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Impact of Zoysiagrass and Tall Fescue Seed Mixtures on Brown Patch Severity

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Impact of Zoysiagrass and Tall Fescue Seed Mixtures on Brown Patch Severity

Abstract

Earlier research has demonstrated that polystands of zoysiagrass and tall fescue can be established successfully, with the potential to provide a high-quality turfgrass stand with reduced inputs. Our objective was to determine whether mixing zoysiagrass with tall fescue will reduce brown patch severity while maintaining overall acceptable quality. Studies were established at the Rocky Ford Turfgrass Research Center in Manhattan, KS. In the split-plot design, natural infection by *Rhizoctonia solani* or a fungicide-treated control was the whole-plot treatment factor and species (tall fescue monostand and the zoysiagrass/tall fescue mixture) were subplots. During July and August 2016, when hot, humid weather triggers brown patch, excessive irrigation was applied to promote brown patch. Disease severity was measured by visual ratings and digital image analysis; number of infected leaves in each plot was recorded using a grid. The mixed stand then showed less plot area affected by brown patch disease compared to the monostand of tall fescue.

Keywords

Disease, turfgrass

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Impact of Zoysiagrass and Tall Fescue Seed Mixtures on Brown Patch Severity

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Summary. Earlier research has demonstrated that polystands of zoysiagrass and tall fescue can be established successfully, with the potential to provide a high-quality turfgrass stand with reduced inputs. Our objective was to determine whether mixing zoysiagrass with tall fescue will reduce brown patch severity while maintaining overall acceptable quality. Studies were established at the Rocky Ford Turfgrass Research Center in Manhattan, KS. In the split-plot design, natural infection by *Rhizoctonia solani* or a fungicide-treated control was the whole-plot treatment factor and species (tall fescue monostand and the zoysiagrass/tall fescue mixture) were subplots. During July and August 2016, when hot, humid weather triggers brown patch, excessive irrigation was applied to promote brown patch. Disease severity was measured by visual ratings and digital image analysis; number of infected leaves in each plot was recorded using a grid. The mixed stand then showed less plot area affected by brown patch disease compared to the monostand of tall fescue.

Rationale. Hot summers and cold winters make it difficult to grow cool- and warm-season turfgrasses, respectively. Tall fescue is used frequently in Kansas due to its heat and drought tolerance compared to some other cool-season grasses. Brown patch caused by the fungus *Rhizoctonia solani* Kühn AG-2-2 IIIB is the main disease limiting the growth of tall fescue in summer, and brown patch resistance in tall fescue cultivars is limited. Zoysiagrass is a warm-season grass with better heat and drought tolerance compared to cool-season grasses, and it may be a good mixture partner with tall fescue. Previous research has demonstrated that a zoysiagrass and tall fescue mixture can be established successfully, with the potential to provide a high-quality turfgrass stand with reduced inputs. From an epidemiological standpoint, polystands of species or cultivars decrease the rate of disease spread compared to monostands.

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Objective. The objective of this research was to determine whether mixing zoysiagrass with tall fescue will reduce brown patch severity while maintaining overall acceptable quality in Kansas.

Study Description. Studies were established at the Kansas State University Rocky Ford Turfgrass Research Center in Manhattan, KS. In the split plot design, natural infection by *R. solani* or a fungicide-treated control was the whole-plot treatment factor and species (tall fescue monostand and the zoysiagrass/tall fescue mixture) were subplots. Whole plots measured 10 by 10 ft and were replicated four times. Sub plots were 5 by 5 ft and there were two sub-plot replicates within each whole plot. 'Compadre' zoysiagrass was seeded in the zoysiagrass/tall fescue mixture plots at Rocky Ford at 1 lb pure live seed (PLS) per 1,000 ft^2 on June 25, 2015. 'Corona' tall fescue was seeded at 4 lb PLS per 1,000 ft^2 in the mixture plot immediately after seeding zoysiagrass. On September 17, 2015, Corona tall fescue was seeded at 7 lb PLS per 1,000 ft^2 to establish the monostand tall fescue plots. The plots seeded the previous spring to the zoysiagrass and tall fescue mixture were overseeded with tall fescue at 2 lb of PLS per 1,000 ft^2. Before seeding, the plots were verticut in two directions using a Bluebird verticutter. On May 24, 2016, brown patch (*R. solani* AG-2-2 IIIB) was observed in the tall fescue monostand plots, and a granular mixture of pyraclostrobin and triticonazole was applied to the subplots (3 lb/1,000 ft^2 of Pillar G Intrinsic, BASF, Research Triangle Park, NC). On June 29, a mixture of 14.3% propiconazole at 2 oz/1,000 ft^2 of Lesco Spector Ultra 1.3 fungicide (LESCO, Inc., Cleveland, OH) and 50% Azoxystrobin at 0.4 oz/1,000 ft^2 from Heritage 50 WG (Syngenta Crop Protection LLC Greensboro, NC) and on July 19, 50% Azoxystrobin at 0.4 oz/1,000 ft^2 from Heritage 50 WG was applied to the subplots. During the disease season, excessive irrigation was applied daily between 9:00 p.m. to 6:00 a.m. to create leaf wetness to promote brown patch.

Brown patch severity was rated visually biweekly on percentage of each plot affected by disease. In addition, patch symptoms were evaluated by taking digital images with a light box. All data were subjected to analysis of variance using the GLIMMIX procedure of SAS 9.4 (SAS Institute Inc., Cary, NC). Fisher's protected least significant difference (LSD) ($P \leq 0.05$) was used to detect treatment differences.

Results. On August 4, 2016, the day with highest disease pressure, brown patch determined by visual rating for the tall fescue monostands was 14%, whereas the zoysiagrass mixture had only 3% brown patch (Figure 1). Overall, the mixed stand exhibited lower symptoms compared to the monostand of tall fescue (Figure 2).

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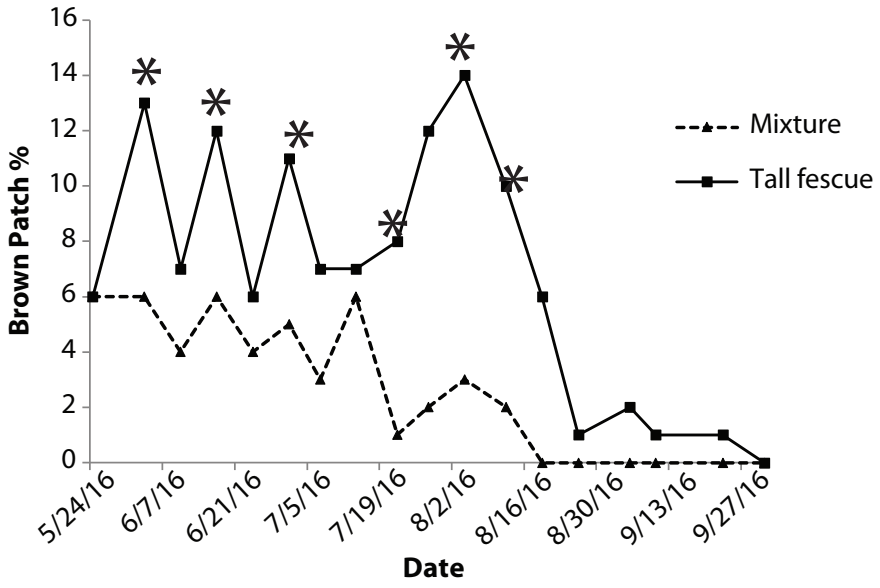

Figure 1. Brown patch in a zoysiagrass/tall fescue mixture vs. a tall fescue monostand in Manhattan, KS, in 2016. Presence of an asterisk denotes that means are significantly different ($P \leq 0.05$).

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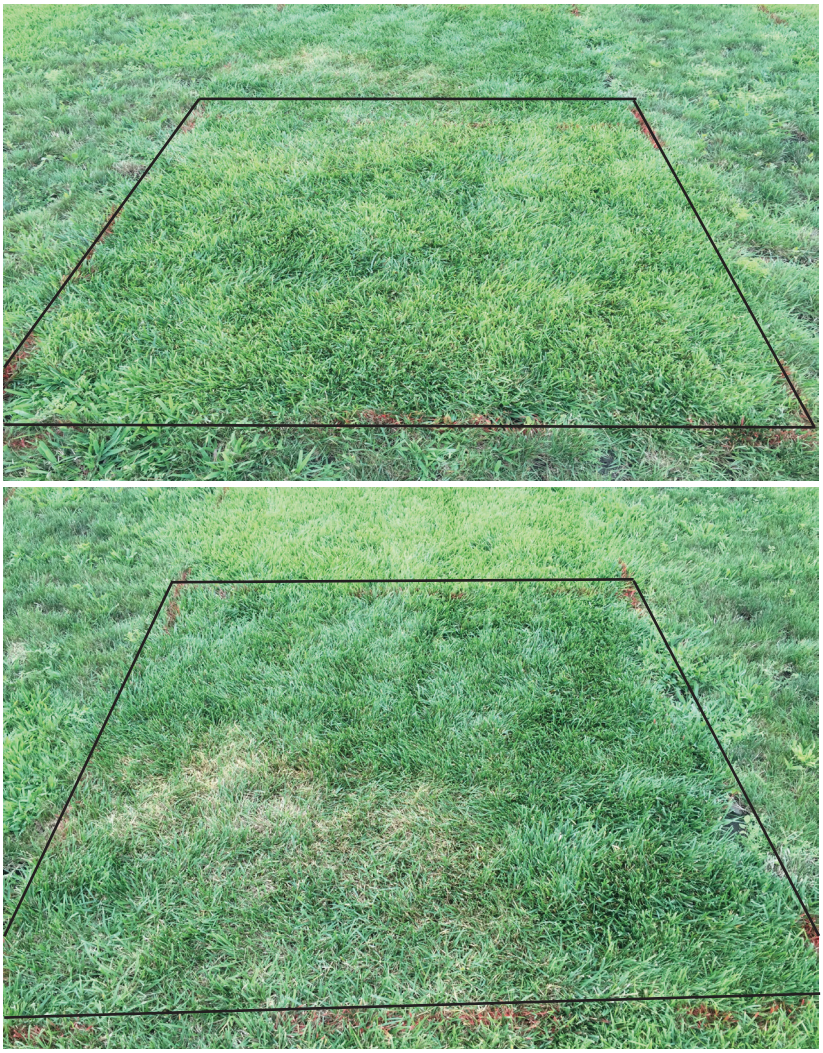

Figure 2. Brown patch in the zoysiagrass/tall fescue mixture (top picture) compared to the tall fescue monostand (bottom picture) in August 2016 in Manhattan, KS.

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