ISSCT JOINT
12th GERMPLASM & BREEDING
AND
9th MOLECULAR BIOLOGY
WORKSHOPS

IMPROVEMENT OF SUGARCANE
FOR STRESS ENVIRONMENTS

OKINAWA, JAPAN
22-26 OCTOBER 2018
ISSCT Workshops
12th Germplasm & Breeding, 9th Molecular Biology in Okinawa, Japan
22 – 26 October 2018

Organizer
International Society of Sugar Cane Technologists (ISSCT)
Japanese Society of Sugar Cane Technologists (JSSCT)

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Scientific Committee
Germplasm & Breeding Section Chair
Goolam Badaloo: goolam.badaloo@msiri.mu
Mauritius Sugarcane Industry Research Institute (MSIRI), MCIA, Mauritius

Molecular Biology Section Chair
Angélique D'Hont: angelique.dhont@cirad.fr
Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), France

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### Oral presentation abstracts (BO)

| BO1 | Determining breeding values of parental genotypes for sugarcane yield  
* Ntombi Mbuma, Marvellous Zhou*, Rouxline Van der Merwe |
|-----|------------------------------------------------------------------------|
| BO2 | Estimating breeding values in sugarcane breeding using SAS mixed models  
* Marvellous Zhou* |
| BO3 | How to make the best sugarcane crossings managing the flowering time  
* Luciana Gonçalves Chaves Castellani*, Michael Keith Butterfield |
| BO4 | Evaluation of extent of flowering and island pithiness in commercial parent varieties in Mauritius  
* Satish Koonjiah, Goolam Badaloo*, Michael Mangar |
| BO5 | Total antioxidant activity in early generation and commercial sugarcane genotypes in Louisiana’s sugarcane variety development program  
* Anna Hale*, Himaya Mula-Michel, James Todd |
| BO6 | Vegetation index as a parameter for identifying spatial variability zones in early stage selection trials  
* Danilo Eduardo Cursi*, Hermann Paulo Hoffmann, Monalisa Sampaio Carneiro, Roberto Giacomini Chapola, Antonio Ribeiro Fernandes Junior, Matheus Gabriel Acorsi, Márcio dos Anjos, Rodrigo Gazaffi |
| BO7 | Evaluation of crossing combination for improvement of ratoon yield in Tanegashima island, Japan  
* Taiichiro Hattori*, Katsuki Adachi, Michiko Hayano, Makoto Umeda, Takeo Sakaiyaichi, Minoru Tanaka, Yusuke Tarumoto |
| BO8 | Creation of genetic variation and selection for drought tolerance in sugarcane  
* Tanapon Chaisan*, Wannasiri Wannarat, Jetsada Authapun |
| BO9 | Breeding for higher total cane biomass for marginal environments and for year-round harvest in Mauritius  
* Goolam Badaloo*, Deepack Santchurn |
| BO10 | Optimizing genomic selection in sugarcane for phenotyping cost and selection accuracy  
* Kosuke Hamazaki*, Yusuke Ueta, Taiichiro Hattori, Takayoshi Terauchi, Yoshifumi Terajima, Jun-ichi Nagai, Masaaki Mori, Hiroyoshi Ishida |
| BO11 | Use of genomic selection to speed up gains in sugarcane breeding  
* Phillip Jackson*, Xianming Wei, Emily Deomano, Karen Aitken |
| BO12 | Utilizing wild germplasm in sugarcane breeding – progress and prospects  
* Phillip Jackson* |
BO13 Characteristics of intergeneric hybrids between *Saccharum* spp. hybrid and *Erianthus arundinaceus*  
Yoshifumi Terajima*, Pachakkil Babil, Nobuko Ohmido, Masumi Ebina, Shin Irei, Akira Sugimoto, Hiroko Takagi

BO14 Web-based pedigree database for sugarcane breeding  
Yusuke Tarumoto*, Katsuki Adachi, Shin Irei

BO15 Development of mobile application for searching Thai commercial cane varieties  
Ratana Tangwongkit*, Borpit Tangwongkit, Prasit Vongsateam, Jakrit Kun Tong, Thawat Hamarn, Pongsak Chonthanasawad, Lop Phavaphutanon

BO16 Selection for brown rust sugarcane resistant varieties using seedlings from fuzz  
Edison Silva*, Fabrizio Martinez, Tito León, Cervando Madrid, Fabián Fiallos, Roberto Díaz Judrez

BO17 Evaluation of disease resistance in sugarcane crosses in China  
Rong-zhong Yang*, Hui Zhou, Fang Tan, Zhong-feng Zhou, Xiu-peng Song, Shi-yun Tang

BO18 How to improve selection decisions in the first replicated yield trial (RYT) of sugarcane selection programs?  
Jean-Yves Hoarau*, Laurent Barau, Audrey Thong-Chane, Thomas Dumont

BO19 High-throughput UAV platform for early stage selection in sugarcane clonal assessment trials  
Jayampathi Basnayake, Sijesh Natarajan, Xianming Wei, Prakash Lakshmanan

BO20 Investigation of genotype by environment interactions in Louisiana breeding, USA  
James Todd*, Yong-Bao Pan, Collins Kimbeng, Edvis Dufrene, Herman Waguespack, Michael Pontif

BO21 Multi-local selection of sugarcane analyzed with GGE biplots: overview of results at a glance and scope of lessons  
Jean-Yves Hoarau*, Susie Guilly, Laurent Barau, Audrey Thong-Chane, Thomas Dumont

BO22 Genetic variability of yield traits in diverse sugarcane ecologies of selection in Réunion island  
Thomas Dumont, Jean-Yves Hoarau*, Laurent Barau, Audrey Thong-Chane, Bernard Siegmund

BO23 Studying three-way interaction under generalized sites regression model in sugarcane final assessment trials  
Gabriela Estéfano Saraiva Leite, Danilo Eduardo Cursi, Roberto Giacomini Chapola, Hermann Paulo Hoffmann, Rodrigo Gazatti*

BO24 Methodology for selecting sugarcane clones for dry environments  
Zhao Peifang, Phillip Jackson*, Liu Jiayong, Chen Yuekuan, Jaya Basnayake, Prakash Lakshmanan, Zhao Xindong, Fan Yuanhong
Screening of elite sugarcane germplasm for developing high sugar varieties in South India
S. Rajeswari*, S. Parthiban, P. Bharathi, K. Shanmugha Sundaram, S.J. Lakshman

Evaluation of cultivar performance of sugarcane in the temperate area in Japan
Shozo Okada*, Masami Ueno, Yoshinobu Kawamitsu

Performance of selected Phil 2009 series of sugarcane varieties in four mill districts in Luzon

Long-term evaluation of the productivity of sugarcane cultivars in the Daitoh islands, Okinawa
Hiroo Takaragawa*, Eizo Taira, Masami Ueno, Yoshinobu Kawamitsu

Rapid adoption of new varieties through post-release trials in Ecuador
Edison Silva C.*, Fabricio Martínez, David Palomeque, Walter Jara, Glenda Toala

Identifying breeding groups to select sugarcane genotypes according to sucrose accumulation curves
Santiago Ostengo*, Angélica Rueda Calderón, Cecilia Bruno, María I. Cuenca, Mónica Balzarini

Evaluation of the phenotypic diversity for traits related to plant growth and sugar content in a sugarcane germplasm collection
Warodom Wirosirsasak*, Sucharat Butphu, Phunsuk Laotongkum, Chirawat Prasitsom, Laurent Soulard, Prapat Punpee, Peeraya Klomsa-ard

Poster presentation abstracts (BP)

Thai sugarcane promising clone KK07-250

Agronomic traits and root distribution of intergeneric F1 and BC1 hybrids between Saccharum spp. hybrid and Thai Erianthus arundinaceus in North-East Thailand
Ammarawan Tippayawat*, Yoshifumi Terajima, Werapon Ponragdee, Taksina Sansayawichai, Shin Irei, Akira Sugimoto, Shotaro Ando

Breeding new resilient and high yielding sugarcane cultivars for stress environments in Brazil
Geraldo Veríssimo de Souza Barbosa, João Messias Dos Santos*, José Vieira Silva, Lailton Soares, Carlos Assis Díaz, Edjane Gonçalves De Freitas, Adeilson Mascarenhas de Oliveira Silva, Danilo Eduardo Cursi, Hermann Paulo Hoffmann

Seed characterization and preservation for fuz exchange
Edison Silva*, Fabricio Martínez, Tito León, Cervando Madrid, Mayra Valdez, Roberto Díaz Juárez
BP5  Effect of high temperatures on flowering and true seed germination in sugar cane
Maria B. Garcia, Carolina Diaz Romero, Santiago Ostengo*, Jorge Forciniti, Maria I. Cuenda

BP6  Presence of a resistance gene to brown rust (Bru1) in Brazilian varieties and sugarcane clones
Samantha Cenci Jaronski Dos Santos, Lucimeris Ruar, Tales Romano, Joao Carlos Bespalhok Filho*

BP7  Nitrogen use efficiency – a tool for screening drought tolerant sugarcane varieties at early growth stage
Dinh Thai Hoang*, Hiroo Takaragawa, Yoshinobu Kawamitsu

BP8  Selection of energy cane clones by logistic model
J Borella, B P Brasilheiro, Ricardo Augusto De Oliveira, Joao Carlos Bespalhok Filho*

BP9  Association of physiological responses and root distribution patterns to ratooning ability and yield of the 2nd ratoon crop in elite sugarcane clones
Patcharin Songsri*, Saranya Chumphu, Nuntawoot Jongrungklang

BP10 Physiological traits related to high sugar yield of 40 sugarcane genotypes grown under rainfed condition
Patcharin Songsri*, Jiraporn Nata, Nuntawoot Jongrungklang, Nam-aoi Bootprom

BP11 Association of the physiological responses on yield and agronomic traits of 19 sugarcane genotypes grown under rainfed condition
Patcharin Songsri*, Jiraporn Nata, Nuntawoot Jongrungklang

BP12 Leaf anatomical traits of sugarcane F1 hybrid derived from parents having different genetic background
Supaporn Jumkudling*, Worasitikulya Taratima, Patcharin Songsri, Nuntawoot Jongrungklang
9th Molecular Biology section abstracts (MO, MP)

Oral presentation abstracts (MO)

**MO1** Worldwide genetic diversity of *Saccharum spontaneum* and level of diversity captured in a sugarcane breeding program
Karen Atiken*, Jingchuan Li, George Piperidis, Cai Qing, Fan Yuanhong, Phillip Jackson

**MO2** A monoploid reference sequence for the highly complex genome of sugarcane
Olivier Garsmeur, Gaetan Droz, Karen Atiken, Bernard Potier, Marie-Anne Van Sluys, Catherine Hervouet, Edwin van der Vossen, Robert Henry, Jeremy Schmutz, Angélique D'Hont*

**MO3** Identification and characterization of genes responsible for the brown rust resistance (Bru1) effect
Joshi SV*, Lloyd Evans D

**MO4** Analysis of QTL related to resistance to smut disease using Japanese wild sugarcane (*Saccharum spontaneum*)
Masaaki Mori*, Yusuke Ueta, Tatsuro Kimura, Hirokazu Enoki, Takeo Sakaiaguchi, Yusuke Tarumoto, Minoru Tanaka, Taiichiro Hattori, Makoto Umeda, Michiko Hayano, Katsuki Adachi

**MO5** Genome-wide association mapping for traits related to drought tolerance and biomass in sugarcane (*Saccharum spp.*) using EST-SSR markers
Laurent Soulard*, Warodom Wirojsirasak, Nitiya Juabsap, Chirawat Prasitsom, Prapat Punpee, Peeraya Klomsa-ard, Klanarong Siriseth

**MO6** Isolation of specific genomic DNA segments from *E. arundinaceus* and chromosome identification
Yongji Huang, Fan Yu, Ling Luo, Zihu Deng*, Jiayun Wu, Muqing Zhang

**MO7** Mapping cold-tolerant photosynthetic quantitative trait loci in (*Saccharum spontaneum* x *Saccharum spp.*) hybrids for ultimate introgression into sugarcane
Vanessa Gordon*, Wittney Mays, Lindsay Clark, Shailendra Sharma, Chifumi Nagai, Ray Ming, Erik Sacks

**MO8** The developmental stages of sugarcane are equivalent between plants of different chronological ages
Donna Glassop*, Mark P. Hodson, Panagiotis K. Chrysanthopoulos, Anne Rae

**MO9** Transcriptomic characterization and potential marker development of contrasting sugarcane genotypes in response to leaf abscission, resistance to Pokkah boeng and water stress
Shiqiang Xu, Jihu Wang, Heyang Shang, Youzong Huang, Wei Yao, Baoshan Chen, Muqing Zhang*
MO10 Guidelines for commercial release of transgenic sugarcane in Argentina
Aldo Noguer, Ramón Enrique, María Francisca Perera*, Santiago Ostengo, Josefina Racedo, Diego Costilla, Silvia Zossi, Maria Inés Cuynya, Maria Paula Filippone, Björn Welin, Atilio Pedro Castagnaro

MO11 Development of transgenic sugarcane associate with increasing biomass, sugar and stress tolerance in Colombia
Jereshon López*, Hugo Jaimes, Marcela Franco, Isabel Ocampo, Rocio Barrios, Fredy Salazar, Fredy Garcés

Poster presentation abstracts (MP)

MP1 Development of microsatellite markers from sugarcane (Saccharum officinarum L.) Phil 97-3933
John Moises G. Relles*, Rimmon T. Armones, and Antonio C. Laurena

MP2 Assessment of genetic diversity of first priority parentals of the sugar regulatory administration
John Moises G. Relles*, and Antonio C. Laurena

MP3 Transcriptomic analysis of sugarcane callus in response to an Agrobacterium-mediated transformation process
Elaine Cristina Alexandre, Leonardo Cardoso Alves, Renato Vicentini*, Monalisa Sampaio Carneiro*

MP4 Length and nucleotide sequence polymorphism at the trnL and trnF non-coding regions of chloroplast genomes among Saccharum and Erianthus species
Yong-Bao Pan*, James R. Todd, Brian E Scheffler, Lionel Lomax, Sheron Simpson, Fanny Liu, Michael P. Grisham

MP5 Presence of a resistance gene to brown rust (Bru1) in Brazilian varieties and sugarcane clones
Samantha Cenci Jaronski Dos Santos, Lucimeris Ruaro, Tales Romano, Joao Carlos Bespalhok F*

MP6 Improvement of sugarcane for stress environments in South Africa
Watt DA*

MP7 Comprehensive transcriptome analysis reveals genes in response to water deficit in the growing point of Saccharum
Hui Zhou*, Rong-zhong Yang, Xi-hui Liu, Yang-rui Li

MP8 A molecular identity database of sugarcane (Saccharum spp.) clones constructed with microsatellite (SSR) DNA markers
Yong-Bao Pan*, James Todd, Brian E. Scheffler, Lionel Lomax, Sheron Simpson, Edwin Dufre, Anna Hale, Michael Grisham, Herman Waguespack Sr., Atticus Finger
GENETIC VARIABILITY OF YIELD TRAITS IN DIVERSE SUGARCANE ECOLOGIES OF SELECTION IN RÉUNION ISLAND

Thomas Dumont¹, Jean-Yves Hoarau¹*,², Laurent Barau¹, Audrey Thong-Chane¹, Bernard Siegmund¹

¹eRcane, 29 rue d’Emmerez de Charmoy, 97 494, La Bretagne, Réunion island, ²CIRAD, UMR Agap, F-34 398 Montpellier, France.

*hoarau.jean-yves@er cane.re

eRcane currently operates in Réunion several decentralized concurrent sub-selection programmes located in the major areas under cane differing in their agro-climatic conditions. Each year about 100,000 new seedlings are dispatched among the different sub-programs which receive mainly the same families. This early decentralized scheme of selection corresponds to a selection strategy for local adaptation with the objective of increased genetic gains in each environment. Seedlings enter into the same 14-years selection scheme across all sub-programs: two non-replicated stages followed by three replicated yield trials (RYT) stages dedicated to the evaluation of cane yield (CY), estimable recoverable sugar (ERS) and an economic index (EI). The selection scheme is strictly the same across all sub-programmes (trial designs, rate of selection between stages, selection criteria and procedures). A database of 10 years trial was used in order to compare the genetic variability of agronomic traits of interest (CY, ERS and EI) in the second RYT between four regional sub-programmes. Two selection sites are located in the wet windward coast (La Mare: LM and Saint-Benoit: SB) of the island and two others in the dry leeward coast (Vue-Belle: VB and Etang-Salé: ES). The objective of this retrospective study was to compare the effect of selection pressure exerted on genotypes by the different agro-climatic environments of the selection sites. Mean genetic coefficient of variation (GCV%) across the ten series and range [min-max] of variety performances for CY distinguished clearly SB and VB sites from LM and ES sites: (i) mean GCV% for CY was higher at SB (15.5%) and VB (15.8%) compared to LM (13.7%) and ES (11.3%); (ii) congruently, the [min-max] range of CY performance of candidates was wider and better centered on the standard cultivar at SB ([45%-152%]) and VB ([35%-173%]) compared to LM ([42%-123%]) and ES ([50%-116%]). These results reflect higher chances of identifying new cultivars in SB and VB in the subsequent final RYT and in semi-commercial tests before release. These larger genetic variabilities of CY in SB and VB compared to LM and ES could be related to agro-climatic differences between selection sites. As opposed to SB and VB, LM and ES are under irrigation. Moreover, LM, SB and ES are at a low altitude synonymous with high temperatures favorable for cane growth. On the contrary, the high altitude of VB site (700 m) implies a seasonal thermal stress (from April to September) less favorable for plant growth. SB has a very stony soil and a relatively fine layer of topsoil (0.25 m) which dries more quickly due to a smaller water reserve. On the contrary LM, VB and ES are not stony and have deeper topsoil layers (>0.50-1.00 m). All these agro-climatic comparisons show that the most favorable environments for cane growth (LM and ES) tend to buffer the differences between candidates for their yield potential. Conversely, in less favorable environments due to water stress (VB, SB) and/or soil characteristics (SB), identification of true superior varieties in cane yield seems easier.

Keywords: Local adaptation, Genetic variabilities, Yield components