

SugarTech

Newsletter

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SUGARCON-2019

February 16-19, 2019

Venue

ICAR-IISR, Lucknow, UP, India

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President Speaks

Welcome to SUGARCON-2019



Welcome to the International Conference Sugarcon-2019 on “Green Technologies for Sustainable Development of Sugar and Integrated Industries” being organized at Lucknow, India from 16-19 February 2019.

With the global sugar production estimates pegged at a surplus and massive sugar stocks being predicted, the low prices and related challenges are bound to affect the profitability and sustainability of the global sugar industry. An efficient channelling of the resources as well as the products need to be ensured so that the sugar and integrated industries remain vibrant and viable. The production and management strategies in the farm and factory also need to be cost-effective and environment-friendly, ensuring a qualitatively superior produce. Green bio-intensive technologies encompassing sustainable strategies, along with diversification to ancillary products can be an effective solution to many of these challenges. Sugar crops-based energy programs have substantial potential to improve and optimize the processing and value addition of the bio-products from the sugar industry, through bio-refinery system and green chemistry. The production of bio-fuels, green energy and other sugar crops-based bio-products are bound to increase manifolds to meet the future demands. Thus it is imperative that there has to be a qualitative and quantitative enhancement in the products with a right mix of the green and traditional approaches and optimal utilization of resources. An effective marketing and spread of these green technologies, along with suitable developmental policies are also important for an ever-growing and successful green industry.

A consolidation of the developments taking place in the different sugar crops and related sectors, towards a green integrated sugar industry is inevitable with collaborative efforts cutting across the boundaries. The Society for Sugar Research Promotion (SSRP) in its twenty years of service to the global sugar industry, has always been in the forefront to facilitate such partnerships for the growth of the global sugar sector and once again, we are taking the lead in this direction with SUGARCON 2019.

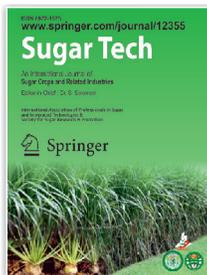
SSRP in collaboration with IAPSIT, has in the past, effectively utilized its vast experience to play a vital role in bringing together all the stake holders in the sugar crops sector for successful deliberations in the application of green technologies in sugar and its ancillary industries. We continue our efforts through SUGARCON 2019. We are sure that fruitful partnerships and collaborations will evolve from this exchange of ideas among the sugar crops researchers and other stakeholders, leading to a Green & Smart Integrated Industry.

A very warm welcome to you all at SUGARCON 2019.

S. Solomon



Sugar Tech – A glorious journey of 20 years...



SugarTech - has successfully completed its 20 years of journey. We remember the historic day, when the name of the journal was first proposed by three colleagues (Dr G.P. Rao, Dr H.B. Singh and Mr Ashok Datta), way back in 1998 at Sugarcane Research Station Campus, Kunraghat, Gorakhpur. A society in the name of “Society for Sugar Research & Promotion” was registered in 1999 with its major objective to publish an international research journal christened as ‘Sugar Tech’.

The Editorial Board and Advisory Board were constituted and the first issue was published in 1999, as Vol.1 No. 1 & 2 with 10 articles (available on Springer website). We would like to thank all the authors who contributed for the first issue of the journal. The SugarTech journal became an official publication of IS-2004, IS-2006 and IS-2008 International Conferences held at Nanning (China), Guilin (China) and Al-Arish (Egypt). Subsequently, the global publishing company Springer took over the publication of Sugar tech in 2008, with four issues a year. Ever since we started publishing in association with Springer India Pvt. Ltd., the quality of the published articles has increased substantially. On time publication of high quality papers during the last two decades is commendable. Special theme based issues have added to the increased visibility of the journal. The release of the 2011 journal citation report from Thomson Reuter added to our delight when Sugar Tech fetched its maiden impact factor (IF) of 0.431 since its first publication in 1999. At present the IF of the journal is 0.802 and last five years’ IF is 0.952, with h% index 16 and over 50000 downloads per year. The journal is cited in more than sixty international citation services, with ISI Thomson Reuters, SCOPUS, Google Scholar, INSDOC, Elsevier Biobase, Indian Science Abstracts, SCIMago, Summon by ProQuests, Science Citation Index Expanded (SciSearch), Journal Citation Reports/Science Edition, Chemical Abstracts Service (CAS), Google Scholar, AGRICOLA, CAB Abstracts, CNKI, Current Contents/ Agriculture, Biology & Environmental Sciences, EBSCO Discovery Service, Elsevier Biobase, EMBiology, Expanded Academic, Global Health, Indian Science Abstracts, OCLC WorldCat Discovery Service, ProQuest Agricultural & Environmental Science Database, etc. The Impact Factor has also led to a dramatic increase in the number of submissions, from more than 50 countries of the world.

The long held speculation of Sugar Tech achieving international status has constantly been seen in the form of several citations in standard high impact journals and books by prestigious publishers. This is a major achievement for Sugar Tech to be amongst the top few journals published in the area of Sugar Crops and Related Industry in the world. We are happy to witness the rapid growth in the quality of our journal with nearly 1300 articles published since 1999 and more than 3000 institutions subscribing to it in India and abroad. It is encouraging to see Sugar Tech articles being cited by the major internationally recognised high Impact journals and many other publications, reflecting its high standard and content of the research papers.

Sugar Tech too has undergone newer developments on many fronts with an aim to leave no lacunae, for instance, the introduction of quality check right at the time of manuscript submission. Moreover, the editorial managerial handling period of the manuscripts received has also been minimized during the last few years. We express

appreciation and our sincere gratitude to the readers and authors of our journal and hope to receive many more quality articles that deserve to be cited and that would add to the ever-increasing recognition of Sugar Tech.

The great success of Sugar Tech would not have been possible without the indispensable contribution of the Society for Sugar Research & Promotion (SSRP) and International Association of Professionals in Sugar & Integrated Technologies (IAPSIT), China, the editors, advisory board members, reviewers and authors who constantly ensured the quality standards of the papers being published. We, in the capacity of Editors-in-chief, would like to extend our sincere thanks to all those who have helped in sustaining the quality and ensuring timely publication of all the issues and look forward for this supporting spirit in the coming years too. We would also like to thank Springer Nature Pvt. Ltd. for Co-publishing Sugar Tech, which has become a mile stone for SSRP. We are grateful to our

editors, authors, society members, Springer team, advisory team and others for facilitating the journey of Sugar Tech from a hard copy format to an online platform of international standards, thereby disseminating scientific contents to a global audience. The Sugar Tech with the support from Springer Nature has been making rapid and consistent progress since 2008.

During our tenure as the Editors-in-Chief of this journal, we have experienced a number of crests and troughs in this journey. We have been very successful in taking the journal to great heights of acceptance and success. We are hopeful that Sugar Tech can reach the pinnacle of expectations of authors working in the area of sugar crops, sugar processing, technologies and by-products. Sugar Tech has

infact performed outstandingly well in the past 5 years, we have been receiving articles from all the continents of the globe and the journal is subscribed by over 3000 institutions and individuals in almost all the major sugar producing countries.

The current IF of 0.807 and increase in number and quality of the submitted articles, wide range of geographical distribution of authors and the consistently increasing subscription to the journal, give us confidence and hope of achieving greater heights in times to come. In 2018, we have received more than 350 articles, published all the issues well in time and have also worked out strategies for the growth of the journal with a special focus on improving the quality of articles that are being published.

Having served SSRP as the Editors-in-Chief of Sugar Tech for the last 20 years (January 1999–till date), it becomes our moral responsibility to ensure continuity of the activities of Sugar Tech and SSRP with greater zeal and dedication. We would like to thank the Editors from ICAR-Sugarcane Breeding Institute, Coimbatore, India; ICAR-Indian Institute of Sugarcane Research, Lucknow, India; UP Council of Sugarcane Research, Shahajahnpur, India; Guangxi Academy of Agriculture Sciences, Nanning, China; HBSES, Brisbane, Queensland, Australia; Sugarcane Research Centre, Houma, Louisiana, USA; who have been instrumental in supporting the editorial activities of Sugar Tech. The publication of Sugar Tech Volume 21 No. 2 in 2019, and its release during Sugarcon-2019 is a major achievement of SSRP and highlights the glorious journey of SugarTech since 1999.

Our sincere greetings and thanks to the esteemed contributors, readers and publishers.

(GP Rao & S Solomon)



Towards A Green Smart Sustainable Sugar Industry

The global sugar industry is progressing through a crucial phase of development, with lots of opportunities as well as challenges. The great strides in the technological and related areas have substantially improved the performance of the industry in the sugarcane growing countries, with sugar production levels touching new heights. The world sugar production in 2017-18 has been estimated to be 192.7 million tons with the production expected to be ~186 million tons during 2018-19. The associated challenges like fluctuating prices in the global markets, surplus production and massive sugar stocks at the global level, global warming and dynamics of sugar production system etc., have prompted the sugar industry to look towards better sustainable options rather than profitability alone. The climate change related challenges and alarmingly dwindling natural resources are other drivers for the industry, for a shift towards environment-friendly green technologies, leading to a sustainable way of producing, managing and utilizing biological resources in an efficient manner.

In a broad sense, green technologies encompass those practices which have the potential to conserve and improve the environment, with a simultaneous enhancement in the production and productivity. Ideally, these should aid in an efficient utilization of resources and their conversion to food, feed, fibre, fuel, chemicals, pharmaceuticals etc. Sugarcane and other sugar crops are excellent sources of renewable feed stocks for bio-energy, green fuel and also for other products like bagasse and molasses-based chemicals, pharmaceuticals and bio-plastics. These crops can be grown in a very large area, even in low fertility and marginal lands, have high conversion efficiency, and can be made readily available for the industry. The efficient use of co-products and wastes, and the most favourable net energy and GHG balance, makes sugarcane one of the most favoured crop for bioethanol production. The well-established production, logistics, processing and marketing systems associated with sugarcane and other sugar crops enhance their attractiveness as source of raw materials for an efficient green, bio-based industry. The C₄ route of photosynthesis in the plant, suitability to the tropical environments, ready-to-use source of soluble carbohydrate, the utilization of the whole crop as source of various products with a very positive energy balance and the lowest carbon foot print etc., make this crop the best choice for an efficient green economy.

Apart from the crop itself being the best green crude for a sustainable industry, there can be many innovative strategies that can be applied in the field and factory by the sugar industry. Such cost effective environment-friendly technologies need to be an integral part of improvement, production and management practices in the field, along with those at the processing stage in the mills. Development of a green sustainable supply chain is also important for a bio-intensive sugar industry, with “green” employment opportunities.

Green technologies in sugarcane cultivation

Sugarcane varietal development for better yield, quality, biomass, stress tolerance and other desirable traits is an important component



of the green technologies that is being adopted in sugarcane agriculture. This, along with other precision farming strategies, contributes towards a bio-intensive, profitable and sustainable sugar industry. Resistance breeding against diseases and pests is an environment-friendly plant protection strategy with minimal use of plant protection chemicals. Varietal development to meet the location-specific requirements can effectively overcome the adverse effects associated with climate change like drought, water-logging, changing insect-pest dynamics etc., thus contributing towards climate change mitigation.

Precision agriculture through site-specific management is also a component of bio-intensive environment-friendly technologies. In the sugarcane production system, it starts right from field preparation and planting with innovative planting methods and planting materials being utilized. Single bud planting, primed cane node/bud chip technology and use of other compact forms of planting material in sugarcane, with suitable handling protocols are cost-effective, with a substantial saving of planting material. GIS-based strategies can help in site-specific management of nutrients, water and other resources for an environment friendly and cost-effective cultivation.

Integrated Nutrient Management (INM) by supplementing the recommended inorganic fertilizers with green manuring (including *in situ* incorporation of green manure crops during land preparation), crop residue incorporation and trash mulching, use of biofertilizers and other organics like FYM, sugar industry by-products like bagasse, pressmud etc., are necessary for rejuvenating the fast depleting soil health in the sugarcane growing areas. In many parts of the country, the organic C content in the sugarcane growing soil is low, as low as 0.4% in some areas. Micronutrient deficiencies have also been reported in these soils. The soils need to be improved drastically through bio-intensive measures like INM. Crop diversification in the form of intercropping is another green technology which facilitate residue incorporation and soil enrichment, apart from providing economic and nutritional security to the grower. An efficient water management system also make use of sustainable technologies like trench method of planting for water-conservation, furrow irrigation, micro-irrigation methods, *in situ* trash mulching etc., to ensure an efficient utilization of irrigation water. Development of drought tolerant varieties through conventional as well as non-conventional techniques can ensure improved productivity under water stress. The drought tolerant GMO sugarcane variety NXI-4T developed at Indonesia which contains betaine gene, is claimed to produce 10-30% more sugar than the conventional genotypes under drought conditions.

Sugarcane, a champion crop at carbon sequestration has been estimated to sequester upto 0.66 tons CO₂/ha/year. Thus, growing the crop itself helps to reduce CO₂ emissions to the atmosphere. Management techniques like rhizosphere engineering, application of biofertilizers including *Trichoderma*, intercropping, trash mulching and other plant residue incorporation practices contribute to carbon sequestration. Thus, enhancing carbon sequestration in sugarcane cultivation with better land management and agricultural practices has the potential to reduce the emissions to atmosphere. This is an excellent climate change mitigation strategy.

Resistance breeding against diseases and pests, GIS-based forecasting, bio-control umbrella for effective management and use of diagnostic kits and other tools for detection of incipient disease incidence. can be some of the green technologies for managing pests and diseases. Bio-agents like *Trichoderma* spp. for disease management, *Trichogramma*, *Cotesia* for managing the borer complex, bio-control of woolly aphid and *Pyrilla*, use of light/pheromone traps, are some of the successful bio-control strategies prevalent all



over the world in this crop. Application of Information and Communication Technology (ICT) is also another green approach for disease and pest diagnosis, with several user-friendly computer and mobile-based applications being used by the sugarcane growers and sugar mills. Mechanization in sugarcane agriculture also adds to profitability and sustainability. Apart from the direct gains through labour saving and ensuring timely operations, there are indirect gains like better water management, moisture

conservation, prevention of lodging in canes, more efficient application of plant protection chemicals, leading to better returns to the grower with efficient resource utilization.

Green technologies in sugar mill complexes

The sugar mills all over the world are moving towards a “Green Smart Sugar-Agro Complex” with an emphasis to produce green energy and other bio-based products, apart from sugar. Improved technologies like GREEN technology (Greatly Reduced Energy and Equipment Needs) for sugar refining (Tongaat Hulett Refinery, South Africa) are being practiced by the sugar mills. The potential of value addition through a better utilization of by-products is also being exploited to the full by the sugar mills today. Bagasse for co-generation, molasses as a source of ethanol, utilization of vinasse/spentwash for bio-electricity and also for soil health management are the major bio-energy chains already being exploited. A bio-refinery encompasses the sustainable processing of sugarcane into a wide range of products. The mandate of “Wealth from waste” encourages the sugar mills to utilize “anything and everything from the sugarcane plant” to be processed for an enhanced profitability and sustainability of the industry. Utilization of excess sugarcane plant residue for co-generation and conversion to SMART distilleries by utilising alternate feed stocks are some of the other strategies. Thus, a green sustainable sugar processing involves approaches like conversion from a single-product to a multi-product factory, optimizing the cost of sugarcane processing, integration with

other related industries like food processing industry, mechanisms to utilize the huge infrastructure even during off-season, modern techniques like hybrid systems for power generation and conversion of existing sugar factories into bio-refineries. The optimal utilization of resources, including the sugarcane plant itself, exploring new avenues for production and processing of sugar and other products etc., will also be favourable steps towards a greener industry, to ensure its sustainability and viability.

Sugar industry for a bio-based green economy

Besides the innovative technologies used in the field and factory, the world is moving towards a sugar industry-based bio-economy. Sugarcane provides the raw material for food, fodder, bio-fuel, green energy, bio ethanol, bio-plastics, bio-detergents, bio-molecule coated fabrics etc. Bagasse based products are being used for manufacturing nature friendly garments. Apart from the primary bio-products i.e., sugar and sweeteners, from the sugarcane plant, other products like trash and sugarcane plant residues, bagasse (for ethanol, for paper, packaging material, board etc.), chemical derivatives from bagasse, molasses (source of chemicals like alcohol, cattle feed, yeast, polyethylene, styrene, synthetic rubber, phytohormones, broad-spectrum biocides and chemicals), ethanol (as bio-fuel as well as raw material for chemicals and textiles), biochar, press mud etc., are effectively being put to use. Biochar from bagasse is an excellent soil amendment, fuel, adsorbant and also enhances carbon sequestration. Wax from the sugarcane peel can be an ingredient for cosmetics, textiles, fruit and vegetable coatings, lubricants and pharmaceuticals. It also contains some edible fatty acids and insect semio-chemicals. Bio-degradable plastics from bio-ethanol, other products from bagasse like tableware, kitchenware and containers, are other products, the production of which is being upscaled in many countries. Not all these are presently produced at a commercial scale. Some like bioethanol are well established and are manufactured at a commercial level.

In the present era of surplus sugar production, fluctuating sugar prices and related challenges, bio-based diversification and green technologies are the key words for the sugar industry to remain productive, profitable and sustainable. The sugar industry is a significant contributor to the economy in many of the Asian countries, these countries should take a lead in application of green technologies in the entire sugar value chain. There has to be a major upscaling of the ancillary products too, which can facilitate a smart green sugar and integrated industry.

(M.Swapna and S.Solomon)



6th IAPSIT International Conference, Udon Thani, Thailand

The 6th IAPSIT International Conference was organized on the theme of **“Sugar Crops Improvement, Biotechnology, Bio-refinery and Diversification: Impacts on Bio-based Economy”**. The Conference was jointly hosted by the Thailand Society of Sugar Technologists (TSSCT), Kasetsart University, Bangkok, Thailand Sugar Planters' Federation, International Association of Professionals in Sugar and Integrated Technology (IAPSIT), The Unity of Thailand Sugarcane Planters, The North-Isan Sugarcane Planters Association, The United Association of Thai Sugarcane Planters and the North Eastern Sugarcane Planters' Federation. South East Asian region is emerging as a promising hub for bio-based products and technologies, with feedstock availability and government support favouring the bio-based product generation. Thailand is a major sugar producer of South East Asian region, and one among the few net sugar exporting countries of the world. It has a share of 15% of the global sugar exports and is the second largest sugar exporter after Brazil. Thailand accounts for approximately 7 % of the global sugar production. By 2020, Thailand expects to produce 13.0 million tons of sugar with a sugar consumption of 3.7 million tons. Also, the country is an important partner in the bio-based economy initiatives, with a utilization of ~40% of the sugarcane produced for bio-based products. Thus, it was very apt that Thailand was chosen as the venue for the 6th IAPSIT International Conference.

Udon Thani, approximately 560 kms from Bangkok is an important regional hub connecting the North Eastern parts of Thailand with the rest of the country, and is also the gateway to Laos. The venue of the conference was Hotel Charoen, situated approximately 2.5 km from Udon Thani Airport. The scenic surroundings and the tastefully decorated interiors offered the right ambience for a comfortable stay for the delegates. The beautifully decorated Expo Area and the well equipped halls of the venue provided an ideal environment for the scientific deliberations. Around 250 delegates from 22 countries participated in this scientific gathering devoted to sugar crops, integrated industries and sugar industry-based bio-economy.

IS 2018- Inaugural Sessions

The arrival of the delegates and their registration commenced from 5th March 2018. There was a grand Delegate Reception along with The Exhibition Inauguration Ceremony at the Udondusadee Convention Hall on 5th March 2018, at 6 pm. Mr. Teerachai Sankaew, Chairman and Advisor of the North Eastern Cane Planters' Association, Thailand, welcomed the delegates to Udon Thani and this was followed by Opening Remarks by Mr. Kittu Choonhawong, President of TSSCT and Chairman of IS 2018, The significance of the

Conference was touched upon by the speaker in his remarks. The delegates were treated to a variety of gastronomic delicacies, including specially prepared sugarcane juice. The participants from various parts of the globe had a memorable time catching up with each other, simultaneously having a glimpse of the exhibits that were displayed by the various organizations. The Exhibition area consisted of stalls put up by many organizations/companies viz., MitrPhol Group, Bangkok, New Holland Agriculture, Bangkok, CropTech Asia, Bangkok, Rivulis, Australia, Smartkasetyon Co., Ltd., Thailand, Syngenta, Bangkok, Kacha Agricultural Chemicals Co., Ltd., Thailand, Saksiam Group, Thailand, SKYVIV Co., Ltd., Thailand, Bruker Optik GmbH, Singapore, Brevini Co. Ltd., Thailand, Thai Agency Engineering Co., Ltd., Thailand, Kuln Formosa Technology Co., Ltd., Thailand and The Global Canesugar Services Pvt. Ltd., India.

The Inaugural Ceremony was held on 06th March 2018 in the Udondusadee Convention Hall. The programme started with a cultural extravaganza by a troupe of dancers, depicting the stories from the religious scriptures like Ramayan. Dr Kittu Choonhawong, Conference Chairman and the Chairman, Thailand Society of Sugar Technologists (TSSCT) briefed about the Conference and extended a warm welcome on behalf of the Conference Secretariat and TSSCT. Mr Cherdpong Siriwit, Chairman, Advisory Board of Conference Organizing Committee also gave his remarks. The Conference was formally declared open by the beating of drum by the Governor, Udon Thani Province.

IS 2018 : Technical Sessions & Interactive Poster Session

The Technical Sessions were held from the afternoon of 06 November 2018. Two Technical Sessions were held concurrently. The Session I was on “Sugar Production and Protection Technologies and Mechanization of Farms” and this continued through all the three days. The Session II held on 07 March, 2018, dealt with “Sugar Crops Improvement, breeding & biotechnology”. The Session III was on “Sugarcane harvesting, processing, value addition and stewardship of environment” and this was held on 07th and 08th March 2018. The Technical Session IV on “Sugar-energy matrix in developing countries, sustainability issues, marketing national policies and integrated industries” was held on 06 March from 2 pm in the Meeting Room 2 (Mookamantri).

The valedictory session was held at 4 pm on 8th March at the Udondusadee Convention Hall. It was chaired by Dr Yang Rui-Li, President IAPSIT and was co-ordinated by Dr S. Solomon, Secretary, IAPSIT.



Field Visits

On the concluding day of the conference, i.e., 9th March, there was a field visit to the Erawan sugar factory and Erawan Sugar Research and Development Centre. The officials at Erawan factory extended a warm welcome in a traditional manner and this was followed by introductory remarks. After a visit to the handicrafts stalls that displayed various items, and also to the sugarcane fields, the delegates enjoyed a sumptuous meal. The visit to the R&D Centre was held in the afternoon. The R&D Centre showcased the commercial varieties released from government sectors like CSB08-108, LK92-11, conventional breeding plots including those for Energy canes derived from conventional breeding techniques, surface and sub-surface drip irrigation, sugarcane tissue culture plantlets being hardened in special nursery etc., apart from the various machinery used for sugarcane cultivation that were displayed.

The field and factory visit marked the formal conclusion of the Conference IAPSIT 2018. The delegates bid farewell to each other and to Udon Thani, looking forward to meet again during the 7th IAPSIT Conference in Vietnam.

Important recommendations and action points

- Promoting germplasm exchange among institutions /countries for introgression of novel gene combinations into the existing genetic background., with a simultaneous emphasis on improvement for biomass along with sugar yield.
- Introgression of *Erianthus* genes for biomass/energy canes. Introduction of cytoplasm from *S. spontaneum* and other wild species.
- Intensifying the application of bio/nanotechnological tools to enhance the efficiency of breeding process for sugar/sweeteners as well as other products.
- Manipulating the specific metabolic pathways in the crop for enhanced production of chemicals, biomolecules, pharmaceuticals and other derivatives from bagasse, molasses etc., thereby, realizing the concept of sugarcane as a biofactory.
- Microbial engineering and identification of suitable microbial consortia for lignin/cellulosic degradation.
- Complete utilization of all the by-products, viz., bagasse, molasses, press mud and other products by the sugar industry, to ensure higher revenues for the industry.
- Use of alternate feed stocks like cassava, sweet sorghum , sugar beet etc., along with sugarcane, for bio-ethanol production/cogeneration
- Modernization of sugar industry with state-of-the-art technological interventions for better utilization of by-products, and establishment of sugarcane /bagasse-based biorefineries.
- Government incentives to sugar industry for facilitating a need-based shift to bio-based products.
- Small-holder friendly strategies to overcome the present-day challenges faced by the sugar industry
- IT-based expert systems for cane production in the field and process improvement in the mill, for improvement in quantity and quality of the products.
- Enhanced public funding and investment in R&D efforts, including infrastructure, for bio-based products/technologies, to facilitate the development of cost-effective, better and novel products and technologies for a bio-based economy.
- Clear-cut government policies with respect to strategies like GM crops, since genetic manipulations will have a significant role in development of bio-based products.
- Development and effective management of “Bio-economy Clusters” within the region among the sugarcane growing ASEAN nations.
- Facilitating adequate infrastructure, investments, trained human resource and exchange of research personnel well-trained in the related technologies, among the countries.
- Initiatives by IAPSIT for linkage and networking among the countries, organizing capacity building programmes and exchange of personnel.



Sugar Industry News

Temporal expression dynamics of plant biomass degrading enzymes for an efficient microbial consortium

Sugarcane bagasse is an important source of biofuel which is easily available in huge quantities from sugar mills. The efficient degradation of the bagasse depends on the availability of suitable microorganisms, that serve as the source of necessary enzymes. Synthetic bacterial consortia for plant biomass (PB) degradation have been developed by researchers but the temporal and other variations and dynamics are yet to be studied in detail. Researchers from Netherlands and Columbia have explored the expression dynamics of PB degrading enzymes from a 5-species synthetic bacterial consortium for degradation of sugarcane bagasse. Temporal expression dynamics was studied to reveal the individual roles and also the potential interactions among them. The 5 strains (*Stenotrophomonas*, *Paenibacillus*, *Microbacterium*, *Chryseobacterium* and *Brevundimonas*) were cultivated in four different substrates including sugarcane bagasse as the sole carbon source. The researchers concluded that the maximum collaboration between the strains studied takes place at the initial stages of growth and this can be effectively exploited. This interaction and temporal expression dynamics can be effectively used to propose a dynamic saccharification process where two types of enzyme cocktails can be applied sequentially for sugarcane bagasse degradation. The first cocktail can comprise of enzymes acting on the backbone of hemicelluloses and the second can consist of a diverse array of endo-enzymes, exo-enzymes and LPMOs. The genus *Paenibacillus*, *Brevundimonas* and *Chryseobacterium* were the most important contributors at initial stages, with *Stenotrophomonas* highly active from 96-192 hours after culturing. The results can be utilized to engineer a suitable PB degrading bacterial consortium to improve the degradation of sugarcane bagasse by combining suitable bacterial strains depending on their level of activity at specific intervals after incubation.

(Source : *Frontiers in Microbiology*. February 2018 | Volume 9 | Article 299)

New Research Project by SRA, Australia

Sugar Research Australia (SRA) has announced 12 new research projects that will begin to drive productivity, profitability, and sustainability for Australian sugarcane growers and millers. These new projects complement the existing portfolio of research investment by SRA and will address critical research gaps and requirements that have been identified in SRA's five-year Strategic Plan. According to SRA CEO Mr Neil Fisher the new research investment would see research providers from several leading research institutions undertake work to address critical issues for the Australian sugar industry.

- Genetic analysis and marker delivery for sugarcane breeding (CSIRO);
- Developing the sugarcane gene catalogue for trait improvement;
- Selecting high value chromosomes from *Saccharum* species;
- Development of commercial molecular biological assays for improved sugarcane soil health and productivity(SRA)
- Impact of stool architecture on ratooning: extending current trial to 4R to strengthen correlations.(CSIRO);
- Implementation of root system diagnostics to deliver a field-based measure for root health.(CSIRO);
- Greenhouse gas emissions from sugarcane soils: strategies for increasing NUE and reducing environmental pollution(QUT);
- Improved irrigation system selection and operation for increased sugarcane productivity and profitability.(QST);
- Pan design and operational changes to suit Australian pan stages operating on low pressure vapour(QUT);
- Validating root system traits for enhanced nutrient capture in challenging environments.(CSIRO);
- Establishing sugarcane farming systems to improve soil health(SRA);
- Moth Borers – how are we going to manage them when they arrive?(SRA)

Society for Sugar Research and Promotion

Vision : Farmer centric sustainable development of sugar and integrated industries.

Mission : Sustainable development of sugar and integrated industries through application of scientific knowledge and improved technologies to augment production efficiency of sugar crops, sugar, green energy and value added products for holistic growth of farming community.

Activities

- National and International Consultancy on Sugarcane Agriculture
- Publication of International Journal - **Sugar Tech**
- Publication of Sugar Tech Newsletter (Half yearly)
- Professional Linkages with International Sugar Industry/Organisation/NGOs
- Conference/Symposium Organisation and Management
- Capacity Building Programs for Sugar Industry Professionals
- Publication of Books/Monographs/Scientific Editing/Preparation of Conference Material

Conference/Academic Services

If you are planning to organize a conference/seminar/workshop/meeting, our professionally qualified team will be happy to provide any of the following services according to your need:

- Conference Circulars/Brochures/Flyers (Up to 8 Pages) Package I (E-version) & Package II (Print version)

- E-book of Conference/Seminar/Symposium Proceedings on Pen Drive/CD
- Conference Abstracts Book/Souvenir/Final Report
- Posters for Conference/Seminar/Symposium Package I (E-version) & Package II (Print version)
- Conference Promotional Material: Banners, Back Drops
- Conference/Seminar Standee
- Conference/Seminar/Workshop announcements and schedules
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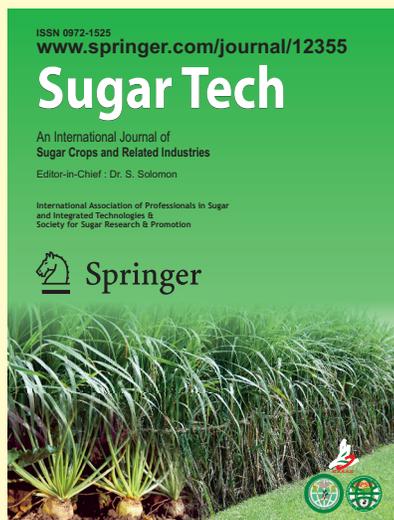
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An International Journal of Sugar Crops and Related Industries

Editor-in-Chief

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Sugar & ancillary industries across the globe are a key driver of rural development, supporting economic growth. In the last two decades they have brought major social-economic changes in the rural areas by providing seasonal jobs to millions of farmers and many farmers welfare programs. A large mass of agricultural labours and skilled and semi-skilled workers, mostly from rural areas, earn their livelihood from the sugar industry. However, sustainability of these industries in developing countries is constantly impacted by stagnant productivity, high cost of production and climate change. There is a need to develop a comprehensive and actionable R & D roadmap that could enable the sugar factories to sustain their socio-economic developmental programs for the holistic improvement of farmers and industry.



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