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Selection of New Zoysiagrass Genotypes for Golf Course Fairways, Greens, and Tees in the Upper Transition Zone

Manoj Chhetri
Kansas State University, mchhetr@k-state.edu

Jack Fry
Kansas State University, jfry@ksu.edu

Megan Kennelly
Kansas State University, kennelly@ksu.edu

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Abstract

A set of 70 experimental zoysiagrass genotypes along with three standards, 'Meyer,' 'Innovation,' and 'KSUZ 1201,' were evaluated for turf performance in the northern transition zone. The genotypes were previously selected from a set of 935 progeny that resulted from pairwise crossings of cold-hardy zoysiagrass parents with fine-textured, under-utilized zoysiagrasses. All 70 progeny survived the winter of 2019–2020 and thus were evaluated based on their turf performance. The preference of selection was based first upon spring green up ratings, followed by leaf texture (finer preferred), vigor, turf quality, and wilt during dry down. A total of 20 best progeny were selected and harvested for propagation on October 12, 2020. Only one genotype, '6844-31' had a texture rating of 8.0 (1 to 9 scale; 9 = finest texture) and four other genotypes had texture ratings higher than 7.0 among the selected 20 best progeny. The progeny will be established in larger replicated plots at several locations including Kansas State University Olathe Horticulture Center, Olathe, KS, starting in the summer of 2021

Keywords

golf course turf, warm-season grasses

Cover Page Footnote

The authors are grateful for the support of this research by the United States Golf Association.

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Selection of New Zoysiagrass Genotypes for Golf Course Fairways, Greens, and Tees in the Upper Transition Zone

Manoj Chhetri, Jack Fry, and Megan Kennelly[1]

Summary

A set of 70 experimental zoysiagrass genotypes along with three standards, 'Meyer', 'Innovation', and 'KSUZ 1201', were evaluated for turf performance in the northern transition zone. The genotypes were previously selected from a set of 935 progeny that resulted from pairwise crossings of cold-hardy zoysiagrass parents with fine-textured, under-utilized zoysiagrasses. All 70 progeny survived the winter of 2019–2020 and thus were evaluated based on their turf performance. The preference of selection was based first upon spring green up ratings, followed by leaf texture (finer preferred), vigor, turf quality, and wilt during dry down. A total of 20 best progeny were selected and harvested for propagation on October 12, 2020. Only one genotype, '6844-31' had a texture rating of 8.0 (1 to 9 scale; 9 = finest texture) and four other genotypes had texture ratings higher than 7.0 among the selected 20 best progeny. The progeny will be established in larger replicated plots at several locations including Kansas State University Olathe Horticulture Center, Olathe, KS, starting in the summer of 2021.

Rationale

Meyer zoysiagrass, a relatively coarse-textured, cold-hardy zoysiagrass is commonly used on golf course fairways and tees in the transition zone. However, fine-textured zoysiagrass cultivars for use on golf course tees, fairways, and putting greens that can tolerate the freezing temperatures in the transition zone are not available. More progress in developing the fine-textured cultivars for the transition zone is needed.

[1] Department of Plant Pathology, College of Agriculture, Kansas State University.

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Objectives

To identify new, cold-hardy, and fine-textured zoysiagrass genotypes for use on golf course tees, fairways, and putting greens in the northern transition zone.

Study Description

We selected 70 experimental hybrids from a set of 935 progeny in a previous nursery plot (Chhetri et al., 2020). Those 70 hybrids were established along with three standards, Meyer, Innovation, and KSUZ 1201 (a cold-hardy experimental), on July 2, 2019. The study area was established using plugs planted into tilled ground at Kansas State University Olathe Horticulture Center, Olathe, KS. Each plot measured 3 × 3-ft with no alley in between. Immediately after planting, Ronstar G (a.i. oxadiazon 2%, Bayer Environmental Science) was applied at 2 lb of a.i. per acre and irrigation was applied to prevent drought stress (until a dry down period in late summer). Mowing was started at a height of 3 inches, and once plugs were beyond that height, it was gradually reduced to 0.5 inches. The plots were arranged in a completely randomized design with two replicates.

Leaf texture on a scale of 1–9 (where 1 = coarse-textured and 9 = fine-textured) and plant vigor on a scale of 1–9 (where 1 = poor growth and 9 = best growth) were recorded on September 27, 2019, and October 6, 2020. Spring green up (where 1 = brown, dormant and 9 = completely green) was recorded on April 7, 2020. Turf quality was rated on a scale of 1–9 (1 = brown dead turf, 6 = minimally acceptable, and 9 = ideal uniform turf) on October 6, 2020. Visible wilting was recorded as a measure of drought tolerance on a scale of 1–9 in which 1 = completely brown, 9 = no wilt on August 27, 2020.

Results

All 70 progeny and three standard genotypes survived the winter of 2019–2020. The genotypes were determined first depending upon spring green up, followed by leaf texture, vigor, turf quality, and wilt during dry down. Based upon this, 20 genotypes were selected as the top performers (Figure 1).

Among the best 20 progeny, leaf texture ratings ranged from 4.5 to 7.5 in 2019 and 4.5 to 8.0 in 2020 (Table 1). Vigor ranged from 2.0 to 8.0 in 2019 and 4.0 to 7.5 in 2020. Also, the progeny showed variation in spring green up (3.0 to 5.0), turf quality (4.5 to 8.0), and wilt (2.0 to 7.0). Only one genotype, 6844-31, had a leaf texture rating of 8.0. The four other genotypes, 6830-56, 6844-147, 6919-29, and 6942-22, had leaf texture ratings higher than 7.0 on October 6, 2020.

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Reference

Chhetri, M., Fry, J., & Kennelly, M. (2020). Identification of cold-hardy zoysiagrass genotypes for tees and greens in the upper transition zone. *Kansas Agricultural Experiment Station Research Reports*, 6 (7), 5. *https://doi.org/10.4148/2378-5977.7949.*

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Table 1. Performance of best 20 interspecific hybrids selected from a set of 70 progeny from a spaced plant nursery located in Olathe, KS

		SGU[‡]	Texture[‡]		TQ[‡]	Vigor[‡]		Wilt[‡]
Rank	Genotype	2020	2019	2020	2020	2019	2020	2020
1	6844-154	5.0[§]	6.0	6.5	6.5	3.5	4.5	5.0
2	6844-91	4.5	5.0	6.5	6.5	5.0	5.5	3.5
3	6830-56	4.0	6.5	7.5	7.5	6.0	6.0	2.5
4	6844-190	4.0	6.0	6.5	6.5	4.5	6.5	3.5
5	6940-15	4.0	5.0	7.0	7.0	5.0	4.5	6.5
6	6844-128	4.0	5.0	4.5	4.5	4.0	4.5	7.0
7	6844-31	3.5	4.5	8.0	8.0	7.0	7.0	5.0
8	6844-147	3.5	5.5	7.5	7.5	4.5	5.5	4.0
9	6829-36	3.5	5.5	5.5	5.5	8.0	5.0	3.5
10	6844-141	3.5	6.0	6.5	6.5	6.5	7.5	6.0
11	6924-47	3.5	5.0	6.5	6.5	6.5	7.0	4.5
12	6844-152	3.5	6.0	7.0	7.0	4.5	6.5	3.5
13	6924-66	3.5	5.0	6.0	6.0	7.0	6.5	4.0
14	6919-29	3.5	5.0	7.5	7.5	6.0	6.0	5.5
15	6844-34	3.5	6.0	6.5	6.5	4.5	5.0	3.0
16	6830-11	3.5	6.0	7.0	7.0	2.0	4.0	4.5
17	6924-44	3.5	5.0	7.0	7.0	8.0	6.0	4.5
18	6942-22	3.0	6.5	7.5	7.5	5.0	6.0	6.5
19	6839-08	3.0	7.5	7.0	7.0	5.0	5.0	4.5
20	6925-53	3.0	6.0	7.0	7.0	4.0	5.0	4.0
-	Meyer	4.5	4.5	6.0	6.0	7.0	6.5	4.0
-	Innovation	3.5	5.5	6.0	6.0	5.0	6.0	2.0
-	KSUZ 1201	3.5	4.5	5.5	5.5	4.0	5.5	4.0

[‡]Spring green up (SGU) was rated visually on a 1 to 9 scale (1 = brown, 9 = most green) on April 7, 2020; texture was rated visually on a 1 to 9 scale (1 = very coarse; 9 = very fine) on September 27, 2019 and June 10, 2020. Turf quality (TQ) was rated on a 1 to 9 scale (1 = poor quality; 9 = optimum, color, density, texture, and uniformity) on October 6, 2020; vigor was rated visually on a 1 to 9 scale (1 = least lateral spread; 9 = most lateral spread) on September 27, 2019 and June 10, 2020; and wilt during dry down was rated on a 1 to 9 scale (1 = severe wilt, 9 = no wilt) on August 27, 2020.

[§]All data reported for each date are the average of two replications.

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Figure 1. The best 20 zoysiagrass progeny were selected out of 70 established progeny in two replicates at the Kansas State University Olathe Horticulture Center, Olathe, KS.

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