



## The 8th IAPSIT International Sugar Conference

**Building a Resilient and Sustainable Global Sugar & Bio-Energy Industry: Transforming ASEAN Sugar Sector (ISC 2024), September 16–19, 2024, Quy Nhon, Binh Dinh Province, Vietnam**

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The 8th IAPSIT International Sugar Conference was organized by the International Association of Professionals in Sugar and Integrated Technologies (IAPSIT), Society for Sugar Research and Promotion (SSRP) and The Sugar Technologists Association of India (STAI). The conference was held at the International Centre for Interdisciplinary Science and Education (ICISE) brought together 236 sugarcane, sugar and bioenergy experts and industry stakeholders from several countries including China, India, Thailand, Fiji, USA, Vietnam, Japan, Guyana, Germany and Philippines to discuss the critical challenges and opportunities facing the sugar and bioenergy industries in developing countries. The focus was on taking a stock of the technological and industry advancements globally and developing strategies to achieve a more sustainable and profitable sugar sector in the ASEAN region. The conference began with an inaugural session featuring speeches from distinguished guests, including Prof. Yang Rui Li (President, IAPSIT), Dr. S. Solomon (President, SSRP), Mr. Sanjay Awasthi (President, STAI), Dr. Govind P. Rao (Organizing Secretary, ISC-2024) and Prof. Jean Tran Thanh Van (President, ICISE, Vietnam). Their opening remarks set the stage for plenary, technical and sugar industry sessions and discussions on how the sugar industry could be transformed to meet the current challenges of climate change, sustainability and efficiency. The conference inaugural session was followed by the formal opening

of ISC-2024 and Sugar Industry Exhibition by the Chief Guest Dr. Nguyen Huu Ha, Director Department of Science and Technology, Binh Dinh Province, was represented by a diverse groups of stakeholders from sugar millers to manufacturers and suppliers from various countries.

The inaugural session of ISC-2024 and the Sugar Industry Exhibition was held on 16th September, at the ICISE, setting the stage for an exciting four days of conference. Prof. Yang Rui Li, President of IAPSIT, gave a welcome speech, acknowledging the global importance of sugarcane research and innovation for the development of sugar industry. Dr. Govind P. Rao, the Organizing Secretary of ISC-2024, extended a warm welcome to the guests and all delegates and emphasized the significance of the event. Prof. Jean Tran Thanh Van, President of ICISE, Vietnam, addressed the audience, highlighting the collaborative spirit of the conference and its importance for the sugar industry of Vietnam. Dr. S. Solomon, President of SSRP, introduced the conference's key themes and objectives. This was followed by Mr. Sanjay Awasthi, President of STAI, delivering an address focussed on the critical role of sugarcane in the agricultural and industrial sectors. A video presentation showcasing 25 Years of SSRP's Glorious Service to the sugar industry was shown, celebrating the organization's contribution to the sector and the global presence of its publication, Sugar Tech journal.

The Conference Souvenir and Silver Jubilee Special Issue of Sugar Tech journal on *Sustainability through diversification in the sugar industry*, edited by S. Solomon, G.P. Rao, Yang Rui Li, Wirat Vanichsriratana, R. Manimekalai and Priyanka Singh was released by the chief guests and dignitaries. This marked a special milestone for the sugar industry and acknowledged the scientific advancements and technological innovations made in sugarcane and sugar beet industries and all the related sectors globally over the years.

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A number of awards were presented to key leaders in the industry, including scientists, business leaders and farmers, recognizing their contributions to sugar industry research, innovation and business development. The key awardees were Mr. Le Van Tam, Ex Chairman, Lam Son Sugar Joint Stock Corporation, Vietnam for Leadership and Excellence: Community Service & Sustainable Development of Sugar Industry; Prof. Jean Tran Thanh Van, President of *Rencontres du Vietnam*, ICISE, Vietnam for Leadership and Excellence- Promotion of Science & Technology in South East Asia; Mr. S.C. Deshmukh, Advisor and Ex: Director General Vasantdada Sugar Institute, Pune, India, for Leadership and Excellence in Sugarcane research and development; Prof. Yang Rui Li, Director & Professor, Sugarcane Research Institute, GXAAS, Nanning, PR China, for Leadership and Excellence in Sugarcane Research and Capacity Building; Mr. K.V.S.R. Subbaiah, General Director, KCP-Vietnam Industries Limited, Son Hoa District, Phu Yen Province, Vietnam, for Leadership and Excellence; Farmers Welfare & Modernization of Sugar Mills and Mr. Nguyen Van Loc, President, Vietnam Sugarcane and Sugar Association (VSSA), for Farmer's Empowerment and Development of Sugar Industry in ASEAN & Vietnam.

The Chief Guest, Dr. Nguyen Huu Ha, Director of the Department of Science and Technology of Binh Dinh province delivered an inspiring address, acknowledging the collaborative efforts within the sugarcane community and the importance of continued advancements in sugar sector for higher productivity and sustainability. The inaugural session concluded with a vote of thanks by Dr. Tran Thanh Son, Vice Director of ICISE, expressing gratitude to all the dignitaries, organizers and participants for their involvement in making ISC-2024 a grand success.

The plenary lectures covered a broad spectrum of topics, offering valuable insights and new perspectives on the sugar and bioenergy industries' future in the ASEAN region. Key lectures included:

1. **Breaking the Sugarcane Productivity Plateau** by **Dr. Prakash Lakshmanan**, Director of the Sugarcane Research Institute in Nanning, China, outlined the significant challenges facing sugarcane productivity in the region, especially in the light of changing climate conditions. He emphasized the urgent need to initiate innovative R&D models such as public-private partnership and complementary strategies to overcome the sugarcane and sugar milling productivity barriers to ensure

the long-term sustainability of sugarcane and sugar production.

2. **The Sugarcane Industry as a Bioenergy Hub** by **Prof. Narendra Mohan**, former Director of the National Sugar Institute, Kanpur, India, highlighted the immense potential for sugarcane to play a central role in bioenergy production. He discussed the opportunities for the sugar industry to diversify into biofuels and other renewable energy sources, underlining the importance of efficiency improvements to ensure the sector's sustainability.
3. **Research and Development Priorities for the Philippines Sugar Industry** by **Dr. Maria Regina Martin**, Director General of PHILSURIN. Dr. Martin stressed the importance of identifying R&D priorities that can drive the sustainable growth of the sugar industry in the Philippines as well as in ASEAN region in general. She emphasized the role of collaboration between researchers, industry professionals and policymakers in fostering innovation and overcoming the challenges facing the ASEAN sugar sector.
4. **Diversification Opportunities in the Bioeconomy** by **Mr. Arvind Chudasama** from Sugar International, Germany, outlined the potential for sugar companies to diversify into value-added products, capitalizing on the expanding bioeconomy. He discussed the need for sugar companies to adapt to shifting market demands by investing in innovative products and services.
5. **The Role of Sugarcane and Sugar Associations in Promoting Industry Growth** by **Mr. Nguyen Van Loc**, President of the Vietnam Sugarcane and Sugar Association spoke about the vital role that industry associations could play in driving sustainable development in the sugar sector. He emphasized the importance of collaboration, knowledge sharing and policy advocacy to foster sustainable industry growth including the elimination of undesirable cross-border sugar trade practices.

## Focus Areas of the Conference

The conference featured technical sessions that concentrated on critical aspects of sugarcane and sugar production, including product diversification, mechanization and innovation. These sessions explored topics such as technological advancements towards developing climate-resilient sugarcane production systems, disease and pests resistant

sugarcane cultivars, mechanization of sugarcane farming, life cycle analysis and efficient water and other resources management. Participants also discussed the importance of advances in modern sugarcane breeding, pest management, carbon sequestration, soil fertility management, soil conservation and biotechnology including genome editing.

Presentations from sugar and bioenergy enterprises such as Natural Resource Biochem Pvt. Ltd., Saisidha Sugar Equipment & Eng. Co. Pvt. Ltd. and Fives Cails-KCP Limited showcased the latest technologies in sugar and bioenergy industries. These sessions offered a platform for industry professionals and researchers to share their latest findings, exchange ideas and discuss the future opportunities of sugar and bioenergy sectors.

### Innovative Solutions for Enhancing Sugarcane Productivity and Profitability

Throughout the conference, several innovative solutions were discussed to enhance sugarcane productivity, diversification and economic and environmental sustainability focussing on research advancements, technological innovations and sustainable practices. Some of the key solutions included:

1. **Molecular Breeding:** Advances in modern breeding technologies such as genomic selection, phenomics-assisted breeding and practical application of emerging knowledge on genomes of sugarcane and related species were highlighted as a means to accelerate the development of high-performing sugarcane varieties. This expected to develop new superior cultivars that meet market demands, emerging business models, particularly for higher yield, improved disease and pest resistance, regional and climatic adaptability, environmental sustainability and profitability.
2. **Genome Editing:** Researchers emphasized the potential of genome editing technologies to improve sugarcane traits such as cane and sugar yield, disease resistance, environmental stress tolerance and crop architecture. This technology enables precise modifications in the plant's genome, allowing for the development of cultivars with the desired and commercially important traits. The technology has been successfully used in cereals.
3. **Mechanization and Automation:** The conference underscored the importance of continued mechanization and process automation in improving the efficiency of sugarcane and sugar and bioenergy production. Innovative machineries such as small GPS-assisted harvesters for small-farm holdings, purpose-built industrial use drones and autonomous machineries for various crop management practices including planting, artificial intelligence (AI)-driven process control systems and large data science platforms were presented as a means to reduce labour costs and improve efficiency and profitability of crop management, sugar milling and product diversification.
4. **Integrated Pests and Disease Management:** The use of biocontrol methods was discussed and promoted as a sustainable approach to managing insect pests in sugarcane crops. This includes the use of natural predators and biopesticides to control pest populations. Additionally, research on developing disease-resistant sugarcane cultivars was emphasized, focussing on enhancing plant defence against common diseases like red rot and smut. Pests and diseases remain a major drag of industry productivity in all developing countries.
5. **Efficient Water Management:** Micro-irrigation systems were proposed as a solution to optimize water use in sugarcane cultivation. This technology helps maintain soil moisture while minimizing water waste, making it essential for regions facing water scarcity. The use of geostatistical modelling to assess soil fertility variability was also highlighted as a tool to tailor irrigation and fertilization practices to specific field conditions.
6. **Sustainable Agricultural Practices:** Integrating sugarcane with other crops in a rotation system was highlighted to improve soil health and reduce pest pressures. Fertigation techniques (applying fertilizers through irrigation systems) were highlighted as a method to ensure efficient nutrient and water use and leading to increased yields and reduced fertilizer runoff. This approach is projected as an effective way of mitigating greenhouse gas (GHG) emissions from sugarcane agriculture.
7. **Energy Efficiency and Bioenergy Utilization:** While co-generation of heat and electricity from bagasse remains a well-established practice in sugar milling globally, the business opportunity for additional production of renewable energy in sugar mills, mainly ethanol as a transportation fuel, presents a dual opportunity for sugar industry to contribute towards reducing fossil fuel consumption with the added benefits of

climate change mitigation and creating new revenue streams.

8. **Collaboration and Knowledge Sharing:** Establishing industry partnerships and fostering collaboration between research institutions, universities and sugar industry stakeholders is critical to drive new investments, technology and business innovation and encourage the adoption of best management practices across the sector. Capacity building of industry at all levels through targeted and wide-reaching training programs and formal academic courses will be needed to keep up with the rapid changes in technology evolution happening agriculture and related fields. This investment will hugely benefit all industry stakeholders including farmers and entrepreneurs, and it is particularly urgent in ASEAN sugar industry.
9. **Policy Advocacy and Support:** Advocating for government policies that support sugarcane farmers, sustainable sugarcane farming practices and innovations in sugar sector such as subsidies for organic farming or funding for appropriate research is needed to help drive industry-wide transformation.
10. **Reducing Carbon Footprint Through Bioenergy Production:** Sugar industry, and sugar mills in particular, can significantly reduce their carbon footprint by embracing bioenergy production through the following strategies which were highlighted in many presentations.
  - a. *Utilizing Sugarcane Biomass Waste:* Conversion of sugarcane by-products, such as bagasse, trash, press mud into bioenergy in sugar mills can be realized through purpose-built biomass boilers to generate electricity from bagasse. This reduces waste sent to landfills and provides a renewable energy source for mill operations and the excess to electricity grids. Compressed biogas production (CBG) is another area little explored by ASEAN sugar sector currently. However, speakers also cautioned judicious retention and incorporation of crop residues to avoid serious damages to soil health and soil fertility which are long-lasting and hard to regain.
  - b. *Bioethanol Production:* Expanding and increasing bioethanol production from sugarcane juice and molasses is becoming an imperative to achieve the target bio-

fuel blending set by various governments in many sugarcane producing countries. Implementing the advances in fermentation technology will enable mills to boost the efficiency and economic gains from converting sugars into bioethanol currently practiced in Brazil and India. This approach is stressed by both technologists and entrepreneurs during discussion.

- c. *Carbon Capture and Utilization (CCU):* Integrated new-generation carbon capture technologies in sugar mills will now allow capturing CO<sub>2</sub> emissions generated during fermentation efficiently and repurposing them for other uses cost-effectively. A significant impetus for CCU was its large mitigation potential sugar industry carbon footprint, and it was well-received by sugar mills.

Adopting these strategies can greatly reduce sugar industry, specifically sugar mills, carbon footprint, and contribute towards a sustainable green energy future, and an economically viable sugar industry with diversified revenue streams.

### Specific Recommendations for Developing ASEAN Sugar Industries into Sustainable Enterprises

Based on the discussions held during the various technical and industry sessions in the conference, several key recommendations were proposed to develop a practical roadmap for an economically and environmentally sustainable ASEAN sugar industry. Based on the presentations and deliberations held during the conference, the following points were emerged.

#### 1. Need for an ASEAN-wide Collaborative R&D Network

A strong R&D network of sugarcane research institutes, sugar millers and sugar industry peak bodies representing farmers of ASEAN region, and the leading international sugarcane research institutions, is imperative for a comprehensive and objective ASEAN-wide assessment to identify and prioritize major industry productivity, profitability and sustainability bottlenecks. Such a competent R&D network is also required to develop effective R&D and innovation strategies, and an operational roadmap, that are technically feasible and financially realistic. To achieve these targets, which underpin the successful transition of

ASEAN sugar industries into sustainable, export oriented and growing enterprises, the following goals and actions have been recommended.

- A centralized sugarcane improvement centre for ASEAN sugar industries needs to be established, preferably in a major ASEAN sugar industry. This centre will be responsible for developing location-specific, climate-resilient high yielding superior sugar varieties for all the regional sugar industries. The ASEAN Sugar Alliance (ASA) and sugar industry could formulate a PAN-ASEAN sugarcane improvement programme following the successful public–private partnership (PPP) model in line with the Indian Sugar & Bioenergy Manufacturers Association (ISMA) and ICAR-Sugarcane Breeding Institute, Coimbatore.. To further strengthen this programme and to be more effective, technical collaboration with sugarcane research institutes of India, Thailand and Australia could be immensely rewarding.
- State-of-the-art crop surveillance and biocontrol integrative pest management (IPM) and integrative diseases management (IDM) facilities to be established in each sugarcane growing ASEAN country to control and manage the changing dynamics of insect pests and diseases in the region.
- Relevant and practical diversification (e.g. biofuel/bioplastic/biopharmaceuticals etc.) options to be identified and promoted by the individual sugar companies in the ASEAN region considering their long-term business priorities, market demand and economic sustainability.

## 2. Investment in Research and Development

Government and private partners in sugar sector should support investment in research, development and modernization of industry. Sufficient research funding in areas related to climate resilience, pest and disease management, AI-based small machines and sustainable agricultural practices is crucial for boosting productivity while minimizing environmental impact.

## 3. Policy Advocacy and Government Support

Advocating for supportive policies that promote innovation and sustainability within the ASEAN sugar industry is necessary for long-term progress. Government policies that encourage farmers adopting sustainable practices through incentives and financial support are needed.

## 4. Awareness Programmes and Training

Developing training programmes to equip farmers and other stakeholders with the skills needed to adopt new technologies will be crucial for the industry's modernization. Educational and hands-on practical training of farmers and technologists of ASEAN sugar sector on modern sugarcane farming practices will be critical.

## 5. Integration of Technology

Encouraging the adoption of innovative technologies of farming practices will significantly improve operational efficiency and promote sustainable production. Special emphasis on innovations like automated harvesting machines and drone technology for monitoring crop health and crop management should be promoted preferably by the regional sugar mills. These transitions will have the potential to greatly enhance productivity and sustainability of sugarcane agriculture.

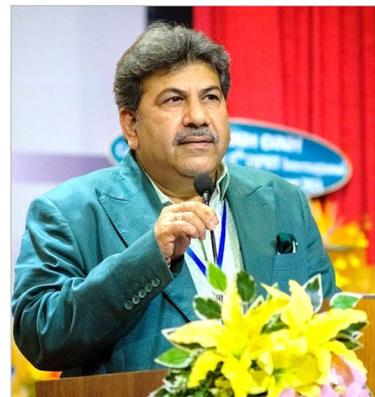
## 6. Sustainable Soil and Water Management

Implement suitable and sustainable soil and water management systems to cope up with the climate variability in the ASEAN region.

A factory tour of delegates to KCP-Vietnam, San Hoa was also arranged on 19 September 2024.

## Valedictory Session

The valedictory session of the International Sugar Conference 2024 was held on 18th September 2024, under the Chairmanship of Mr. Shivjirao Deshmukh, Advisor, VSI, Pune. Dr Prakash Lakshmanan highlighted the key recommendations for ASEAN sugar industries and sugarcane industries in general from the technical deliberations that took place over three days, focussing on establishing collaborative networks emphasizing PPP model, investing in research and development, initiating industry-wide product diversification, promoting sustainable practices, advocating for supportive policies and the critical need of upskilling education and training. By adopting these strategies, ASEAN and the global sugar industry can enhance its resilience to environmental challenges such as climate change, while ensuring long-term economic viability and social responsibility. Awards were presented to the best paper presenters, and sponsors were felicitated for their valuable contributions to the conference. The conference ended with the vote of thanks by Dr. G.P. Rao, Organizing Secretary of ISC-2024.



Group photos of delegates attending Sugarcon 2024 and Inaugural function



**Technical Sessions and speakers**



**Award presentation ceremony**



Speakers and delegates in different technical sessions



Groups photos of delegates attending different technical sessions



**Sugar Expo Inauguration and stalls**



Delegates at leisure time during tea, lunch and dinner time



**Sugarcane fields and factory visit**

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