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

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Objectives:

Phase II (year 2-3) 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, West Lafayette, IN, and Dallas, TX. The objective of Phase II field testing is the selection of experimental lines that have comparable/superior cold tolerance to Meyer and improved turfgrass quality. Attention will be paid to select for entries that exhibit no visible symptoms of large patch as a result of natural incidence of the disease.

This was the second year of field evaluation for 985 zoysiagrass progeny developed at Texas A&M AgriLife Research in Dallas, Texas by crossing 22 cold-hardy zoysiagrasses with TAES 5645, which has demonstrated some resistance to large patch in growth chamber studies. From each cross (family), multiple genetically distinct individual progeny were grown from seed then propagated individually. A similar number of progeny were evaluated in Dallas, TX and West Lafayette, IN (results of their progress will be submitted separately). In Manhattan, it was a harsh winter, and temperatures dropped below zero in December 2013 (-6 F), and in 2014 in January (-12 F); February (-9 F); and March (-3 F). Data were collected on percent winter survival, coverage, color, quality, and texture. Winter survival was calculated based upon total surviving progeny within a family. Coverage was rated visually on a 0 to 100% scale. All other ratings were done on a 1 to 9 scale (9 = greenest color, finest texture, highest quality).

In 2014, 579 progeny survived of the original 985 following the second winter of evaluation. In September 2014, twenty progeny were selected from the Manhattan location and sent back to Texas A&M AgriLife Research, Dallas for vegetative (clonal) propagation. A similar 20 selections were identified at the other two

Figure 1. Zoysiagrass progeny in Manhattan, KS on 12 May 2014 with visible winter injury on the north side of plots.

Figure 2. Part of the zoysiagrass progeny study area at the Rocky Ford Turfgrass Research Center in Manhattan, KS on August 27, 2014.

evaluation sites and propagated in Dallas. In June 2015, 60 progeny, plus controls, will be established in 6 by 6 ft plots maintained under golf course fairway/tee conditions in Manhattan. After plots are fully established, one-half of each plot will be inoculated with the large patch fungus; a similar inoculation will be done in West Lafayette, IN. Several other transition zone sites will also be selected to evaluate zoysiagrass progeny for quality characteristics and large patch resistance based upon natural infestations.

Summary Points

- Over 900 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 were evaluated for winter survival, color, texture, and quality in 2013 and 2014.
- In September 2014, twenty of the highest rated progeny were selected and sent to Texas A&M AgriLife Research, Dallas for propagation; twenty progeny will also be selected in Indiana and Texas and propagated in Dallas.
- In 2015, the compiled 60 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.

Table 1. Zoysiagrass progeny family (crosses) means at the Rocky Ford Turfgrass Research Center in Manhattan, KS in 2014.[†]

Coded Family (TAES #)	Survival (%) 2014[‡]	Spring Color[§]	Spring Coverage (%)[¶]	Early Summer Quality[#]	Summer Texture[††]	Summer Color[§]
6095	65% (40)	2.8	23.6	4.4	4.7	5.4
6096	60% (66)	2.3	17.4	4.0	5.9	5.2
6097	73% (38)	2.9	24.7	3.8	4.8	5.7
6099	77% (152)	3.4	33.3	4.3	4.9	5.4
6100	68% (77)	3.5	34.4	4.4	5.1	5.6
6101	73% (52)	2.9	26.9	4.8	5.8	5.6
6102	60% (115)	3.1	28.9	4.3	4.8	5.6
6104	74% (56)	2.5	20.1	3.9	3.8	5.1
6105	60% (5)	2.3	25.0	4.0	5.7	5.3
6106	20% (5)	2.0	10.0	4.0	4.0	7.0
6109	65% (32)	2.8	27.1	4.2	5.9	5.5
6110	9% (51)	1.3	5.0	3.4	4.4	5.4
6118	30% (30)	1.9	16.1	3.6	5.6	5.4
6119	46% (71)	2.9	27.3	4.1	5.2	5.2
6120	54% (24)	2.0	15.8	4.2	5.6	5.1
6121	65% (46)	2.3	18.3	3.9	6.5	6.4
6126	61% (40)	1.8	7.2	3.3	5.5	5.3
6220	40% (15)	2.0	11.3	4.8	3.9	5.8
6221	28% (25)	1.3	8.1	3.8	4.0	4.1
6222	33% (15)	1.2	9.3	2.4	5.6	5.5
6263	30% (10)	1.1	10.0	2.0	5.0	5.5
6315	17% (6)	1.1	5.0	2.0	6.0	6.0

[†] 881 zoysiagrass progeny which were planted on 14 June 2012 were evaluated in 2013; the additional 104 progeny were not planted until 25 July 2013 and evaluation began in 2014.
[‡] Survival is a percentage of the initial number of progeny in the family planted, which is indicated in parentheses.
[§] Color was rated on a 1 to 9 scale, on which 1 = straw brown and 9 = dark green. Spring color is an average of ratings on 2 and 21 May. Summer color was rated on 10 July.
[¶] Spring coverage was rated on 28 May 2014 on 0 to 100% scale.
[#] Early summer quality was rated on 12 June on a 1 to 9 scale, on which 1 = poorest color, density, texture, and uniformity, and 9 = optimum quality.
[††] Texture was rated on 10 July on a 1 to 9 scale on which 1 = coarsest, and 9 = finest.

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