Relationship of Environment, Management, and Physiology to Bermudagrass Decline

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Objectives:

1. To determine the relationship between several environmental, cultural, and physiological factors to the development of bermudagrass decline.

Start Date: 2000
Project Duration: 3 years
Total Funding: $74,984

Bermudagrass decline is a recently described, devastating root disease of highly managed bermudagrass turf, especially turf used for golf greens in the southern United States. It is caused by an interaction of host-predisposing abiotic stresses and the soil-borne, ectotrophic, root-infecting fungus *Gaeumannomyces graminis* var. *graminis*.

The objective of this research is to determine the relationship between several environmental, cultural, and physiological factors to the development and cure of bermudagrass decline. Summer fungicide applications did not control bermudagrass decline in Tifeagle bermudagrass during 2000. The phytotoxic effects of several fungicides, due in part to application when summer temperatures were high, may actually have been counter productive to recovery from bermudagrass decline.

During 2001, the effects of monthly aerification, monthly heavy topdressing, biweekly light topdressing, and nitrogen fertilization of 6, 12, and 24 lb/1000 ft^2 annually were evaluated. Hollow tine aerification was extremely damaging because of poor rooting. Solid tine aerification was less damaging. The most advantageous treatment combination for recovery from bermudagrass decline symptoms and improvement of turfgrass quality was solid tine aerification, heavy topdressing, and 24 lb N 1000 ft^2. This improvement in quality was accomplished without raising the mowing height above 0.125 inch.

Floradwarf had greater shoot density than Tifdwarf, a finding that confirms previous reports. Shoot density of Floradwarf and Tifdwarf responded differently to N source, rate, and season. Crop growth rate (CGR) of Floradwarf increased with increasing N during summer months applied as ammonium sulfate and IBDU. However, CGR of Floradwarf in October responded very little to increasing N from either source. The CGR of Tifdwarf was very responsive in August, but not October to increasing N supplied as ammonium sulfate.

The effect of management practices on the occurrence of bermudagrass decline on ultradwarf bermudagrasses is under evaluation at Texas A&M University.

Increasing N from IBDU did not elicit the same CGR response in Tifdwarf as did ammonium sulfate. The greatest CGR in Tifdwarf fertilized with IBDU occurred at a moderate application rate. In October, both N sources caused a similarly low CGR in Tifdwarf. The CGR of both cultivars increased with increasing N, but Tifdwarf had a greater overall CGR at all N levels than Floradwarf.

In both Floradwarf and Tifdwarf, N source and rate had a substantial effect on CGR, but only slight effects on shoot density. The maximum CGR of Tifdwarf was two to three times greater in August than for Floradwarf, but the CGR of these cultivars was similar in October. Floradwarf had poorer turf quality than Tifdwarf in October even though the CGR of the cultivars was similar.

These data indicated that the difference in turf quality observed among cultivars in October was not the result of a more rapid growth rate in Tifdwarf compared with Floradwarf. Increasing N increased CGR and turf quality of Floradwarf to a small extent in October. The poorer quality of Floradwarf during October 2001 was characteristic of bermudagrass decline symptoms, including poor response to N, chlorosis, and a thin canopy.

Thus, Floradwarf was more vulnerable to bermudagrass decline than Tifdwarf at a low CGR. Although turf quality during October increased with increasing N for Floradwarf, increasing N did not totally mask symptoms of bermudagrass decline as anticipated.

Summary Points

- Hollow tine aerification was extremely damaging because of poor rooting. Solid tine aerification was less damaging.
- The most advantageous treatment combination for recovery from bermudagrass decline symptoms and improvement of turfgrass quality was solid tine aerification, heavy topdressing, and 24 lb N 1000 ft^2.
- Floradwarf had greater shoot density than Tifdwarf.
- Summer fungicide applications did not control bermudagrass decline in Tifeagle bermudagrass during 2000.
- The difference in turf quality observed among cultivars in October was not the result of a more rapid growth rate in Tifdwarf compared with Floradwarf.
- Although turf quality during October increased with increasing N for Floradwarf, increasing N did not totally mask symptoms of bermudagrass decline as anticipated.