TEXAS A&M PLANT BREEDING BULLETIN

October 2014

Our Mission: **Educate and develop Plant Breeders worldwide**
Our Vision: **Alleviate hunger and poverty through genetic improvement of plants**

The Texas A&M AgriLife Research turf breeding program led by Dr. Ambika Chandra has a long history of releasing improved zoysiagrass and bentgrass plus a minor emphasis on Buffalograss. Ambika assumed leadership of the program in 2007 and has been working on developing resource-efficient cultivars of zoysiagrass, St. Augustinegrass and hybrid bluegrasses. Dr. Chandra's discussion of her program can be viewed at http://soilcrop.tamu.edu/newsletters_bulletins/plant_breeding/chandra/chandra.html**. Ambika provided the following description of her work.**

Zoysiagrasses: There is renewed interest in the use of zoysiagrass in the southern U.S. and the transition zone, mainly because of its low-input requirements and persistence under a range of environmental stresses. Zoysiagrass is touted as a "grass of the future" because of its ability to survive and perform to an acceptable level with limited resources and low maintenance budgets. The Texas A&M AgriLife Research Center has a collection of approximately 850 genetically-diverse zoysiagrass accessions, providing an excellent foundation for our breeding work. Recurrent droughts and, consequently, water restrictions for turfgrass irrigation has intensified the need to develop cultivars that demand less water for acceptable performance. In general, warm-season turfgrasses have higher water-use efficiency than cool-season turfgrasses, and serve as a viable alternative, especially in the transition zone. Prolonged freezing temperatures in the transition zone,

however, can be detrimental to the survival of many warm-season turfgrasses, as evidenced by the winter of 2013-2014.

We have been partnering with Kansas State University since 2004 to develop and evaluate zoysiagrasses adapted to the transition zone. We have developed and jointly released a cold hardy cultivar of *Z. japonica* named 'Chisholm'. Chisholm has a texture coarser than 'Meyer' (industry standard for the transition zone), and freezing tolerance equivalent to, or slightly poorer than Meyer but it is superior to Meyer for establishment rate from vegetative plugs, turfgrass quality, growth under shade, fall color, resistance to bluegrass billbug, zoysiagrass mite, take all patch, recovery from divots, and seedhead production (fewer produced). We believe that improvement over Meyer in these traits potentially will increase the utility of zoysiagrass in the transition zone. Chisholm is well suited for use on home lawns and golf courses, particularly those areas in zones 6b or higher on the USDA Plant Hardiness Zone map.

St. Augustinegrass: This is a popular shade tolerant warm-season turfgrass grown in the southern and southeastern United States. The St. Augustinegrass breeding project at Texas A&M AgriLife has been ongoing since 2003 as a result of funding support from the Turfgrass Producers of Texas. This breeding effort, and years of evaluation at several locations, has resulted in the identification of DALSA 0605 for commercial release. DALSA 0605 is an interploid hybrid [diploid (2n = 18) x triploid (2n = 27)] developed using embryo rescue and is highly sterile, a trait desirable in sod production. This new hybrid St. Augustinegrass maintains its color and turfgrass quality under prolonged drought stress conditions and has deep rooting potential, similar to 'Floratam'. This, combined with its rapid recovery following long drought periods, makes DALSA 0605 well-suited for lawns and landscapes, where frequency and amounts of water are restricted for irrigation. DALSA 0605 is highly tolerant to gray leaf spot disease. In addition, it shows the antixenosis form of resistance to southern chinch bugs, which means reduced levels of fecundity and juvenile development of the pest. After experiencing the extremely cold winter of 2013-2014, we observed that the cold tolerance of DALSA 0605 is better than Floratam, and similar to 'Raleigh' St. Augustinegrass as far north as Dallas. We believe that the drought-, disease-, insect- and cold-tolerance of DALSA 0605 will result in

significant savings of resources and maintenance costs for growers and end-users going forward.

In 2010, Texas A&M AgriLife Research received funding from USDA- NIFA (SCRI) for the development and commercialization of drought- and salinity-tolerant turfgrass species for the southern and southeastern United States. This is an ongoing collaboration between Texas A&M AgriLife, North Carolina State University, University of Georgia, Oklahoma State University, and the University of Florida. A team of breeders, Extension specialists and physiologists is working to improve bermudagrass, St. Augustinegrass, zoysiagrasss, seashore paspalum, and ryegrass. All participating universities are breeding, conducting field trials of these grasses, and making selections of lines that have survived the extreme weather conditions of the past three to four years. Exceptionally hot and dry summers of 2011 and 2012 in Oklahoma and Texas, and the unusually cold winter of 2013-2014 have resulted in good phenotypic separation of different species as well as different genotypes within each species. The data being collected and analyzed will enable us to make selections based on the performance of lines under varying environmental conditions. Three promising bermudagrasses and more than 10 zoysiagrasses from this cooperative breeding program have been entered into the 2013 NTEP for advanced testing.

Hybrid bluegrass: Another breeding objective is to develop turf-type interspecific hybrids between dioecious Texas bluegrass and apomictic Kentucky bluegrass adapted to the southern United States. The intent is to combine the heat and drought tolerance characteristics of Texas bluegrass with visual aesthetics of Kentucky bluegrass and develop year-around green cultivars. DALBG 1201 is an F1 hybrid bluegrass cultivar (Meeks et al. 2014) developed by the breeding team at the Dallas Center and evaluated for performance at Auburn, AL, Dallas, TX, Knoxville, TN, Raleigh, NC and Starkville, MS, as a result of funding support from NGTurf. It is a cool-season grass recommended for use in home lawns, landscape, and other recreational sites across the southern United States. It has exceptional turfgrass quality, dark green color, high shoot density, medium-fine leaf texture, and persistance under a range of environmental stresses typically encountered in the southern U.S. such as heat and drought stress.

In closing, turfgrass industry is a multi-billion dollar industry in the U.S. ($40 billion annual value), and apart from imparting several socio-economic benefits such as increase in property value by 5 to 11%, improve commercial appeal, enhance physical and mental health, community recreation and sports, family lawn activities, and added beauty and comfort in our lives, a healthy turfgrass system also imparts several environmental benefits – enhances heat dissipation (on a hot summer day, lawns will be 30 degrees cooler than asphalt and 14 degrees cooler than bare soil) and provides a cooling effect (a football field or the front lawns of eight houses has the cooling capacity of a 70 ton air conditioner; an average home has an air conditioner with 3 to 4 ton capacity), energy saving (reducing the energy input and costs required for the mechanical cooling of interiors of adjacent homes and buildings), helps with water conservation by reducing runoff and improving ground water recharge, air cleansing (a 2,500 sq. ft. of turf area produces enough oxygen to meet the everyday needs of a family of four), reduces soil erosion, and provides a safer playing surface. The goal of our breeding program is to develop sustainable and environmentally friendly cultivars of turfgrasses that can survive and perform with limited and diminishing supply of natural resources while allowing us to enjoy these benefits and improve the overall quality of life.

References:

1. **Chandra, A., A. D. Genovesi, B. G. Wherley, S. P. Metz, J. A. Reinert, Y-Z. Wu, P. Skulkaew, M.C. Engelke, D. Hargey, L. R. Nelson, B. M. Schwartz, P. L. Raymer, Y. Q. Wu, D. L. Martin, S. R. Milla-Lewis, G. Miller, K. E. Kenworthy and P. Munoz. 2014. Registration of DALSA 0605 St. Augustinegrass. Journal of Plant Registration (accepted).**
2. **Chandra, A., J. D. Fry, M. C. Engelke, , A. D. Genovesi, B. G. Wherley, J. A. Reinert, M. L. Binzel, S. P. Metz, Q. Zhang, D. Okeyo. 2014. Registration of Chisholm Zoysiagrass. Journal of Plant Registration (accepted).**
3. **Genovesi, A. D., R.W. Jessup, M. C. Engelke and B. L. Burson. 2009. Interploid St. Augustinegrass [*Stenotaphrum secundatum*(Walt.) Knutze] hybrids recovered by embryo rescue. In Vitro Cell. Dev. Biol.-Plant 45(6): 659-666.**

4. **Meeks, M., A. Chandra, S. Metz, A.D. Genovesi, J. Read and R. White. 2014. Registration of DALBG 1201 hybrid bluegrass. Journal of Plant Registration (accepted).**

The Specialty Crops Research Initiative (SCRI) breeding nursery at Dallas, TX on July 22, 2013, 10 days into the dry-down.

The zoysiagrass breeding nursery on September 12, 2013 after eight weeks of dry-down

The St. Augustinegrass breeding nursery on September 12, 2013 after eight weeks of dry-down

The St. Augustinegrass breeding nursery on June 6, 2014, showing winter damage and recovery

Ambika Chandra observing the breeder's fields of DALSA 0605 in Boling, TX.

Continuing and Distance Education in Plant Breeding at Texas A&M

Continuing education course modules in plant breeding and genetics, and related disciplines are available from Texas A&M University 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. No campus visit is required. Course modules currently available can be found at (https://scsdistance.tamu.edu/continuing-education-courses/**).**

For more information visit https://scsdistance.tamu.edu/ or contact LeAnn Hague, Distance Education Coordinator in Soil and Crop Sciences at leann.hague@tamu.edu or (979)845-6148.

Distance Plant Breeding M.S. and Ph.D. degree programs at Texas A&M.

Texas A&M University offers MS Thesis Option, MS non-thesis option, and PhD Plant Breeding degrees at distance. For details, visit https://scsdistance.tamu.edu/plant-breeding-distance-education/.

Meetings

ASA/CSSA/SSSA International Annual Meeting in Long Beach, CA, November 2-5. Visit https://www.acsmeetings.org/ for details.

National Association of Plant Breeders Annual Meeting in Pullman, WA—July, 2015. Visit www.plantbreeding.org for details.

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