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**REPORT ON THE 2019 ISSCT MANAGEMENT COMMISSION WORKSHOP**

***'From agro-ecology to agro-economics : Frameworks for sustainable production'***

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**ABSTRACT**

The Management Commission workshop is traditionally held in conjunction with the ISSCT congress, and features as a concurrent session in the programme. In 2019 it was held during the XXX ISSCT Congress in Tucumán, Argentina. The theme of the workshop was, *From Agro-ecology to Agro-economics: Frameworks for Sustainable Production*. Conducted as a facilitated panel discussion, the workshop addressed issues associated with farming in a manner that enhanced economic sustainability and recognised the importance of environmental conservation. The value of monitoring and measuring was emphasised and the importance of collecting the right data and preserving them in organised databases and interconnected systems was stressed.

This report provides a record of the workshop and presents a brief outline of each paper and synthesis of the discussions that followed. Since the workshop was run in parallel with the congress, delegates attending each of the three sessions varied in number. The morning session was attended by approximately 70 delegates, while attendance tailed off in the afternoon. Mention is also made of the remaining two Management sessions that addressed topics unrelated to the theme of the workshop.

## 1. INTRODUCTION

The ISSCT Management Commission Workshop was held concurrently with the XXX ISSCT Congress in Tucumán, Argentina on the 5 September 2019 during the Management programme of the congress. The overall theme of the workshop was: *From agro-ecology to agro-economics: Frameworks for sustainable production*.

The Management programme comprised three sessions with the first dedicated as the workshop in alignment with the theme; and the remaining two sessions comprising a collection of submissions on various management topics that were submitted for the congress. This report deals mainly with the two-hour workshop session (Annexure 1).

In the region of 70 delegates attended the workshop session, while smaller numbers 20-30 remained for the general sessions in the afternoon.

CM Baker facilitated the workshop session, while K Sriroth facilitated the two general sessions.

## 2. SESSION 1

### 2.1. Workshop session

There were six presentations, each of which was followed by a brief opportunity for questions of clarification, and then followed by a 40-minute panel discussion.

#### **MJ Tonatto, LP Garolera De Nucci, SD Casen, M Ruiz and ER Romero** **Use of energy in sugarcane production in Tucumán, Argentina**

This presentation focussed on examining how to reduce energy consumption in the production of sugarcane, by changing management practices namely, mechanisation changes, fertiliser and agrochemical practices, and changes to transport. The message and evidence was clear, and the need to encourage adoption of improved practices was identified as the challenge.

**Abstract:** *In a global scenario of increasing energy demand and environmental care, it is necessary to increase the contribution of renewable and clean energy sources. Sugarcane is globally recognized as one of the most suitable feedstocks for bioenergy generation. The objective of this study was to quantify and analyze the use of energy throughout the sugarcane agricultural production stages, considering a conventional and optimized cropping system, during a total productive cycle of 5 years, in the province of Tucumán (Argentina). Labor usage, agronomic inputs and application rates were used to estimate the energy consumption required for feedstock production. Management alternatives are considered as ways to generate substantial contributions in energy saving, environmental impact reduction, and overall processing efficiency. The energy consumption to produce 1 t of sugarcane using conventional agronomic management was 301.7 MJ. When changes were made to optimize the agronomic management, energy used was considerably less, a total of 186.2 MJ per t of sugarcane. The main energy consumption in both cases was due to the use of fuel during machinery operations followed by fertilizers use. Replacing traditionally used urea by calcareous ammonium nitrate was the most important means of reducing energy use. This study generated local information to advance sustainability studies and the environmental footprint of biofuels and highlighted the significant improvements made in both conventional and optimized cropping cycles.*

**LP Garolera De Nucci, J Tonatto, E Romero, GJ Cárdenas<sup>1</sup> and FD Mele**  
**Life-cycle assessment of sugarcane-based ethanol production in Tucumán, Argentina**

The presentation focussed on using the tool (LCA) to assess environmental impact of ethanol production. Emphasis was placed on using good practices (green cane harvesting; trash-blanketing; reduced synthetic fertilisers) to ameliorate the environmental impact. The work showed the impact of various contributors in the production process (in field, mill and distillery) to the environment.

*Abstract: Production of sugar, as well as bioethanol from sugarcane, are among the most important activities in Tucumán and the Northwestern (NW) Region of Argentina. This study shows the application of life cycle assessment (LCA) to such activities. LCA is an appropriate tool to estimate the environmental burden associated with a product or process during the entire life cycle from cradle (extraction of raw materials) to grave (disposal). This technique includes identifying critical process steps with potential for improvements and makes an important contribution in decision-making. LCA is undertaken according to the procedures included in the ISO 14040 standards. The aim of our poster is to present the environmental profile of bioethanol from sugarcane in the province of Tucuman (NW Region) and evaluate a set of relevant environmental impacts through the LCA technique. The study also provides information about the impact of the sugarcane agricultural and industrial activities for the different stages of the production process and through different impact categories, which together constitute the environmental footprint of biofuels.*

**Alejandro D Brown, Miguel Ullivarri, Hector Paez and Arturo Blanco**  
**Protected Productive Landscape of Ledesma S.A.A.I.: Reconciling nature conservation with production in areas of high environmental value**

The paper outlined a programme to enable sugarcane production within a biodiverse conservation space. Implemented in conjunction with an NGO it comprised three elements: assessment of existing biodiversity; identification of priority actions to ensure biodiversity; and creation of a management model to enable ongoing sustainability.

*Abstract: The Yungas or subtropical mountain forests encompass, in northwestern Argentina, more than 600 km in a north-south direction and no more than 70 km in width. This area (about 3 million hectares), although small for Argentina, shelters almost half of the country's biodiversity. At present, the southern Yungas are undergoing considerable biodiversity loss. The properties of the Ledesma agribusiness are situated in this complex environment and their activities link production development with biodiversity conservation in one of the most biologically diverse environments in Argentina. We have developed a concept called the Productive Protected Landscape<sup>®</sup> concept through a series of targeted actions that are included in a specific program of joint activities between Ledesma and Fundación ProYungas. This paper describes the approach taken to achieve synergy and compatibility between production and preservation of the environment.*

**S Auzoux, E Scopel, M Christina, C Poser and J-C Soulié**  
**AEGIS, an extended information system to support agroecological transition for sugarcane industries**

A digital system to support development and maintenance of good agroecological activities that collates, integrates, processes and shares data was described. Focussed

towards enhancing economic, environmental and social sustainability, the system served as a useful decision support tool.

*Abstract: Faced with increasing environmental, economic and social challenges, sugarcane industries are adopting agroecological approaches to design and evaluate systems that use natural resources more efficiently, mobilize plant biodiversity and adopt agroecological practices. In order to set up this agroecological transition, stakeholders of sugarcane industries need to: (i) access and analyze raw data; (ii) capitalize and share knowledge through professional networks; (iii) define performance and impact indicators; and (iv) engage in learning processes to acquire new skills based on successful experiments. CIRAD developed AEGIS (AgroEcological Global Information System), a platform to support digital agriculture and successful agroecological transition. AEGIS can provide standardized, harmonized and organized data that come from various sugarcane agroecosystems. Data stored in AEGIS are collected at different spatial and temporal scales, from different experiment designs and protocols, and in different contexts (agronomy, ecology, sociology, and economy). AEGIS meets the expectations of stakeholders through the development of generic statistical analysis tools and the implementation of ex-ante and ex-post data processing methodologies. It provides datasets for simulation of crop models and complex visualization tools to facilitate the interpretation of data and to highlight indicators, patterns and correlations inaccessible from raw data. AEGIS uses ontologies, metadata standards and web services, which ensure the semantic and technical interoperability of the various components of the information system. These features allowed development of a common language for sharing and exchanging contextualized information between stakeholders, whatever their fields of activity. By integrating dashboards, statistical analysis tools, data processing tools (data mining), simulation and visualization tools (artificial intelligence), our platform is a complete steering and decision support tool in the context of the agroecological transition.*

### **Ampapan Thitithawonwong, Thanaporn Athipanyakul and Chakrit Potchanasin Factors affecting the adoption of the Bonsucro Standard amongst Thai sugarcane farmers**

The paper described how a sustainable standard (Bonsucro) was being used to measure sustainable performance in Thailand. The focus was on adoption factors and showed how to gain an understanding of the environmental compliance/ attitudes of a grower.

*Abstract: This paper investigates adoption level of the Bonsucro Standard and identifies factors affecting its adoption. The primary data were collected from 100 sugarcane farmers during the 2016/2017 crop year and assessed using an ordered logit model. The results showed that the core and general indicators of the Bonsucro Standard have been adopted, except for the indicators regarding environmental law, accessibility to first aid and provision for emergency response, and management of biodiversity and ecosystem services. The adoption of practices in these indicators are low. Four levels of adoption are identified: (i) low adoption, 23% of sugarcane farmers; (ii) moderate adoption, 25% of sugarcane farmers; (iii) high adoption, 34% of sugarcane farmers; and (iv) very high compliance, 18% of sugarcane farmers. The results obtained from the ordered logit model show that the significant factors, at 95% of the confidence interval, affecting the adoption of the Bonsucro Standard include: the sugarcane farmers' gender; farmers' experience in sugarcane production; educational level of farmers; farm household labour; farmers' perception of the Bonsucro Standard; and distance from a sugarcane farm to a sugar mill.*

**S Solomon, GP Rao, M Swapna, A Kumar and RC Singhal**  
**Corporate Social Responsibility initiatives and their impact on sugar-mill performance: a case study of the Seksaria Biswan Sugar Factory, India**

The paper described the corporate social responsibility plan of a sugar mill in India that contributes to the economic and environmental sustainability of the mill area.

*Abstract: The Indian sugar industry is a key driver of rural development, supporting over 50 million farmers and their families, along with workers and entrepreneurs of almost 550 sugar mills. These sugar mills contribute significantly towards the Corporate Social Responsibility (CSR) in their area. The Seksaria Biswan Sugar Mill in the north Indian sub-tropics is a progressive sugar company with a crushing capacity of 7500 t/day, employing 190 regular and 400 seasonal workers. The cane production area is spread over 38,000 ha. This sugar complex produces white sugar (17740 t/year), bioethanol (65 kL/day), green electricity (32 MW), bio-compost (40,000 t) and promotes bio-intensive sugarcane cultivation. The annual price payment to cane growers reached US\$62 million in 2017-18. About 1500 m<sup>3</sup> of treated effluent is discharged per day from its effluent treatment plant, minimizing environmental pollution. The company spends around US\$40-50,000 per year towards CSR, generating a positive impact through promoting education, health, family welfare and a clean environment. The company has opened a school equipped with library and computer facilities, a skills-development program for women, scholarships for girls and a recreation room for students and employees. A hospital in the mill premises organizes weekly health camps with free check-ups. The mill participates in 3-5 km of link road construction per year. Clean drinking water (>1000 cane farmers/day), sanitation and cafeteria facilities are provided to farmers in the mill premises. The company also participates in the Clean India Mission, agroforestry, conserving and maintaining the quality of natural resources and related programs. These CSR initiatives along with technological advancement during the last 5 years has resulted in an increase in cane area (30.5%), sugarcane yield (19.7%), sugar production (104.5%), sugar recovery (0.91 units) and cane price improvement paid to farmers (94%). Overall, the CSR activities by this mill have enhanced the economic, environmental and social security of the sugarcane growers in the area.*

## **2.2 Discussion**

During the panel discussion questions revolved around the following:

- Difficulties in encouraging adoption of management practices that were aligned with sustainability norms and standards.
- The importance of being able to demonstrate the value and returns offered through adopting best practices was noted. The fact that without a structured technology exchange process, that was facilitated by advisors (extension specialists), the adoption rate was extremely slow.
- The value in defining the revenue streams that might emerge as a result of preserving a biodiverse agricultural landscape.
- The role that economic analyses play in facilitating adoption.
- The importance of collecting robust data, of storing it and making it accessible for analyses. Essentially the need to measure, monitor and analyse the agro-ecological changes/transitions to demonstrate the value of biodiversity and landscape ecology.
- The knowledge required to understand the economic and environmental performance of an agroecosystem.
- The value of being able to model the sugarcane production environment to achieve understanding.

### **3. SESSIONS 2 and 3**

#### **3.1. General Management presentations**

Four paper and five poster presentations made up the balance of the programme. Broad topics included: (a) economic indicators associated with sugar industry performance; (b) knowledge exchange and adoption dynamics; (c) research strategy; and (d) general management tools and principles.

### **4. GENERAL COMMENTS**

It was unfortunate that only two members of the Management Commission were able to attend the congress and hence the Management Workshop and general sessions. I am very grateful for the assistance of Klanarong Sriroth in assisting with facilitation.

It has become the norm that the Management sessions are scheduled on the last day of the congress. While this need not necessarily be a problem, it does mean that the last few sessions become less well attended than those held earlier, and it is suggested that arranging the workshop earlier in the congress programme could be considered.

Despite having agreed a theme for the workshop at the outset, and having called for papers in accordance with this theme in the first announcement, only three papers/posters were submitted to address this theme. Each would have served as an ideal anchor for discussions and workshopping. It was unfortunate therefore when two of these papers were withdrawn at a late stage, necessitating reconsideration of the theme, which resulted in changing it to one that was aligned with other papers and posters that had been submitted. It was fortunate that we were able to do so.

### **5. ACKNOWLEDGEMENTS**

I am grateful for the support and assistance given by the members of the Management Commission in the past three years and for their contributions to discussions on matters pertaining to the commission as and when needed. Thanks are also due to the members of the ISSCT Technical programme Committee for their support and comaraderie over the past six years.

## ISSCT MANAGEMENT COMMISSION WORKSHOP 2019

Thursday 5 September 2019

## Facilitated Panel Discussion Programme

*From agro-ecology to agro-economics: Frameworks for sustainable production*

	<b>AUTHOR and TITLE</b>		<b>TIME</b>
1	<b>Tonatto, Garolera De Nucci, Casen, Ruiz, Romero</b> - Use of energy in sugarcane production in Tucumán, Argentina	5 mins: POSTER	<b>80 minutes</b>
2	<b>Garolera De Nucci, Tonatto, Romero, Cárdenas, Mele</b> - Life-cycle assessment of sugarcane-based ethanol production in Tucumán, Argentina	5 mins: POSTER	
	CLARIFICATION QUESTIONS	5 minutes	
3	<b>Brown, Ullivarri, Paez, Blanco</b> - Protected Productive Landscape of Ledesma S.A.A.I.: Reconciling nature conservation with production in areas of high environmental value	20 mins: PAPER	
4	<b>Auzoux, Scopel, Christina, Poser, Soulié</b> - AEGIS, an extended information system to support agroecological transition for sugarcane industries	20 mins: PAPER	
5	<b>Thitithawonwong, Athipanyakul, Potchanasin</b> - Factors affecting the adoption of the Bonsucro Standard amongst Thai sugarcane farmers	20 mins: PAPER	
	CLARIFICATION QUESTIONS	5 minutes	
	<b>FACILITATED PANEL DISCUSSION</b>		