IMPACT OF NITROGEN AND MOWING HEIGHT AT GROWER ON PERFORMANCE OF ZOYSIAGRASS SOD AFTER HARVEST

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Introduction

Zoysiagrass (*Zoysia spp.* Willd) is a perennial sod-forming species of turfgrass that has tremendously contributed to the US turfgrass industry with its adaptation for use in the transitional climatic zone and warm-climate regions. In 2006, approximately 16,293 acres of zoysiagrass could be found on golf courses across the U.S (Lyman et al., 2007). It is believed that cultivars or cultural practices at sod producers may influence the performance of zoysiagrass sod after it is laid.

Objective

- Evaluate the influence of zoysiagrass cultivars and grow-in cultural practices on performance of sod after it is harvested and then laid at two Kansas locations.

Materials and Methods

Field Management

- Three cultivars of zoysiagrass including 'Meyer' (*Zoysia japonica* Steud.), 'Innovation' *(Z. japonica* x *Z. matrella*), and DALZ 1808 *(Z. japonica*) were sprigged at the K-State Olathe Horticulture Research and Extension Center (OHREC) in June 2021 in a separate experiment evaluating management practices influencing grow-in. Cultivars received high N level (220 kg/ha/yr) or low N level (74 kg/ha/yr) in '21 and '22; and were mowed at 1.9 cm or 3.8 cm starting in Spring '22 and continued into spring '23. This experiment was the sod source for the details that follow.
- Meyer zoysiagrass growing at fairway height was treated with glyphosate and then stripped out using a sod cutter at the Rocky Ford Turfgrass Research Center (RFTRC) in Manhattan and the K-State OHREC.
- Sod was harvested from OHREC on May 24, 2023 and laid in the area described above at OHREC (Fig. 1). Sod was also harvested at OHREC on June 13, 2023 and laid at RFTRC on June 14.
- The experimental area was mowed at 3.8 cm the first week after sodding (WAS); 2.5 cm at 2 WAS and then 1.9 cm beginning 3 WAS.

Experimental Design

- Experimental design was a split-plot with 3 replicates ; 2 whole plots (aerified vs. non-aerified prior to sodding); and 12 sub plots as cultivars from the aforementioned grow-in practices (3 cultivars, 2 N levels and 2 mowing heights).
- Whole plots measured 1.2 m x 6 m; sub-plots (sod strips laid) were 1.2 m x 0.5 m.
- Sod strips were laid on a silty clay loam soil at both locations with soil pH 6.0 at OHREC and pH 7.1 at RFTRC.

Figure 1. (A) Area where zoysia grow-in experiment was sprigged in summer 2021; (B) 'Meyer' zoysiagrass was removed from a fairway-height area at research site and sodded in 1) aerified whole plot and 2) nonaerified whole plot; (C) Sod being laid in Olathe in late May 2023; (D) Data was collected weekly on NDVI and visual quality in Olathe and Manhattan.

Data collection and Analysis

- Visual quality on a scale of 1-9 (6 = acceptable; 9 = best) was rated weekly from May 24 to August 31, 2023 in Olathe and June 15 to Sept. 1 in Manhattan.
- Normalized difference vegetative index (NDVI) [0-1] was collected weekly using FieldScout CM1000 at wavelengths 660 nm and 840 nm.
- Data was collected on maximum root length using a digital vernier caliper, and root numbers determined by cutting 30 cm off the end of each subplot, flipped over, and roots within a 6.4 cm diam. ring were counted (Fig. 2; average of 2 randomly placed).
- Both locations were subjected to three weeks of drought stress and data was collected on the scale of 1-9 (9 = no drought stress).
- Analysis of variance was performed using SAS 13.2 to evaluate main effects or interactions. Data presented or outlined hereafter refer to significance level of $P < 0.05$.

Figure 2. (A) A 30 cm area of each plot was cut and flipped to determine maximum root length and root number. (B) A 6.4 cm diam. ring was used to count root numbers.

Results

Figure 3. Impact of core aerification on NDVI and visual quality among cultivar ("Yes" after cultivar name refers to soil aerification; "No" is no aerification prior to sodding). Asterisks (*) reflect dates on which aerification resulted in lower DALZ 1808 NDVI or quality after sodding compared to DALZ 1808 on non-aerified soil. Reduction in NDVI and quality in late August in Olathe resulted from occurrence of significant drought stress.

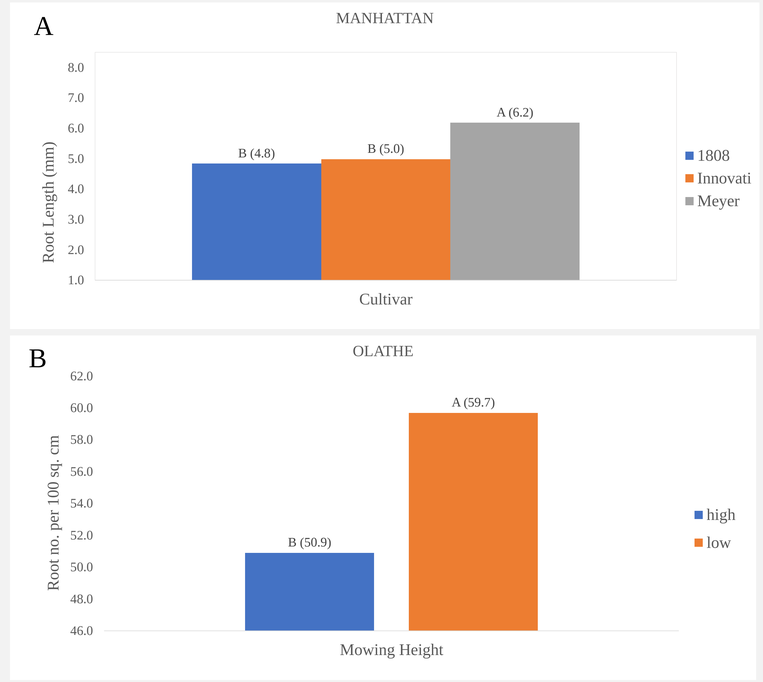

Figure 4. (A) Cultivar effects on root length 9 days after sodding in Manhattan; (B) Mowing height effect on root number 9 days after sodding in Olathe. Different letters above bars indicate statistical differences.

Summary

- Aerification prior to sod laying reduced the NDVI and quality of DALZ 1808 after it was laid; 'Meyer' and 'Innovation' were not affected (Fig. 3).
- Root length of 'Meyer' was longer than other cultivars 9 days after sodding in Manhattan (Fig. 4A).
- Low mowing during grow-in resulted in greater root number in all cultivars in Olathe when evaluated 9 days after sodding (Fig. 4B).
- After 3weeks of no irrigation/watering in Olathe, 'Meyer' exhibited more significant drought stress (6.2 rating on 1 to 9 scale) compared to 'Innovation' (7.1) and DALZ 1808 (7.3).

Conclusion

Although grow-in prior to harvest was done using high and low N and high and low mowing, cultural practices had minor impacts on sod performance after harvested and laid. Conversely, there were impacts of aerification prior to sodding (on DALZ 1808) and a significant difference among cultivars across the growing season regarding rooting and drought response. At both research sites, disruption of soil structure with aerification reduced NDVI and quality for DALZ 1808. However, more research should be done to evaluate the impact of aerifying compacted soils on sod performance of zoysiagrass.

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Reference

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