Year 4 Report
Cooperative Effort to Develop Fine-Textured and Cold Hardy Zoysiagrass Cultivars with Large Patch Tolerance for the Transition Zone – Texas A&M AgriLife-Research - Dallas Report

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Objectives: The development of fine textured, cold hardy and large patch tolerant cultivars of zoysiagrass for the transition zone

Background: This project is an ongoing collaboration between Texas A&M AgriLife, Kansas State University (Jack Fry and Megan Kennelly) and Purdue University (Aaron Patton) funded by the USGA since 2012. As part of this project the A&M breeding team developed approximately 2,800 new hybrids in 2011/2012 by crossing selected parental lines exhibiting traits of interest. These hybrids were tested at three locations (Dallas, TX; Manhattan, KS and West Lafayette, IN) from 2012 to 2014 (2 yr. of winter recovery data). Based on the cold hardiness, texture ratings in comparison to 'Meyer' primarily, and initial testing for large patch tolerance at Dallas, we have selected the top 2% (60 hybrids) for advancement and further testing in the 2015 Zoysiagrass Cooperative Test currently underway at ten locations.

Start Date: January 2012
Project Duration: 6 years
Total Funding: $144,140

Summary Text –

Zoysiagrass is a warm season grass species that provides an excellent playing surface for the sport of golfing with the added benefits of low nutrient and pesticide requirements making it an ideal turfgrass species for use in the transition zone (Fry et al., 2008). 'Meyer' (*Z. japonica*) has been the cultivar of choice since its release in 1951 (Grau and Radko, 1951), in part because it has excellent freezing tolerance. However, Meyer is relatively slow to spread and recover from divots, and is more coarse textured and less dense than *Z. matrella* cultivars (Fry and Dernoeden, 1987; Patton, 2009).

Researchers at Texas AgriLife Research-Dallas and Kansas State University have worked together since 2004 to develop and evaluate zoysiagrasses with better turf quality than Meyer that are adapted to the transition zone. From this work, a number of advanced lines derived from paired crosses between *Z. matrella* and *Z. japonica*, have been identified with a level of hardiness equivalent to Meyer and 'Chisholm' (Okeyo et al., 2011), but with finer texture and better density than Meyer (e.g. – KSUZ 1201 entered in the 2013 NTEP; KSUZ 0802 recently released by Texas A&M AgriLife and KSU).

Large patch disease, caused by *Rhizoctonia solani* (AG 2-2 LP), continues to be the #1 pest problem on Meyer zoysiagrass fairways and tees in the transition zone (Kennelly et al, 2009). Most golf course superintendents treat with two applications of fungicide annually to limit damage from large patch. The best fungicides for suppressing this disease cost ~$350/acre. A course with 30 acres would then need to budget $21,000 annually to treat this disease alone. Incorporating large patch tolerance (LPT), along with cold hardiness and improved turf quality into new transition zone zoysiagrasses would reduce fungicide requirements and maintenance costs with the added bonus of increased sustainability.

We at Texas A&M AgriLife Research - Dallas have partnered with Drs. Jack Fry, Megan Kennelly from KSU, and Aaron Patton from Purdue University. These scientists have extensive experience with the test and evaluation of turfgrasses adapted to the transition zone for cold hardiness and disease susceptibility.

Phase III Testing (2015 to 2018): PI's at Purdue and KSU shipped their 20 selections to the Dallas Center in late August and early September of 2014 for propagation. Along with the 20 lines selected at Dallas, there were a total of 60 experimental entries. Plant materials were propagated to produce ten 18 cell trays for each line or 600 trays total for all entries across all locations. In 2015 replicated field trials were planted with the 60 advanced lines plus 5 standards/parental lines at seven diverse locations in the transition zone in addition to Manhattan, KS, West Lafayette, IN and Dallas, TX (Figure 1), making for a total of 10 test site locations (Table 1). The replicated field trial will span a three year period (2015 to 2018). There will be 65 x 3 reps = 195 plots (approx. 5' x 5' per plot) at each location. In addition advanced materials will be evaluated in disease nurseries at KSU, U. Arkansas and Purdue by inoculating with *Rhizoctonia solani* (AG 2-2 LP) isolates reared in the lab. Other testing will include using standard laboratory bioassays that will allow for measured comparative levels of LPT (KSU) and cold tolerance (KSU and Purdue) under controlled conditions.

Summary Points

- Phase I and II (2012 - 2014): Pairwise crosses were made between large patch tolerant germplasm and cold hardy zoysiagrasses adapted to the transition zone with the production of 2,858 progeny. Phase II: Spaced plant nurseries were planted late in 2012 and 2013 at three locations with a two year total of: 967 progeny at Manhattan, KS, 971 progeny at West Lafayette, IN, and 920 progeny at Dallas, TX in 2012. The nurseries were allowed to grow-in during 2013 and 2014. Selection of the top 20 lines from each location was made late in the growing season in 2014. Advanced lines were shipped to Dallas, TX for propagation.

- Phase III (2015 - 2018): Experimental lines and checks were propagated and plant materials distributed to 10 test locations. Plant materials were planted in replicated field trials (3 reps) with 5' x 5' plots. Data will be collected for a 3 year period (2015 to 2018). Cold hardiness, large patch tolerance and turf quality will be traits most critically scrutinized and prized.

Table 1. 2015 Zoysiagrass Cooperative Trial locations and cooperators.

Figure 1. Cold Hardy / Large Patch Tolerant Replicated Field Trial planted on 07/30/15 in Dallas, TX. Picture taken on 11/4/15.

References:

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Grau, F.V., and A.M. Radko. 1951. Meyer (Z-52) Zoysia. USGA J. Turf Manag. 4:30-31.

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Table 1. 2015 Zoysiagrass Cooperative Trial locations and cooperators.

10 Test Locations	Cooperator	Affiliation
Blacksburg, VA	Erik Ervin	Virginia Tech.
Chicago, IL	Ed Nangle	Chicago District Golf Association
Columbia, MO	Xi Xiong	U. Missouri
Dallas, TX	Dennis Genovesi and Ambika Chandra	Texas A&M AgriLife Research
Fayetteville, AR	Mike Richardson	U. Arkansas
Knoxville, TN	John Sorochan	U. Tennessee
Manhattan, KS	Jack Fry and Megan Kennelly	Kansas State
Raleigh, NC	Grady Miller	NC State
Stillwater, OK	Justin Moss	OK State
West Lafayette, IN	Aaron Patton	Purdue
Ancillary Locations for Large Patch		
Fayetteville, AR	Mike Richardson	U. Arkansas
Manhattan, KS	Megan Kennelly	Kansas State
West Lafayette, IN	Aaron Patton	Purdue

Figure 1. Cold Hardy / Large Patch Tolerant Replicated Field Trial planted on 07/30/15 in Dallas, TX. Picture taken on 11/04/15.