

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 (Table 1), which has demonstrated some resistance to large patch in growth chamber studies. Nearly 840 of these unique genetic individuals were delivered to West Lafayette, IN in May 2012. A similar number of progeny from the same genetic crosses was also planted in Dallas, TX and Manhattan, KS (results of their progress will be submitted separately). Zoysiagrasses were established in Indiana an area which was fallow the previous two years. After laying out the plot area, plugs were planted on 3 foot centers to accommodate plugs, and planting was done on May 17, 2012 (Figure 1). Plugs were irrigated after planting to minimize stress and encourage establishment. Data collection began in May 2013, and visual ratings were taken for spring green-up, color, texture, coverage, and quality. All ratings, except coverage, 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 129 progeny were sent to West Lafayette for establishment. These additional



Figure 1. . Planting 860 zoysiagrass progeny at the William H. Daniel Turfgrass Research and Diagnostic Center on May 17, 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.

progeny are not included in the below summary results. The plot area was established as described for 2012, and grasses were planted on 3 foot centers on August 2, 2013 in an area adjacent to the 2012 planting. Data collection for this set of progeny will begin early in 2014.

Data were analyzed to evaluate progeny performance within families (crosses) (Table 1), and also for individual progeny (data not shown).

Progress Update and Results:

- Over 960 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 West Lafayette in 2012 and 2013.
- In 2013, a total of 763 progeny of the initial 860 (including checks) survived after planting in 2012 (Figures 1–4). Initially on 8 May, 147 entries had a spring green-up = 1 while later on 30 May only 116 entries had a spring green-up = 1. By 27 August, 114 entries had $\leq 5\%$ coverage indicating that about 746 entries had survived.
- Based on May spring green-up and coverage data, entries with a pedigree of 6095, 6096, or 6097 are performing best (good winter survival and coverage) (Table 2).
- These surviving 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) and planted in replicated



Figure 2. Photo of the plots on August, 2, 2012 showing excellent grow-in.

field plots beginning in 2015.

- Turf quality was highest for entries with a pedigree of 6095 and 6097 but some entries in the 6100 and 6101 group also had turf quality ≥ 7.0 in August (Table 2).
- Turf density was highest (≥ 8.0) for entries with a pedigree of 6101, 6102 and 6109 (Table 2).
- Turf color was ≥ 7.0 for all entries (Table 2).

Table 1. Pedigree of families.

Coded Family (TAES #)	Pedigree
6095	(DALZ 0501 x TAES 5645) x Meyer
6096	(Zorro x Meyer) x TAES 5645
6097	(Zorro x TAES 5645) x Meyer
6099	TAES 5645 x Meyer
6100	(Emerald x Meyer) x TAES 5645
6101	(Cavalier x TAES 5280) x TAES 5645
6102	Meyer x TAES 5645
6104	DALZ 0102 x TAES 5645
6109	(Emerald x Meyer) x TAES 5645
6110	(TAES 8501 x Zenith) x TAES 5645
6118	(Compatibility x Diamond) x TAES 5645
6119	Meyer x (DALZ 0501 x TAES 5645)
6120	(Cavalier x TAES 5645) x Meyer
6121	(Cavalier x TAES 5645) x Meyer

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.



Fig. 3. Photo of the plots during winter 2012–2013.



Fig. 4. Photo of the plots on May 30, 2013 after winter showing varied survival percent amongst the entries.

Table 2. 2013 spring green-up, coverage, color, texture, and quality of zoysiagrass progeny in West Lafayette, IN.^z

Coded Family (TAES #)	8 May Greenup ^y (1–9)	30 May Greenup ^y (1–9)	30 May Cover ^x %	14 June Quality ^w (1–9)	2 August Color ^v (1–9)	2 August Texture ^u (1–9)	27 August Cover ^x %	27 August Quality ^w (1–9)
6095	3.7	7.0	30.3	6.6	7.6	6.8	74.7	7.6
6096	3.4	6.1	27.0	5.3	7.5	7.6	70.6	6.7
6097	3.5	6.4	33.0	6.0	7.8	7.6	79.5	7.4
6099	3.5	5.5	31.0	5.4	7.5	7.5	76.4	6.7
6100	3.6	5.8	24.7	5.8	7.5	8.1	76.3	7.2
6101	3.6	5.4	25.3	5.3	7.3	8.2	77.3	7.0
6102	3.0	4.6	18.7	4.5	7.6	7.4	60.7	5.9
6104	2.4	4.0	13.9	4.0	7.1	6.9	72.3	6.4
6109	3.1	4.7	18.8	4.7	7.6	8.1	70.8	6.4
6110	1.3	1.6	2.2	2.0	7.1	7.4	19.4	3.4
6118	2.1	2.9	9.9	3.3	7.2	7.8	43.0	4.8
6119	2.5	3.9	15.0	4.0	7.6	7.7	49.9	4.9
6120	2.2	3.2	11.5	3.4	7.4	7.9	57.2	5.7
6121	3.0	4.6	20.8	4.8	7.3	7.8	65.0	6.1

^zGrasses were planted on May 17, 2012.

^ySpring green-up was rated on a 1 to 9 rating scale with 1 = straw brown and 9 = completely green.

^xCoverage was rated on 0 to 100% scale.

^wQuality was rated on a 1 to 9 scale, where 1 = poorest color, density, texture, and uniformity, and , 9 = optimum quality.

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

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