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Identification of Cold-Hardy Zoysiagrass Genotypes for Tees and Greens in the Upper Transition Zone

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Identification of Cold-Hardy Zoysiagrass Genotypes for Tees and Greens in the Upper Transition Zone

Abstract

Since the summer of 2017, 1,376 experimental zoysiagrass genotypes have been evaluated for winter survival in Olathe, KS, in an attempt to identify high quality, fine-textured types that survive in Kansas. After planting 458 progeny in the field in August 2017, only 17 experimental progeny survived when evaluated in spring 2018 (4%). In 2018, those 17 survivors were included with a new planting of 918 experimental progeny. In spring 2019, it was determined that 70 genotypes survived (8%). The 70 surviving progeny were transferred to a new, adjacent plot area in June 2019 and they varied in leaf texture (3.0 to 7.5 on a 1 to 9 scale; 9 = finest) and vigor (2.0 to 8.0 on a 1 to 9 scale; 9 = most vigorous) when visually rated on September 27, 2019. In 2020, all 70 progeny survived and showed variation in spring greenup in April (1.0 to 5.0; 1 to 9 scale, 9 = completely green). By early summer of 2020, best performing progeny with superior cold-hardiness and quality will be propagated for evaluation in larger plots starting in 2021.

Keywords

Fine-textured zoysiagrass

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Identification of Cold-Hardy Zoysiagrass Genotypes for Tees and Greens in the Upper Transition Zone

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Summary

Since the summer of 2017, 1,376 experimental zoysiagrass genotypes have been evaluated for winter survival in Olathe, KS, in an attempt to identify high quality, fine-textured types that survive in Kansas. After planting 458 progeny in the field in August 2017, only 17 experimental progeny survived when evaluated in spring 2018 (4%). In 2018, those 17 survivors were included with a new planting of 918 experimental progeny. In spring 2019, it was determined that 70 genotypes survived (8%). The 70 surviving progeny were transferred to a new, adjacent plot area in June 2019 and they varied in leaf texture (3.0 to 7.5 on a 1 to 9 scale; 9 = finest) and vigor (2.0 to 8.0 on a 1 to 9 scale; 9 = most vigorous) when visually rated on September 27, 2019. In 2020, all 70 progeny survived and showed variation in spring greenup in April (1.0 to 5.0; 1 to 9 scale, 9 = completely green). By early summer of 2020, best performing progeny with superior cold-hardiness and quality will be propagated for evaluation in larger plots starting in 2021.

Rationale

Zoysiagrass is widely used in golf course fairways and roughs in the transition zone due to its excellent turf quality and low input requirements. However, more progress is needed in developing cultivars for the transition zone that have quality comparable to *Z. matrella* cultivars used in the southern U.S. Researchers at Texas A&M AgriLife Research, Dallas, conducted pairwise crossings of cold-hardy zoysiagrass parents with fine-textured, under-utilized *Zoysia* spp., resulting in more than 1600 hybrid progeny. These progeny are currently being studied at Texas A&M AgriLife

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Research, Dallas, TX; Kansas State University, Olathe, KS; and Purdue University, West Lafayette, IN, to identify cold-hardy, high quality, fine-textured genotypes.

Objective

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

Study Description

On August 18, 2017, 458 zoysiagrass progeny were established using plugs in a single-spaced nursery at Olathe Horticulture Research Center, Olathe, KS. Progeny were evaluated for winter survival in May 2018. On July 30, 2018, surviving genotypes from the 2017 planting were moved to an adjacent area and planted with an additional 918 experimental genotypes. Winter kill ratings were recorded on a scale of 1–9 (where 1 = brown, dead turf and 9 = no injury) in May of 2018 and 2019. On May 17, 2019, entries with a winter kill score of 3 and greater were transferred to a new adjacent plot on July 2, 2019. In each evaluation, standards were included for comparison, such as Meyer, Innovation, and KSUZ 1201, a cold-hardy experimental. For the 2017 and 2018 plantings, cool-season turf growing in the study areas was terminated using glyphosate several weeks before planting. Plugs were planted by drilling holes in the ground and inserting plugs. Plugs planted in 2019 were inserted into tilled ground and were arranged in a completely randomized design with two replicates. Each plot measured 3- × 3-ft with no alley in between. Leaf texture on a scale of 1–9 (where 1 = coarse-textured and 9 = fine-textured) and vigor on a scale of 1–9 (where 1 = poor growth and 9 = best growth) were recorded on September 27, 2019, and spring greenup (1 = brown, dormant and 9 = completely green) was recorded on April 7, 2020. In all years, immediately after planting plugs, 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. Mowing was done only in 2019 at a height of 3 inches once plugs were beyond that height.

Results

After planting 458 experimental progeny in 2017, 17 survived (4%) when evaluated in May 2018. In 2018, 918 experimental progeny were planted along with the 17 survivors from the 2017 planting. Out of the 935 experimental progeny, 70 survived when evaluated in May 2019 (8%). These surviving progeny varied in leaf texture (3.0 to 7.5) and vigor (2.0 to 8.0) when rated on September 27, 2019. In April 2020, all genotypes survived and showed a variation in spring greenup (1.0 to 5.0) (Figure 1). In addition to all cold-tolerant standard cultivars (Meyer, Innovation, and KSUZ 1201), only one experimental genotype has survived each winter since planting in 2017 (6787-28). The planting approach in 2017 and 2018 was to drill into untilled soil and insert plugs. In 2019, plugs were planted into tilled ground. Those planted in 2019 seemed more vigorous than earlier years, and this could have impacted survival.

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The 2017–2018 and 2018–2019 winters were colder than 2019–2020, which may have affected survival as well (Figure 2). Weather data obtained from the Kansas Mesonet system (*https://mesonet.k-state.edu/*) showed that in 2017–2018, there were 19 days with a minimum air temperature < 10°F and 30 days < 14°F; the lowest air temperature (-9.8°F) was recorded on January 11, 2018. In 2018–2019, there were 16 days with the minimum air temperature < 10°F and 25 days < 14°F; the lowest air temperature (-5°F) was recorded on January 30, 2019. In 2019–2020, there were 7 days with the minimum temperature < 10°F and 13 days < 14°F; the lowest air temperature (-2.1°F) was recorded on February 14, 2020.

Acknowledgment

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Figure 1. Seventy zoysiagrass progeny that have exhibited good cold tolerance are in the field at the Olathe Horticulture Center and were evaluated in April 2020 for spring greenup.

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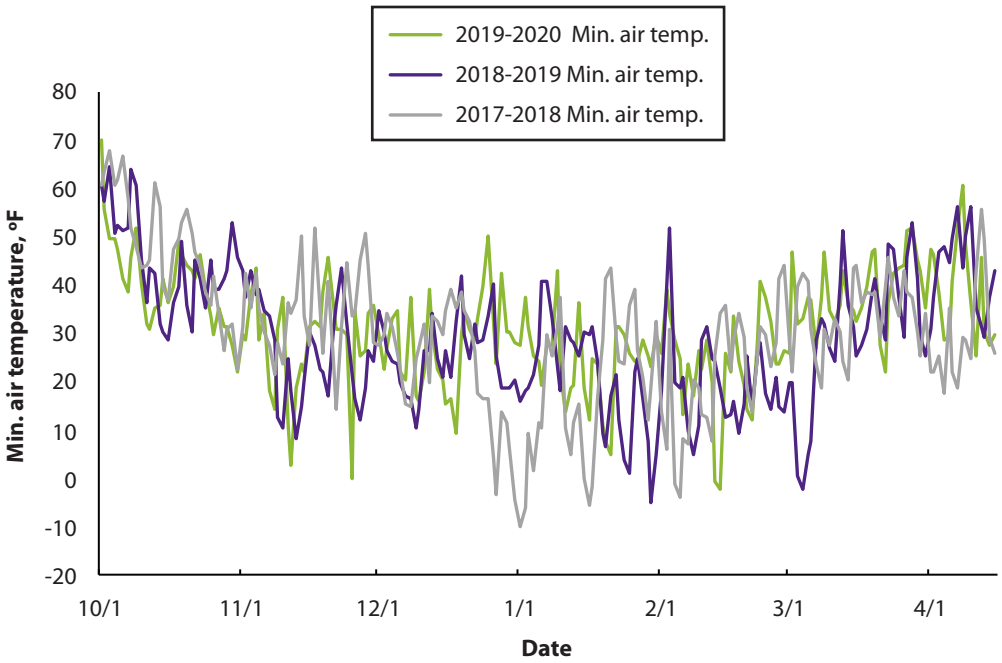

Figure 2. Daily averages of minimum air temperatures in 2017–2018, 2018–2019, and 2019–2020 between October 1 through April 15. Data were obtained from the Kansas Mesonet system at the Olathe location (*https://mesonet.k-state.edu/*).

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