

Management of Take-all Patch of Creeping Bentgrass on Greens Constructed to USGA Specifications

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Objective

The objective of this research is to determine the effect of pre-plant and post-plant treatments on the establishment and spread of take-all patch of creeping bentgrass in a sand-based root zone prepared according to USGA specifications.

Rationale

Take-all patch, caused by *Gaeumannomyces graminis* f. sp. *avenae*, is favored by alkaline soils. Because the calcareous sands used for putting greens in the Midwest have a high pH, bentgrass greens constructed with high sand content or to USGA specifications are especially prone to the disease. Previous research addressed take-all patch on established bentgrass greens and fairways with a history of the disease. The proposed research is designed to investigate options for avoiding or reducing the potential severity of take-all problems on newly constructed sand-based greens with both cultural and chemical disease control options.

How It Was Done

The research is being conducted at the William H. Daniel Turfgrass Research and Diagnostic Center at Purdue University. The experimental site is a 5000 sq ft area of creeping bentgrass (*Agrostis palustris* cv. Pennlinks) planted into a sand-based rootzone mix prepared according to USGA specifications in April, 1998. The experimental design was a randomized split plot, with whole plots represented by the target pH (5.5, 6.5, and 7.5). The pH of the root zone mix was 7.5. The adjustments to 6.5 and 5.5 were made by incorporating acidifying amendments such as aluminum sulfate and ammonium sulfate. The subplots involve different combinations of nitrogen fertilizer and fungicide application (Table 1).

Prior to seeding, the whole plots designated pH 5.5 and 6.5 were treated with ammonium sulfate at rates equivalent to 1.79 lb/cubic yard and 5.48 lb/cubic yard, respectively. The ammonium sulfate was lightly incorporated into the top 1 - 2 inches of the root zone mix. Once the turf was established, aluminum sulfate was applied to the 5.5 and 6.5 target pH plots on Jun 1, and Aug 31. Subplots were treated with ammonium sulfate (21-0-0) or a complete fertilizer (18-4-10) on Sep 16, and Oct 9, 1998 at a rate equivalent to 0.75 lb N/1000 sq ft. Fungicide (Banner Maxx at 2.0 fl oz/1000 sq ft) was applied to appropriate plots on Oct 16, 1998.

Introduction of the pathogen into the treatment plots was attempted on two separate occasions. On June 1, approximately 25 g of millet seed infested with *Gaeumannomyces graminis* f. sp. *avenae* (Gga) was placed into the turf after a 1" deep soil core was removed from 3 sites in each treatment plot. The soil cores were then replaced over the inoculum.

Results

Take all patch symptoms were expressed precisely at the inoculation sites in many of the experimental plots. A take all patch severity index (see Table 3) was devised to evaluate treatment effects. Although the data have not been subjected to statistical analysis, several trends are quite clear. Take all patch symptoms were far more severe in the treatment that included a balanced fertilizer (18-4-10) and no fungicide than in any other treatment (Table 3). Severity index means were 2.75, 2.00, and 1.83 for the target pH values 7.5, 6.5, and 5.5, respectively. It appears that the acidifying fertilizer (21-0-0) and fungicide treatments resulted in significant disease suppression. Symptoms dissipated slightly as the rate of turf growth increased and normal mowing practices were initiated for the spring. Disease severity will be monitored and indexed periodically throughout the growing season. It is expected that severity will increase during periods of summer heat and drought stress.

Conclusions regarding the effects of the initial acidifying treatments cannot be drawn until statistical analysis is complete. There appears to be no difference in mean take all patch severity between target pH 7.5 and 6.5. However, there was a nearly 20 % decrease in the mean take all patch severity where the target pH was 5.5 (Table 1).

Table 1. Take all patch severity index ratings were recorded in April, 1999. Values represent the mean of 4 replications.

Treatment	Target pH			Means
	7.5	6.5	5.5	
	----- Take-all severity ^a -----			
No fungicide / N (21-0-0)	0.83	1.17	0.67	0.89
Fungicide / N (21-0-0)	0.08	0.42	0.42	0.31
No fungicide / N (18-4-10)	2.75	2.00	1.83	2.19
Fungicide / N (18-4-10)	0.33	0.33	0.25	0.31
Target pH mean	1.00	0.98	0.79	

^aTake all patch severity index:

- 0 = take all patch symptoms were not evident
- 1 = take all patch symptoms consisted of inconspicuous patches of thin turf at the inoculation sites
- 2 = take all patch symptoms consisted of well defined patches of thin and chlorotic turf at the inoculation sites
- 3 = take all patch symptoms consisted of well defined patches of orange and brown turf