

TEXAS A&M PLANT BREEDING BULLETIN -- May 2013

Our Mission: Educate and develop Plant Breeders worldwide.

Our Vision: Alleviate hunger and poverty through genetic improvement of plants.

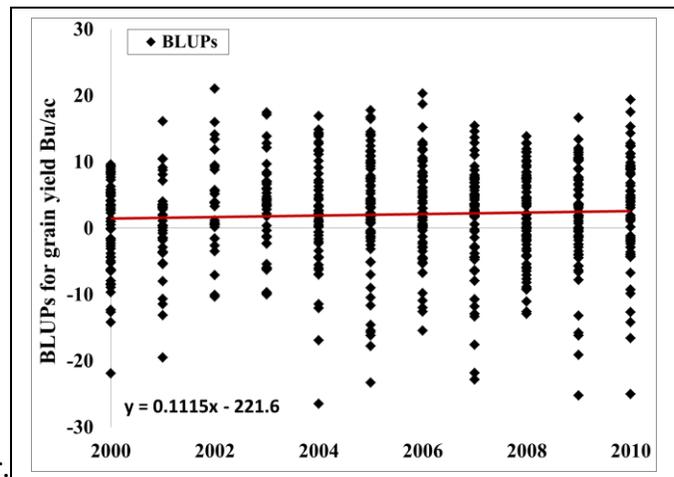


Ivan D. Barrero is a Ph.D. student in plant breeding in Texas A&M under the direction of Dr. Seth Murray. He began his Ph.D. program in January, 2011 and will graduate in August.

Ivan is from Bucaramanga, a middle-size city in Colombia. He received his bachelor degree at the Universidad Industrial de Santander in Biology in 2007 and his M.S. from Purdue University in 2010 under the direction of Dr. Mitch Tuinstra. His thesis research involved the identification of a stable *dw3-sd2* allele that prevents *dw3*, one of the four dwarf genes in sorghum, from reverting back to the wild type *Dw3*, resulting in tall and less productive sorghum plants. A patent has been filed for this gene/trait. After his M.S., he worked for eight months as a maize product development intern with Pioneer Hi-Bred in Windfall, IN. Ivan impressed the folks at Pioneer sufficiently to receive a Valdo Puskaric Pioneer Hi-Bred Plant Breeding Fellowship to work on his Ph.D. with Dr. Seth Murray at Texas A&M University.

Ivan chose two of his projects based on his interest in quantitative genetics, statistics and the analysis of large and complex datasets. The first project involved analyzing a large multi-environment trial (MET) dataset of the maize performance trials conducted by the Texas AgriLife Crop Testing group over 16 locations and 11 years. Mr. Barrero compiled and investigated these data to elucidate past trends and hopefully provide guidance for Dr. Murray's corn breeding program, as well as others, relative to improving maize yields in Texas. After

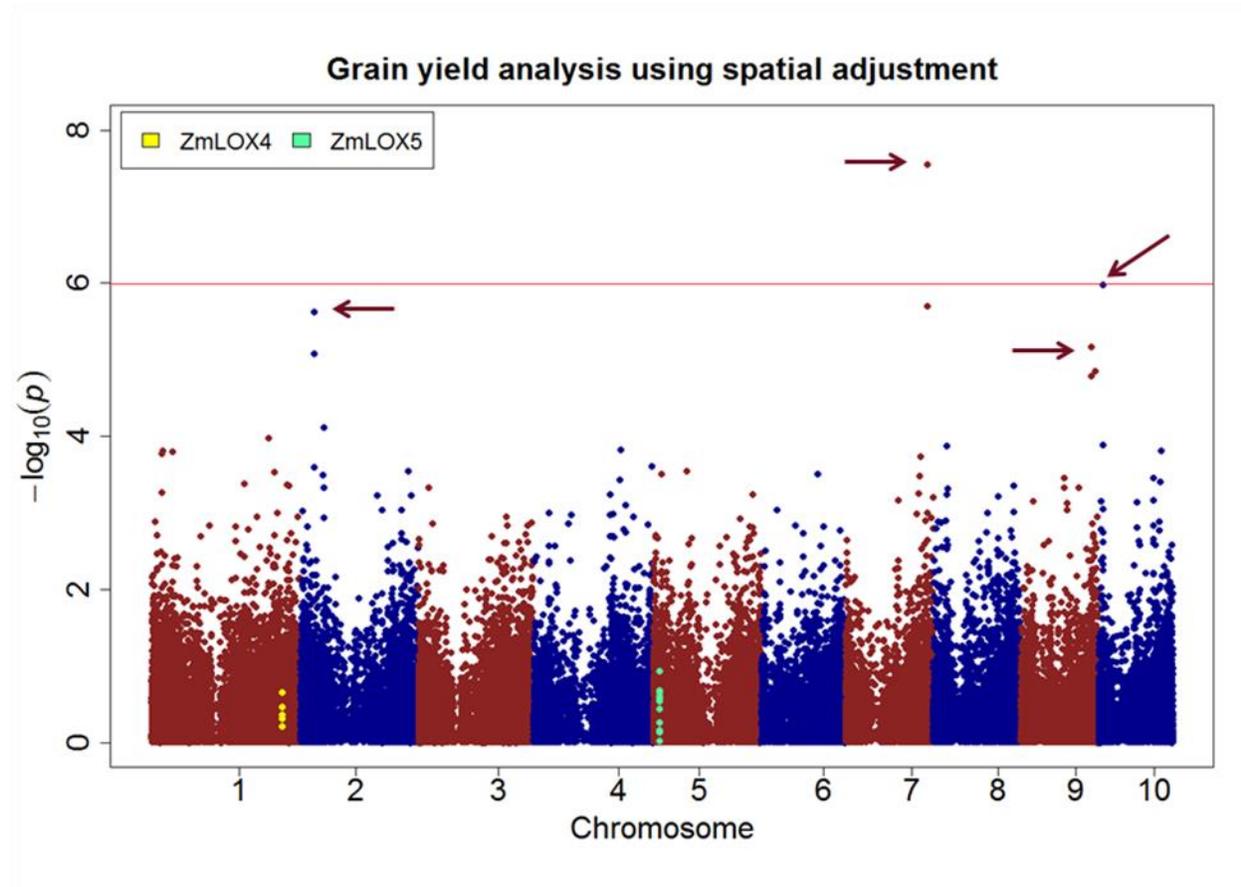
fitting a linear mixed model that accommodates different error residual variance per location, the Best Linear Unbiased Predictors (BLUPs) for the hybrid effect were regressed against the first year of testing. His study found that corn grain yield in Texas has increased 0.11 bu/ac per year, considerably different than other studies for the Midwest that have reported a grain yield gain of 1.1 bu/ac per year.



Additionally, Ivan found that data collected on an annual basis is valuable in retrospective meta-analyses to provide insights into traits, patterns, and processes that can further improve regional yields. This project is completed and the results will be published this year in *Field Crops Research*.

Ivan's second project was about a candidate gene and genome wide association study for drought tolerance and aflatoxin resistance in maize. The major obstacles for corn producers in Texas are drought stress and aflatoxin infection caused by the fungus *Aspergillus flavus*. Previous research showed that maize lipoxygenase gene mutants, *zmlox4-8::mu* and *zmlox5-3::mu* exhibit greater resistance to drought stress and aflatoxin accumulation, respectively. The native alleles of these loci were evaluated in a candidate gene association mapping analysis for drought and aflatoxin resistance. Naturally occurring variants at *Zmlox4* and *Zmlox5* were identified and crossed to two LOX family knock-out-mutant isogenic lines in the Tx714 (Betran et al. 2004. Crop Sci. 44:1028) background (Tx714*zmlox4-8::Mu/zmlox4-8::Mu* and Tx714*zmlox5-3::Mu/zmlox5-3::Mu*). The hybrids (*ZmLOX4/zmlox4-8::Mu*) were evaluated under well-watered and drought conditions during 2011 and 2012, while the *ZmLOX5/zmlox5-3::Mu* hybrids were evaluated under well-watered conditions, inoculated with *A. flavus*, and the aflatoxin content determined. Grain yield and other important agronomic traits were collected for all hybrids and entries in the study. The candidate gene association study suggested that *zmLOX5* is associated with plant and ear height, an association that was stronger under drought than under well watered conditions. Several QTL variants for grain yield, days to silk and days to flower, ear and plant height were identified. For example, a QTL variant identified on chromosome 2 effected a 3 to 8 bu/ac increase in yield. A QTL variant in chromosome 7 exhibited a pleiotropism and influenced

several traits. Dr. Murray will validate many of the QTLs identified by Ivan and integrate them in current maize inbred lines in Texas.



Ivan is graduating this summer of 2013 and he is going to start a position as corn breeder for the 90-105 maturity group at AgReliant Genetics in Kirkland, IL. Ivan enjoys time spent time with wife and two kids, computers and electronics, reading about politics and technology, and dancing salsa or merengue.

Recent campus visitors with the Plant Breeding graduate students:

Dr. Wenwei Xu: Corn Breeder with Texas A&M AgriLife at Lubbock

Dr. David Becker: Head of U.S. Breeding, Cotton and Rice—BayerCrop Sci.

Mr. Steve Carlson: Monsanto Technology Development

Dr. Shahal Abbo: Professor, Plant Breeding, Hebrew Univ., Jerusalem, Israel

Dr. Randall Wisser: Assistant Professor of Plant Genetics; Univ. of Delaware

Dr. Donn Cummings: Monsanto

Dr. Brian Gardunia: Corn Breeder, Monsanto

Upcoming Meetings:

NAPB Annual Meeting, June 2-5, 2013 in Tampa, FL

The annual meeting is an opportunity for breeders and allied scientists to stay updated on recent innovations in plant science and to discuss public policy issues relevant to plant breeding. The meeting also provides an important venue for graduate students to present their research, meet with potential employers, and become acquainted with plant breeding graduate students from other universities. This year's meeting will be hosted by the University of Florida.

More information and registration for the meeting is available at www.plantbreeding.org.

NAPB is an organization of public and private sector individuals associated with or interested in the science or business of plant breeding. It is a strong proponent for maintaining and enhancing public plant breeding and plant breeding education programs.

NABC 25, June 4-6, 2013 in College Station, TX

The 25th meeting of the North American Biotechnology Conference will be held on the campus of Texas A&M University at the George Bush Presidential Library from 4 to 6 June. This meeting brings together academic researchers, government officials and industry leaders to discuss the roles of genomic sciences, regulatory policy and related topics in an attempt to catalyze progress and realize opportunities for improving agriculture, especially as it relates to specialty crops. Keynote speakers will be Roger Beachy, President Emeritus of the Donald Danforth Plant Sciences Center, Brett Giroir, Vice Chancellor for Strategic Initiatives at Texas A&M University, and Texas Commissioner of Agriculture Todd Staples. Topics discussed will deal with sweet corn, citrus greening resistance, potatoes, vegetables, and regulatory issues. Additional information can be found at <http://nabc25.tamu.edu>.

Distance Education in Plant Breeding at Texas A&M University

This program is an extension of the existing Plant Breeding programs offered by the Department of Soil and Crop Sciences and the Department of Horticultural Science at Texas A&M



University. We offer a non-thesis option M.S., thesis option M.S., and Ph.D. in Plant Breeding completely at a distance to students unable to study on-campus in a traditional setting. This program is designed for individuals employed in private industry, CGIAR centers, government agencies, non-government organizations, and other agriculture professionals who need and desire additional knowledge and training in plant breeding but cannot relocate to a university campus. Distance

Education students will take advantage of the same curriculum available to on-campus students with identical course content and professors. Our unique program is designed to deliver a high quality plant breeding education to students across the globe. No campus visit is required. For more information visit <http://soilcrop.tamu.edu/academics/distance-education/> or contact LeAnn Hague, Distance Education Coordinator in Soil and Crop Sciences at leann.hague@tamu.edu or (979)845-6148.

Continuing Education in Plant Breeding at Texas A&M University

We have received approval from the College of Agriculture and Life Sciences at Texas A&M to deliver continuing education courses in plant breeding and genetics to clientele interested in gaining new information in plant breeding or simply seeking refresher courses. This program is designed for individuals employed in private industry, CGIAR centers, government agencies, non-government organizations, and other agriculture professionals who need and desire additional knowledge and training in plant breeding but who are not interested in an additional academic degree. A professional certificate can be a part of this program.

Please direct comments concerning this bulletin to Wayne Smith, cwsmith@tamu.edu or 979.845.3450.