ABSTRACT

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IMPROVEMENT OF SUGARCANE FOR STRESS ENVIRONMENTS

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Oral presentation abstracts (BO)

**BO1**  Determining breeding values of parental genotypes for sugarcane yield
_Ntombi Mbuma, Marvellous Zhou*, Rouxlene 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 Koonjah, 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
_Taishiro Hattori*, Katsuki Adachi, Michiko Hayano, Makoto Umeda, Takeo Sakaigaichi, 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, Taichiro Hattori, Takayoshi Terauchi, Yoshifumi Terajima, Jun-ichi Nagai, Masaaki Mori, Hiroyoshi Iwata_

**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*
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

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

Development of mobile application for searching Thai commercial cane varieties
Ratana Tangwongkit*, Borpit Tangwongkit, Prasit Vongsateam, Jakgrit Kuntong, Thawat Hamarn, Pongsak Chonthanasawad, Lop Phavaphutanon

Selection for brown rust sugarcane resistant varieties using seedlings from fuzz
Edison Silva*, Fabricio Martínez, Tito León, Cervando Madrid, Fabián Fiallos, Roberto Díaz Juárez

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

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

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

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

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

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

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

Methodology for selecting sugarcane clones for dry environments
Zhao Peifang, Phillip Jackson*, Liu Jiayong, Chen Xuekuan, Jaya Basnayake, Prakash Lakshmanan, Zhao Xindong, Fan Yuanhong
BO25  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

BO26  Evaluation of cultivar performance of sugarcane in the temperate area in Japan
Shozo Okada*, Masami Ueno, Yoshinobu Kawamitsu

BO27  Performance of selected Phil 2009 series of sugarcane varieties in four mill districts in Luzon

BO28  Long-term evaluation of the productivity of sugarcane cultivars in the Daitoh islands, Okinawa
Hiroo Takaragawa*, Eizo Taira, Masami Ueno, Yoshinobu Kawamitsu

BO29  Rapid adoption of new varieties through post-release trials in Ecuador
Edison Silva C.*, Fabricio Martinez, David Palomeque, Walter Jara, Glenda Toalla

BO30  Identifying breeding groups to select sugarcane genotypes according to sucrose accumulation curves
Santiago Ostengo*, Angélica Rueda Calderón, Cecilia Bruno, María I. Cuency, Mónica Balzarini

BO31  Evaluation of the phenotypic diversity for traits related to plant growth and sugar content in a sugarcane germplasm collection
Warodom Wirojsirasak*, Sucharat Butphu, Phunsuk Laotongkum, Chirawat Prasitsom, Laurent Soulard, Prapap Punpee, Peerya Kiomsa-ard

Poster presentation abstracts (BP)

BP1  Thai sugarcane promising clone KK07-250

BP2  Agronomic traits and root distribution of intergeneric F1 and BC1 hybrids between Saccharum spp. hybrid and Thai Erianthus arundinaceus in North-East Thailand
Amarawan Tippayawat*, Yoshifumi Terajima, Werapon Ponragdee, Taksina Sansayawichai, Shin Irei, Akira Sugimoto, Shotaro Ando

BP3  Breeding new resilient and high yielding sugarcane cultivars for stress environments in Brazil
Geraldo Verissimo de Souza Barbosa, João Messias Dos Santos*, José Vieira Silva, Laliton Soares, Carlos Assis Dinz, Edjane Gonçalves De Freitas, Adelison Mascarenhas de Oliveira Silva, Danilo Eduardo Cauri, Hermann Paulo Hoffmann

BP4  Seed characterization and preservation for fuzz exchange
Edison Silva*, Fabricio Martinez, 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 Ruaro, 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 Brasileiro, 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 Jankudling*, Worasitikulya Taratima, Patcharin Songsri, Nuntawoot Jongrungklang
Oral presentation abstracts (MO)

**MO1**
Worldwide genetic diversity of *Saccharum spontaneum* and level of
diversity captured in a sugarcane breeding program
Karen Aitken*, 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 Droc, Karen Aitken, Bernard Potier, Marie-Anne Van
Shuys, 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, Hiroyuki Enoki, Takeo
Sakaiachi, 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-arvd, Klanarong Srooth

**MO6**
Isolation of specific genomic DNA segments from *E. arundinaceus*
and chromosome identification
Yongji Huang, Fan Yu, Ling Luo, Zuhu Deng*, Jiayan 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*, Witney 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, Jihua Wang, Heyang Shang, Youzong Huang, Wei Yao,
Baoshan Chen, Muqing Zhang*
MO10  Guidelines for commercial release of transgenic sugarcane in Argentina
Aldo Noguera, Ramón Enrique, María Francisca Perera*, Santiago Ostengo, Josefina Racedo, Diego Costilla, Silvia Zossi, Maria Inés Cuenny, Maria Paula Filippone, Björn Welin, Atilio Pedro Castagnaro

MO11  Development of transgenic sugarcane associate with increasing biomass, sugar and stress tolerance in Colombia
Jershon López*, Hugo Jaimez, 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, Edwis Dufrene, Anna Hale, Michael Grisham, Herman Waguespack Sr., Atticus Finger
MULTI-LOCAL SELECTION OF SUGARCANE ANALYZED WITH GGE BIPLOTS: OVERVIEW OF RESULTS AT A GLANCE AND SCOPE OF LESSONS

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Multi-environment trials (METs) represent the final stage of breeding programs prior to the commercial release of new varieties. Optimized analysis of METs impact genetic gains subsequently delivered to cane growers. The information provided by METs can be large and therefore complex to analyze and interpret when considering many environments of selection. An overview and a comprehensive interpretation of METs can be laborious on the sole basis of many tables of summary data and quantitative analyses of yield components. A complementary approach to interpreting many tables of figures can be obtained using "Genotype main effect plus Genotype-by-Environment" (GGE) analysis. The two-way data table of adjusted genotype means x locations is first standardized by environment. The resulting "standardized GGE matrix" of genotype main effect (G) and genotype x environment interaction (GE) is then subjected to a singular value partitioning between the genotype and environment eigenvectors. Genotypes and environments are represented on biplots defined by axes representing the most significant principal components (PCs). In order to assess effectiveness of GGE biplots to analyze sugarcane METs of Réunion Island, GGE analysis was performed on 21 sugarcane varieties tested in the MET network of eR cane that consists of seven sites of selection. These sites cover a wide range of ecologies of production representative of the main sugarcane growing areas of the industry. Varieties were assessed during two crop-cycles for tonne cane per hectare (TCH), estimable recoverable sugar (ERS), fiber content (FIB) and an economic index (EI). A biplot represented by both PC1 and PC2: (i) adequately approximated the total GGE variation of TCH (76.52%) and ERS (71.55%) data, (ii) represented very accurately the GGE data of FIB (90.23%) and (iii) represented less efficiently the GGE data of EI (63.41%). Such two-dimensional GGE biplots of genotypes and locations permitted to visualize at a glance: (i) congruent scatterings of genotypes on trait biplots for traits linked by significant positive (TCH and EI) or negative (TCH and ERS) correlations; (ii) a succinct summary of interrelationships among environments; (iii) best performing candidates and reliable rankings of genotypes in each environment; and (iv) the ranking of mean performance and stability of genotypes across environments. This GGE biplots graphical statistical tool permits to grasp a large scope of lessons relative to multi-local selection in the particular context of eR cane programme and provide a useful tool to rapidly assist decision-making at the time of selection.

Keywords: Multi-environment trials (METs), Genotype main effect plus Genotype-by-Environment (GGE) biplot