer. It imported the bulk of its oil needs from the Middle East and shipped in about 9 per cent from Latin America in 2021.*		

Azcuba sugar group to intensify sugar cane planting [Cuba]

	Prensa Latina	**June 1, 2022**	**futurefarming.com/smart-farming/tools-data/the-power-of-swat-maps/**
	Cuba's sugarcane agriculture has activated all the necessary works to promote planting of that crop in the spring stage, mainly plowing and furrowing the land, Azcuba said today. *At the moment, 124 percent of the volume of areas in movement for this date has been reached, Dionis Perez, director of Information Technology and Communications of the Sugar Enterprise*		

	Group (Azcuba), told Prensa Latina. *He specified that sugar cane sowing, which they have been able to activate by 67 percent, has been affected since April 5, due to insufficient availability of fuel.*

Sugar Cane Growers Fund Will Fund More Modern Technologies For The Sake Of Farmers [Fiji]

	Fiji Sun	**June 10. 2022**	**https://fijisun.com.fj/2022/06/10/sugar-cane-growers-fund-will-fund-more-modern-technologies-for-the-sake-of-farmers/**
	Chief Executive Officer, Raj Sharma, said the scheme supported farmers who actually produced sugarcane. "Apart from these harvesters, there are small machines that have come in to spray your cane farms, plant cane, and apply fertiliser," he said. *Mr Sharma said the fund was scouting the international market for the benefit of local ginger farmers. "Within the sugar industry, there are about 2000 people," he said.* *"If these people look to acquire farms, that is what we want to drive."*		

NSI gets patent for innovative tech [India]

	The Times of India	**June 4, 2022**	**https://timesofindia.indiatimes.com/city/kanpur/nsi-gets-patent-for-innovative-tech/articleshow/91996795.cms**
	National Sugar Institute, Kanpur, got a patent for developing an innovative technique for 'Production of Graphene Oxide from sugarcane bagasse'. The technique has been developed by Vishnu Prabhakar Srivastava, assistant professor of organic chemistry under the guidance of Prof Narendra Mohan, director, National Sugar Institute. *"We are continuously working on developing newer techniques for production of bio-chemicals and bio-energy from the by-products of the sugar industry, and "Graphene Oxide" is one such product which we have developed after several years of research work", said Prof Narendra Mohan.*		

Are robots to replace sugarcane cutters in Maharashtra? [India]

	Business Line	**June 6, 2022**	**https://www.thehindubusinessline.com/economy/agri-business/are-robots-to-replace-sugarcane-cutters-in-maharashtra/article65499834.ece** *(subscription required)*
	The sugar industry players in Maharashtra are mulling fully mechanised sugarcane harvesting with the help of harvesters and robots. Anticipating labour shortage and a glut in sugarcane output, sugar mills have requested the Pune-based Vasantdada Sugar Institute (VSI), the apex sugarcane research body, to research employing robots for cane cutting.		

Research team produces environment-friendly GM sugarcane [Indonesia]

ANTARA INDONESIAN NEWS AGENCY	**Antara**	**June 6, 2022**	**https://en.antaranews.com/news/232821/research-team-produces-environment-friendly-gm-sugarcane**

Jakarta (ANTARA) - Molecular biology scientist from the University of Jember Prof. Bambang Sugiharto on Monday announced that a research team led by him has succeeded in producing genetically modified sugarcane that is safe for the environment.

The genetically modified (GM) sugarcane was produced by Sugiharto's research team in collaboration with PT Perkebunan Nusantara (PTPN) XI and Ajinomoto, a Japanese company.

A gene encoding choline dehydrogenase (CDH) (betA) was cloned from Rhizobium meliloti by Ajinomoto, he said during a "Media Roundtable: The Role of Innovative Technologies in Addressing Agricultural Challenges," held virtually on Monday.

The betA gene was inserted in the pMLH2113 binary vector and transformed into Agrobacterium tumefaciens.

Farmdar, a Pakistan based agritech raises $1.3 million in a Seed round [Pakistan]

TECHJUICE	**Techjuice**	**May 10, 2022**	**https://www.techjuice.pk/farmdar-a-pakistan-based-agritech-raises-1-3-million-in-a-seed-round/**

Farmdar uses deep-tech with high-res, multi-band satellite imagery to create actionable data for farmers and corporates. This data has a direct result on the efficiency and profitability of farmers and corporates.

The round has been led by Indus Valley Capital with participation by strategic investors from Pakistan, the Middle East, and US, including Deosai Ventures, Tricap Investments, United Distributors Pakistan Limited, The Community Fund VC, LMKR and K2 Global Ventures.

"We looked at supply chain improvements first, like cold chain, which allowed us to extend shelf life but our underlying quality was still poor. We then tried remote sensing and precision agriculture technology and it created a step change in quality and yield whilst reducing our input costs" said Ibrahim.

"Pakistan is amongst the top 10 producers in the world for essential crops such as sugarcane, wheat and rice, yet in terms of yield we rank 50th or below. It's a massive yield gap. Farmdar is in a unique position to help increase yield and quality while reducing farming costs and minimizing waste. Pakistan is well placed to be a regional and global agricultural leader. The starting point for agricultural excellence is data and insight that can be actioned upon, accurately and quickly. That's where Farmdar comes in." quotes Manghi.

Pakistan, China join hands for agri-mechanisation [Pakistan]

THE EXPRESS TRIBUNE	**The Express Tribune**	**April 30, 2022**	**https://tribune.com.pk/story/2354814/pakistan-china-join-hands-for-agri-mechanisation**

Slow adoption of mechanisation technology has been a key reason for low yields and inefficiencies in agriculture in Pakistan, resulting in lower profit for farmers, said Dr Muhammad Waqar Akram, a lecturer in the Department of Farm Machinery and Power, University of Agriculture Faisalabad.

	He is attending Modern Agriculture Workshop of China-Pakistan Regional Innovation Institute for Modern Agriculture, organised by the Ministry of Agriculture and Rural Affairs of China. *The five-month workshop, starting from the end of March, provides inclusive training in the use and maintenance of modern agricultural machinery, field management, etc.*

Sustainable aviation fuels can be a potential green industry in South Africa

	Engineering News	**June 10, 2022**	**https://www.engineeringnews.co.za/article/sustainable-aviation-fuels-can-be-a-potential-green-industry-in-south-africa-2022-06-10**
	Sustainable aviation fuels (SAF) can contribute to a 65% reduction of emissions in the aviation industry by 2050, and South Africa has an excellent resource base to produce like-for-like replacements for fossil fuel-derived fuels that can be used with existing equipment and aeroplanes, says global conservation organisation World Wide Fund for Nature South Africa (WWF-SA) bioenergy analyst Farai Chireshe. *Unlike road transport, which can mitigate emissions through electrification, long-haul aviation is more difficult to decarbonise, which underpins demand for SAF.* *"South Africa has or can produce various feedstocks that can be used to produce SAF without impacting on food security, has extensive experience in Fischer-Tropsch processes that present an opportunity to tap into existing expertise, and also needs to decarbonise its own aviation sector," he says.*		

A bit of sugar to save the climate: scientists create degradable plastic [UK]

	TRT World	**May 25, 2022**	**https://www.trtworld.com/life/a-bit-of-sugar-to-save-the-climate-scientists-create-degradable-plastic-57431**
	Many plastic products labelled as biodegradable are available on the market. However, what manufacturers don't tell consumers is that they are only compostable under industrial conditions. *For instance, polylactic acid (PLA), a plastic which is derived from sugar cane or corn starch, has been in vogue for a few years. It's been mooted as a popular alternative to plastics derived from crude oil products – as it is renewable and sustainable.* *While PLA is labelled as biodegradable, in reality it only degrades under industrial composting conditions of high temperature and humidity, unlikely to be achieved in domestic compost heaps. PLA also has limited degradability in natural environments, e.g. in soil or in seawater.* *Scientists at the UK-based University of Bath wanted to make plastics biodegradable in natural conditions, and they have come up with a method of making plastics break down using only UV (ultraviolet) light.* *Researchers at Bath University's Centre for Sustainable and Circular Technologies (CSCT) have figured out a way to make these plastics more degradable in the natural environment.*		

Latest Research

Vinasse And Straw Retention Decrease Fungal Diversity And Pathogenicity In Sugarcane Soil / Aplicação De Vinhaça E Retenção De Palha Diminuem A Diversidade E Patogenicidade De Fungos Em Solo Canavieiro

This study focused on the effects of vinasse (V), a by-product of the sugar-ethanol industry, combined with mineral nitrogen fertilizer (N) and straw retention on the fungal community diversity, composition, and structure in a sugarcane-cultivated soil. The experiment consisted of a combination of V, mineral N and sugarcane-straw blanket. Soil samples were collected at 7, 157, and 217 days after planting, corresponding to maximum carbon dioxide emissions from soil after three repeated applications of fertilizers into the soil. Across 57 soil metagenomics datasets, it was revealed that the application the V in combination with N fertilizer and straw retention decreased the diversity, evenness and richness of fungi at the community level in soil. Analysis of the soil fungal community composition based on the 20 genera most abundant revealed decrease for Blastomyces, Melampsora, and Penicillium after the third application of V in combination with N fertilizer and straw blanket. An opposite response was revealed for Amauroascus, Cantharellus, Chrysosporium, Clavaria, Morchella, Puccinia, and Tuber in soil under this treatment. Shifts in fungal community composition were followed by increases in mycorrhizal and decomposers soil-borne fungi and decrease in potentially pathogenic fungi, but not by changes in community structure. Based on these results, it is possible to attest that repeated applications of V in combination with N fertilizer and sugarcane-straw blankets affect ecological aspects of the soil fungal community composition and potential functions played by fungi in sugarcane soil, which are essentials to ecosystem function and sustainable management of agricultural ecosystems.

Published March 9, 2022

> Link

Pathway to a land-neutral expansion of Brazilian renewable fuel production

Biofuels are currently the only available bulk renewable fuel. They have, however, limited expansion potential due to high land requirements and associated risks for biodiversity, food security, and land conflicts. We therefore propose to increase output from ethanol refineries in a land-neutral methanol pathway: surplus CO2-streams from fermentation are combined with H2 from renewably powered electrolysis to synthesize methanol. We illustrate this pathway with the Brazilian sugarcane ethanol industry using a spatio-temporal model. The fuel output of existing ethanol generation facilities can be increased by 43%–49% or ~100 TWh without using additional land. This amount is sufficient to cover projected growth in Brazilian biofuel demand in 2030. We identify a trade-off between renewable energy generation technologies: wind power requires the least amount of land whereas a mix of wind and solar costs the least. In the cheapest scenario, green methanol is competitive to fossil methanol at an average carbon price of 95€ tCO2-1.

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> Link

Effect of sugarcane trash management techniques on soil fertility, nutrient uptake and yield of sugarcane ratoon in calcareous soil

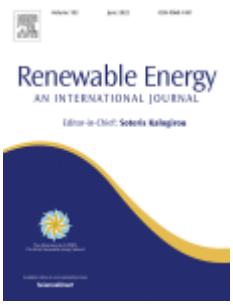
TPI International Journal

A field research was formulated for sugarcane (Saccharum spp. Hybrid complex) plant -ratoon system in calcareous soil at Crop Research Centre, RPCAU, Pusa, Bihar, to see the effect of various trash management techniques viz., sugarcane trash incorporation and trash mulching treatments activated with urea, FYM, vermicompost, and trash mulching treatments inoculated with Trichoderma / Azotobacter + PSB along with control plot. RDF (170 kg N, 60 kg P2O5 and 60 kg K2O ha-1) applied in all the treatments. The trash mulching treatments either activated with FYM, VC or inoculated with Trichoderma resulted in the significant enhancement in all the growth and yield parameters of ratoon crop and these treatment were found on par. Among treatments Trichoderma inoculated trash recorded highest cane yield and maximum uptake of nutrients (NPK) by ratoon crop. The various trash mulching treatments either activated with FYM, vermicompost, or inoculated with Trichoderma/ Azotobacter + PSB significantly enhance organic carbon and NPK availability in soil after ratoon harvest. The N, P and K availability in soil improved maximum to the extent of 15.45, 39.66 and 63.14 percent respectively in Trichoderma inoculated trash plot over control. Our findings suggest that mulching of activated / inoculated sugarcane trash @10 t ha-1 in plant-ratoon system has an immense potential to supply organic matter and availability of nutrient in soil with significant improvement in cane yield and uptake of nutrient by sugarcane grown in calcareous soil.

Published 2022

> **Link**

Adoption of biomass for electricity generation in Thailand: Implications for energy security, employment, environment, and land use change



As countries implement renewable energy policies, it's important to understand the impacts of policies on sustainability. Population, economic and production changes affects in land use, water consumption and emissions along with trade-offs for limited resources to achieve food and energy security. Thailand faces increasing electricity imports and agricultural production, causing residue burning, a resource utilized for electricity generation. Thailand implemented a renewable energy policy and another to curb sugarcane residue burning addressing above challenges. The paper uses an extended input-output model in Thailand and the Northeast to understand impacts of these policies on output, labor income, employment, land and water use, etc. The study concludes these policies lead to supplementary increase in income, employment and value added contributing towards achieving SDGs through energy security, climate action, decent work and economic growth. At a national level, renewable energy policy is unable to capture a large potential of biomass electricity, while the no burn policy is better able to achieve sustainability through total output, income, employment, and water use. The renewable energy policy in Northeast Thailand is better able to capture the electricity potential. The Northeast also sees land use shifts from rice to cane, which could cause food security challenges.

Published June 5, 2022

> **Link**

Soils and seasons effect on sugarcane ratoon yield



Sugarcane yields are known to decline with successive ratoon crops, a phenomenon termed ratoon yield decline (RYD), and the rate of decline is largely dependent on the environment in which the crop grows. An environment in sugarcane production is characterized by harvest season and soil type, and gaining an understanding on how these influence RYD, can assist growers manipulate them through best practices to attain longer profitable ratoon cycles. This study aimed to quantify the effect of harvest seasons and soil types on RYD for tons cane per ha per annum (TCHA), sucrose content (SUC%) and tons sucrose per ha per annum (TSHA). To achieve this, 15 year (2000–2014) commercial field data from four large growers of the Eswatini sugarcane industry with similar climatic conditions were analyzed using linear mixed models. Season, soil and season x soil effects had highly significant ($p < 0.0001$) effect on RYD for TCHA and TSHA. The order of importance for TCHA was season > soil > season x soil while for TSHA it was soil > season > season x soil. SUC% was not significantly ($p > 0.05$) affected by change in ratoon crop numbers, although there were indications of increase with increase in ratoon number. Early season harvests had the highest rate of cane yield decline (-3.33 TCHA) followed by late season (-2.30 TCHA), and mid season (-1.98 TCHA) had the lowest. Early (-0.33 TSHA) and late (-0.32 TSHA) season harvests had higher rates of sucrose yield decline than mid season harvests (-0.26 TSHA). Poor draining soils had a higher rate of cane yield decline (-2.92 TCHA) than moderate draining (-2.30 TCHA) and good draining (-2.43 TCHA) soils. Similarly, poor draining soils had a higher rate of sucrose yield decline (-0.38 TSHA) than moderate draining (-0.28 TSHA) and good draining (-0.25 TSHA) soils. There were larger variations in rates of yield decline for season x soil effects for TCHA (-1.70 to -3.98) and TSHA (-0.23 to -0.46) than the main effects of seasons and soils indicating the complexity associated with yield traits. The results of this study will inform sugarcane yield forecasting models to estimate yields of plant cane and ratoon crops for each soil class, adjusted for harvest seasons. Plant breeders can segregate environments according to their potential RYD and select genotypes for specific adaptations to optimize genetic gains. Growers on the other hand will be able to identify profitable ratoon numbers for each growing environment and schedule their replant programs accordingly.

Journal to be published 1 August 2022, article available online now

> **Link**

Challenges Faced by Farmers in Crops Production Due to Fungal Pathogens and Their Effect on Indian Economy



Indian agriculture is considered a global powerhouse. It is the second largest producer of rice, wheat, sugarcane, fruits, vegetables, cotton, and tea. In India, the agri sector employs around 60% of the population and contributes about 17% to the total GDP. One of the major constraints Indian agriculture facing is its low yield, which is 30-5% lower than those of developing countries. The challenges stagnating agricultural productivity in India include outbreaks of pests and diseases, poor soil fertility, unavailability of sufficient water, and climate change. Among all the factors, plant pathogens especially fungal pathogens are of key concern, and they are a major yield-limiting factor in agriculture. According to Punjab Agricultural University in 2007, 26% of yields got lost due to plant diseases. Pest and diseases cause over INR 290 billion per annum losses of crops in India. Out of 30,000 plant diseases recorded from different countries, around 5000 occur in India. The fungal infections related decline in crop yield in India is believed to be 5 million tons per year, approximately. In 2012, fungal diseases ruined at least 125 million tons of the crops like wheat, rice, soybeans, maize, and potatoes. The global damage to rice, wheat, and maize by the fungi accounts for $60 billion each year. This shows serious economic implications, resulting in production losses, market declines, and increased unemployment in the food and agriculture sector. Thus, there

is an urgent need to emphasize the problem of plant diseases so that preventive measures can be taken up. Plant pathology has a special role to meet new challenges for sustainability and advancements of Indian agriculture.
Journal published April 2022, article available online since October 2021

> Link

The Time of Day Is Key to Discriminate Cultivars of Sugarcane upon Imagery Data from Unmanned Aerial Vehicle

Remote sensing can provide useful imagery data to monitor sugarcane in the field, whether for precision management or high-throughput phenotyping (HTP). However, research and technological development into aerial remote sensing for distinguishing cultivars is still at an early stage of development, driving the need for further in-depth investigation. The primary objective of this study was therefore to analyze whether it could be possible to discriminate market-grade cultivars of sugarcane upon imagery data from an unmanned aerial vehicle (UAV). A secondary objective was to analyze whether the time of day could impact the expressiveness of spectral bands and vegetation indices (VIs) in the biophysical modeling. The remote sensing platform acquired high-resolution imagery data, making it possible for discriminating cultivars upon spectral bands and VIs without computational unfeasibility. 12:00 PM especially proved to be the most reliable time of day to perform the flight on the field and model the cultivars upon spectral bands. In contrast, the discrimination upon VIs was not specific to the time of flight. Therefore, this study can provide further information about the division of cultivars of sugarcane merely as a result of processing UAV imagery data. Insights will drive the knowledge necessary to effectively advance the field's prominence in developing low-altitude, remotely sensing sugarcane

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> Link

Sugarcane bagasse amendments mitigate nutrient leaching from mineral soils under tropical humid conditions



Large quantities of organic by-products are generated from the sugarcane industry during the process of sugar extraction. These by-products may be used as soil amendments to improve soil quality, as nutrient leaching is common in Florida mineral soils due to their sandy texture and frequent rain events. A soil column study was designed to evaluate the effects of bagasse application of 5 cm, 10 cm, and 10 cm + N, compared to control (no Bagasse) on the leaching potential of carbon (C), nitrogen (N), phosphorus (P), and potassium (K). Three application rates of bagasse were incorporated within the topsoil (0–15 cm) in outdoor soil columns exposed to natural conditions and periodically irrigated during the experiment. After 12 months, the distribution of C, N, P, and K were evaluated at three soil depths (0–15; 15–30; 30–53 cm) within the soil column. Total organic C (TOC), N, and P in leachates decreased significantly from soils amended with bagasse compared to the control. Based on the concentrations in the columns, bagasse could also be utilized as a potential source of K for plant uptake. Overall, application of bagasse to soils as a soil amendment might be an effective way to sustainably reutilize organic by-products while reducing concerns regarding major nutrients entering groundwater resources. Results from this study could assist developing nutrient management plans of using sugarcane bagasse as a potential soil amendment on mineral soils.

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> Link

Using Undigested Biomass Solid Leftovers from the Saccharification Process to Integrate Lignosulfonate Production in a Sugarcane Bagasse Biorefinery



Innovative schemes for lignocellulosic biomass refining could optimize the chemical use and biomass conversion efficiency, providing diversified biorefinery products. A new biorefinery scheme used mild alkaline-sulfite chemithermomechanical processing to pretreat sugarcane bagasse, producing highly digestible solids and diluted lignosulfonates in the black pretreatment liquor. Most of the glucan and xylan contained in the pretreated solids were converted into monosaccharides by saccharification with commercial enzymes. The undigested biomass solids remaining from the saccharification process were recycled with the existing alkaline-sulfite black pretreatment liquor. The optimized reaction conditions (159 °C and 13% NaOH amendment in the liquor) enhanced the lignosulfonate concentration from 7.1 ± 0.3 to 33.5 ± 0.7 g/L. Mass balance for the process indicates that most of the original sugarcane bagasse lignin were split into lignosulfonates contained in the resulfonation liquor (57.3%) and in the enzymatic hydrolysate (16.2%). 2D-NMR analysis of a lignosulfonate fraction recovered by ultrafiltration confirmed that approximately 9–10% of all β-O-4′ alkyl–aryl ether substructures were α-sulfonated. The combined chemical characteristics of the prepared lignosulfonate suggested its suitability for use in several lignosulfonate applications.

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> **Link**

Regional groundwater sustainability assessment through enhancing conveyance and application efficiencies of irrigation water

Springer
Irrigation Science

Groundwater depletion is a big sustainability challenge of 21st century all around the world. Local water authorities are in urgent need of concrete and focused steps to ensure sustainable groundwater management policies as quickly and as effectively as possible to achieve the sustainable development goals. For sustainable and efficient utilization of groundwater resources a study was conducted in farmer's field of Rasoolpur jatan village in Western U.P, India. This study presents a new approach to explore and evaluate the impact of various water management technologies on water table fluctuations in order to build up a sustainable groundwater use strategy. In this paper modeling was done to simulate the future groundwater table behaviour and give the alternate course of management options. Sugarcane crop covered the maximum part of study area and irrigation is being done through earthen open channel. When water is applied through earthen channel with 60% application efficiency (Ea), the water table would decline at 0.57 m/yr. The water table would decline at 0.39 m/yr, when application efficiency of unlined earthen channel increased to 65%. To avoid conveyance losses water is applied through pipe distribution network with 79% application efficiency, in this case water table would rise by 0.05 m/yr and when irrigation is done with drip system with Ea = 90%, water table would rise by 0.27 m/yr. The groundwater level for the year 2030 under four scenarios projected as 213.84, 217.20, 225.39 and 229.37 m respectively. Simulated results suggest that the sustainability of groundwater could be ensured in the study area by enhancing efficiency of irrigation water or shift from traditional irrigation methods to modern irrigation i.e. drip and sprinkler irrigation system or timely transformation like change the cropping pattern.

Preprint published: June 1 2022

> **Link**

Events

	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**
	Conferencia Bonsucro México 2022 *Bonsucro* **30 June – 1 July 2022** **Mexico City, Mexico** > **Link**
	American Sugar Alliance Symposium *American Sugar Alliance* **29 July - 3 August 2022** **Vail, Colorado** > **Link**
	94th SASTA Congress 2022 *SASTA – South African Sugar Technologists' Association* **16-18 August 2022** **ICC, Durban, 45 Bram Fischer Rd, Durban, 4001 South Africa** > **Link**
	28ª Feira Internacional da Bioenergia *Fenasucro & Agrocana* **16-19 August 2022** **Centro de Eventos Zanini, Sertãozinho, Brazil** > **Link**

3rd Edition Sugarex THAILAND 2022 In Conjunction with the 8th edition World Sugar Expo	**SugarEx Thailand 2022** *Tecnicaña* **8 - 9 September 2022** **KICE, Khonkaen, Thailand** > **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**
SUGARCON-2022 16-19 February, 2022 Lucknow - India 7th IAPSIT International Sugar Conference IAPSIT	**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**
BON SUCRO GLOBAL WEEK Brazil 17-20 October 2022	**Bonsucro Global Week** *Bonsucro* **17-20 October 2022** **Ribeirão Preto, Brazil** > **Link**

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