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7. Title

Improved Sugarcane Cultivars for Louisiana through the Identification of Superior Parents, Crosses and Seedlings

12. Investigator Name(s) (Last Name and Initials)

Kimbeng, C. A.

20. Termination Date 09/30/2013	40. Period Covered (mo/da/year): 01/01/2011 TO 12/31/2011

Outputs:

Results from this research were publicized at conferences, and through publications in refereed journals and book chapters.

Outcomes/Impacts:

Results from these studies are being used in the sugar breeding program to facilitate the development of new, sugarcane varieties for the Louisiana sugar industry. Variability for starch content among parental genotypes was found to be under genetic control. Based on these results, selection among progeny derived from parents with low starch content led to progeny with reduced starch levels when compared with the parents. Those progenies with agreeable agronomic characteristics have been retained for further evaluation in more advanced stages of the program. One of two populations that were developed for linkage and QTL mapping was discarded because of its susceptibility to sugarcane smut disease caused by the fungus, Ustilago scitaminea. The other population consisting of 300 genotypes developed by selfing the cultivar LCP 85-384 has been genotyped using AFLP, TRAP and SSR markers as well as evaluated for traits of commercial interest in replicated field trials. A framework genetic linkage map has been constructed and is being saturated with more markers to render it more useful for QTL discovery. Additionally, genetic diversity analyses were conducted to understand the structure of diversity among sugarcane germplasm used in the breeding program. Alternate statistical methods for analyzing and interpreting data from routine sugarcane breeding trials continue to be developed and tested. A new statistical analysis technique known as random coefficient model was tested for family selection in sugarcane. The method proved to be superior to currently used statistical methods in identifying superior families during seedling selection.

Publications:

Zhou, M., C. Kimbeng, S. Edme, A. Hale, R. Viator, G. Eggleston. 2010. Sustainability of Low Starch Concentrations in Sugarcane through Short-Term Optimized Amylase and Long-Term Breeding Strategies. In: Eggleston, G., editor. Sustainability of the Sugar and Sugar-Ethanol Industries, ACS Symposium Series 1058. Washington, DC: American Chemical Society. P. 229-250.

Zhou, M., C. Kimbeng, T. Tew, K. Gravois, M. Pontiff. 2011. Artificial Neural Network Models as a Decision Support Tool for Selection in Sugarcane: A Case Study Using Two Seedling Populations. Crop Science 51: 1-11.

Parco, A., J. Arro, S. Patil , L. Bernaola, C. Kimbeng, N. Baisakh 2011. Genetic Diversity of Commercial Sugarcane Cultivars of Louisiana Analyzed Using SSR Markers American Society of Sugarcane Technologists Program and Abstract. The 41st Annual Joint Meeting, held June 8 - 10, 2011 at the Sheraton New Orleans, LA (P59).

Zhou, M., C. Kimbeng, S. Andru, T. Tew and K. Gravois. 2011. Random Coefficient Model: A Statistical Tool for Family Selection in Sugarcane. American Society of Sugarcane Technologists Program and Abstract. The 41st Annual Joint Meeting, held June 8 - 10, 2011 at the Sheraton New Orleans, LA (P59).

Liu, P., Y. Que, S. Andru, C. Kimbeng and Y. Pan. 2011. A LCP 8-8 Genetic Linkage Map Enriched with Polymorphic SSR Markers. American Society of Sugarcane Technologists Program and Abstract. The 41st Annual Joint Meeting, held June 8 - 10, 2011 at the Sheraton New Orleans, LA (P57).

Zhou, M., C. Kimbeng, T. Tew, M. Shoko. 2011. Trends in Starch and Sucrose Content among Sweet Sorghum Genotypes and Implications for Sucrose and Ethanol Production. J. of Agri. Science and Technol. 5: 161-167.

Andru S., K. Ali, J. Arro, A. Parco, C. Kimbeng, N. Baisakh. 2011. Molecular Diversity Among Members of the Saccharum Complex Assessed Using TRAP Markers Based on Lignin-Related Genes. Bioenergy Research. DOI 10.1007/s12155-011-9123-9.

Andru S., Y. Pan, S. Thongthawee, D. Burner, C. Kimbeng. 2011. Genetic analysis of the sugarcane (Saccharum spp.) cultivar LCP 85-384. I. Linkage mapping using AFLP, SSR, and TRAP markers. Theoretical and Applied Genetics. 123: 77-93.

Gravois, K., K. Bischoff, M. Pontif, C. LaBorde, J. Hoy, T. Reagan, C. Kimbeng, B. Legendre, G. Hawkins, D. Sexton, D. Fontenot. 2011. Registration of L 01-299 sugarcane. Journal of Plant Registrations. 5:191-195.

Participants:

Collins Kimbeng (PI), Kenneth Gravois, Michael Pontif, Niranjan Baisakh, and Arnold Parco, LSU AgCenter; Thomas Tew, Yong-Boa Pan, Anna Hale, Ryan Viator, Ping Liu, USDA-ARS, Sugarcane Research Laboratory, Houma, LA; Serge Edme, USDA-ARS, Sugarcane Field Station, Canal Point, Fl; Jie Arro, Lina Bernaola, Suman Andru, Marvellous Zhou, graduate students; Songkran Thongthawee, Center for Agricultural Biotechnology, Kasetsart University, Thailand; Kazim Ali, National Institute for Biotechnology and Genetic Engineering, Faisalabad, Pakistan; Sanjay Patil, Sankeshwar, India.

Target Audiences:

Plant breeders, sugarcane growers and sugarcane researchers.

Project Modifications:

Nothing significant to report during this reporting period.

Approved (Signature)	Title	Date