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Development of Cold Hardy, Large Patch Resistant Zoysiagrass Cultivars for the Transition Zone

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Summary. TAES 5645, a *Z. japonica* genotype that exhibited resistance to large patch in preliminary studies, was used as a breeding parent and crossed with 22 cold hardy zoysiagrasses, resulting in 985 progeny. These progeny were evaluated for cold hardiness and agronomic traits (establishment rate, overall quality, spring greenup, leaf texture, and genetic color) in Manhattan, KS; West Lafayette, IN; and Dallas, TX; from 2012 to 2014. From this work, 60 progeny were identified for further evaluation in larger plots. During the 2015-2016 establishment year, experimental line 6102-47 showed good vigor and spring green up rate, which is comparable to 'Meyer,' the standard cultivar in our area.

Rationale. Cold hardiness is the trait that limits the long-term survival of zoysiagrass in the transition zone. Further, large patch disease caused by *Rhizoctonia solani* (AG 2-2 LP) has become the primary pest on zoysiagrass. To limit the damage caused by large patch, up to $350/ acre is spent annually on fungicide applications (Genovesi and Chandra, 2013). Improved cultivars with good cold hardiness and large patch resistance are desired in the transition zone, which could reduce fungicide requirements and maintenance costs.

Objective. Identify high quality experimental zoysiagrass genotypes with cold tolerance equivalent to or better than Meyer, including some resistance to large patch.

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Study Description. In June 2015, 60 experimental progeny, previously screened from 985 entries for their quality and cold hardiness, were planted in Manhattan, KS. One parent of each of the progeny (TAES 5645) has previously shown resistance to large patch infection in growth chamber experiments. The experimental progeny, plus controls, were laid out in a randomized complete block design with 6 by 6 ft plots in three replications. The plots will be maintained under golf course fairway/tee conditions starting in summer, 2016. These progeny have also been planted and will be managed by university cooperators in West Lafayette, IN; Dallas, TX; Blacksburg, VA; Chicago, IL; Columbia, MO; Fayetteville, AR; Knoxville, TN; Raleigh, NC; and Stillwater, OK. In 2015, vigor was rated on a 1-9 scale with 9 equaling maximum vigor. In May 2016, the spring green up was rated on a 1-9 scale with 9 being completely green. In fall 2016, after plots are fully established, one-half of each plot will be inoculated with the large patch fungus in September; a similar inoculation will be done in West Lafayette, IN, and Fayetteville, AR. At the other sites, disease will be assessed if it naturally occurs.

Results. The 2015 growing season was an establishment year. Grasses were recently rated for winter survival, and there were significant differences. Some genotypes were not cold hardy, while others showed no negative effects after winter. Winter survival, establishment, and quality data will be reported in 2016, and if full coverage is achieved, all plots will be inoculated with the large patch pathogen this autumn.

Figure 1. Zoysiagrass plugs were planted on July 22, 2015 in Manhattan, KS.

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Figure 2. Zoysiagrass genotype study area at the Rocky Ford Turfgrass Research Center on November 3, 2015 in Manhattan KS, two weeks after the first frost.

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