

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

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Objectives:

Phase II (year 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 2), which has demonstrated some resistance to large patch in growth chamber studies. 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. Zoysiagrass plugs were planted on May 17, 2012 and irrigated initially to encourage establishment. Data collection began in May 2013 and continued until August 2014. 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. Data were analyzed to evaluated progeny performance within families (crosses) (Table 1), and also for individual progeny (data not shown).

Table 1. 2014 spring green-up and coverage when averaged by family across genotypes following the severe winter in West Lafayette, IN. ^z

Coded Family (TAES #)	7 May Greenup ^y	30 May Greenup ^y	30 May Cover ^x
	(1-9)	(1-9)	%
6095	3.4	6.9	61.6
6096	2.5	5.9	50.4
6097	2.0	5.8	48.6
6099	2.1	5.0	43.3
6100	2.3	5.4	42.4
6101	2.3	5.3	45.7
6102	2.3	4.7	35.8
6104	1.5	2.8	17.0
6109	1.8	3.9	26.3
6110	1.1	1.3	2.1
6118	1.4	2.7	12.8
6119	2.4	4.2	27.3
6120	2.2	4.6	34.3
6121	1.9	4.1	26.6

^z Grasses were planted on May 17, 2012.

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

^x Coverage was rated on 0 to 100% scale.

Progress Update and Results:

- 840 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. An additional 20 were planted as standards for comparison.
- 103 of the 860 progeny died in 2013 due to winterkill after planting. Of the 757 surviving genotypes, 205 (27%) had a spring green-up = 1 when rated on 7 May 2014. On that same date, 16 genotypes had a



spring green-up ≥ 5 . Later on 30 May, only 149 entries had a spring green-up =1 and 206 genotypes had a spring green-up ≥ 7 (93 genotypes had a spring green-up ≥ 8). By 30 May, 177 entries had $\leq 5\%$ coverage indicating that about 683 entries had survived two winters in Indiana.

- Based on May spring green-up and coverage data, entries with a pedigree of 6095, 6096, or 6097 performed best (good winter survival and coverage) which was consistent with 2013 spring green-up data (Table 1).
- The top 2.4% (20 entries) of the progeny were

selected at the end 2014 (second year of field evaluations) based on green-up, coverage, color, density, texture, and overall quality data as well as a final evaluation by four separate evaluators (Table 2). All entries selected performed as well as or superior to Meyer zoysiagrass in Indiana.

- A 24 by 18 inch sod piece was removed from the top 20 entries and shipped to Dallas, TX to reproduce enough plant material of each entry to initiate replicated field trials in 2015 at 10 total locations. Additional plant material from Manhattan, KS and Dallas, TX was also selected for these field trials.

Table 2. Entries selected at Purdue University for additional testing at multiple locations in 2015-2107 and the pedigree of each genotype.

Entries selected for future testing	Coded family (TAES #)	Pedigree
6095-55, 6095-56, 6095-73	6095	(DALZ 0501 x TAES 5645) x Meyer
6096-117, 6096-81, 6096-93	6096	(Zorro x Meyer) x TAES 5645
6097-41, 6097-50, 6097-74	6097	(Zorro x TAES 5645) x Meyer
6099-232	6099	TAES 5645 x Meyer
6100-106, 6100-129, 6100-146, 6100-86, 6100-88	6100	(Emerald x Meyer) x TAES 5645
6101-63, 6101-71	6101	(Cavalier x TAES 5280) x TAES 5645
6102-196	6102	Meyer x TAES 5645
6109-61	6109	(Emerald x Meyer) x TAES 5645
6119-87	6119	Meyer x (DALZ 0501 x TAES 5645)



Figure 1. Photo of the plots on May 30, 2014 after a severe winter showing varied survival percent amongst the entries with some entries performing excellent.



Figure 2. Photo of the plots on 26 June, 2014 after a severe winter showing a genotype with improved quality compared to other selections. Same plot as shown in Figure 1.