

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



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Objective:

Phase II (years 2 and 3) of the evaluation process will focus on field testing in the form of non-replicated spaced plant nurseries comprised of the newly generated progeny population that will be conducted concurrently at Manhattan, KS and West Lafayette, IN. The objective of Phase II field testing is the selection of experimental lines that have comparable/superior cold tolerance to Meyer as well as improved turfgrass quality. Attention will be paid to select for entries that exhibit no visible symptoms of large patch as a result of the natural incidence of the disease.

Zoysiagrass progeny were developed at Texas A&M AgriLife Research in Dallas, Texas by crossing various cold-hardy zoysiagrasses with TAES 5645, which has demonstrated some resistance to large patch in growth chamber studies. Nearly 900 of these unique genetic individuals were delivered to Manhattan, KS in June 2012. A similar number of progeny from the same genetic crosses was also planted in Dallas, TX and West Lafayette, IN (results of their progress will be submitted separately). In Manhattan, grasses were established in an area on which cool-season turfgrasses were previously growing. Glyphosate was applied to the cool-season turf two weeks in advance of plugging. After laying out the plot area, holes were drilled on 3 foot centers to accommodate plugs, and planting was done on June 14, 2012 (Fig. 1). Plugs were irrigated after planting to minimize stress. Data collection began in early 2013, and visual ratings were taken for spring green up, color, texture, coverage, and quality. All ratings were done on a 1 to 9 scale (9 = greenest color, finest texture, highest quality). Coverage was rated visually on a 0 to 100% scale.

In 2013, an additional 104 progeny were sent to both sites for establishment. The plot area was



Figure 1. Planting > 800 zoysiagrass progeny at the Rocky Ford Turfgrass Research Center in Manhattan, KS on June 14, 2012. Each progeny resulted from the cross of a cold-hardy zoysiagrass with a clone (TAES 5645) which has demonstrated some resistance to large patch at Texas A&M AgriLife Research – Dallas.

established as described for 2012, and grasses were planted on 4 foot centers on July 25, 2013. Data collection for this set of progeny will begin early in 2014.

Data are being analyzed to evaluate progeny performance within families (crosses) (Table 1), and also for individual progeny (data not shown). In 2013, a

total of 573 progeny of the initial 881 (including checks) survived after planting in 2012 (Fig. 2). The summer of 2012 was extremely hot with 18 days recorded 100°F or above from June 14 through August 31, 2012 and some of the zoysiagrasses were lost during the establishment period. Cold winter temperatures also caused loss of some less hardy progeny. These 573 progeny will be evaluated through 2013 and during 2014. The top 5 to 10% of the progeny will be selected at the end 2014 (second year of field evaluations), propagated in the greenhouse, and planted in replicated field plots beginning in 2015. Once fully covered, each plot will be inoculated with *R. solani* and disease progress will be evaluated.



Figure 2. Irrigating the zoysiagrass progeny space planting in Manhattan, KS on August, 21, 2013.

Table 1. Survival, spring green up, color, texture, and quality of zoysiagrass progeny at Manhattan, KS in 2013.^z

Coded Family (TAES #)	Survival % 2013 ^y	Spring Color ^x	Summer Color	Fall Color	July Texture ^w	August Cover ^v	August Quality ^u
6095	68% (40)	3.2	6.8	6.5	4.4	40.7	4.2
6096	64% (66)	2.9	5.8	6.2	5.7	39.8	4.3
6097	74% (38)	3.7	6.3	6.3	4.6	46.8	4.7
6099	80% (152)	4.2	6.3	6.2	4.8	52.9	5.1
6100	69% (77)	3.5	6.5	6.7	4.9	46.9	4.9
6101	77% (52)	3.3	6.2	6.4	5.7	46.0	4.6
6102	63% (115)	3.8	6.4	6.3	4.8	50.7	4.9
6104	84% (56)	3.2	6.4	6.1	3.6	47.6	5.0
6105	60% (5)	2.7	6.7	6.0	4.7	40.0	4.3
6106	20% (5)	3.0	6.0	5.0	4.0	55.0	4.0
6109	69% (32)	4.0	6.6	6.2	5.3	49.6	5.3
6110	16% (51)	2.0	5.8	7.2	4.5	27.9	4.0
6118	33% (30)	2.5	6.2	6.6	5.4	33.0	4.3
6119	54% (71)	4.4	6.4	6.0	5.2	47.6	4.4
6120	63% (24)	2.8	6.8	5.8	4.9	34.7	4.0
6121	65% (46)	3.5	6.1	5.6	6.4	43.0	4.0
6126	75% (4)	3.3	6.0	7.5	6.0	23.3	3.0

^zGrasses were planted on June 14, 2012.

^ySurvival is a percentage of the initial number planted, which is indicated in parentheses.

^xColor was rated on a 1 to 9 scale, on which 1 = straw brown and 9 = dark green.

^wTexture was rated on a 1 to 9 scale on which 1 = coarsest, and 9 = finest.

^vCoverage was rated on 0 to 100% scale.

Summary Points

- Over 950 unique zoysiagrass progeny from Texas A&M AgriLife Research–Dallas, each arising from a cross between a large-patch resistant parent and cold-hardy parent, were planted as single plugs in Manhattan, KS in 2012 and 2013.
- Grasses are being evaluated for winter survival, color, texture, and quality in 2013 and 2014.
- In 2015, the best-performing 5 to 10% of progeny will be expanded into larger plots, maintained under golf course fairway conditions, and inoculated with the fungus causing *Rhizoctonia large patch* to evaluate potential for resistance.