

Managing Take All Patch

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Objective

To determine the effects 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. The research described herein is part of a multi-year project to investigate factors that influence the development of take all patch and is funded by the Golf Course Superintendents Association of America.

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. This 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 experimental site was initially established with replicated blocks where pH levels in the top inch of root zone mix were adjusted to 5.5, 6.5, and 7.5 prior to seeding (spring 1998). Although the pH differences influenced take all patch development in 1999, no effect was observed in 2000. This was not unexpected, as the pH of all blocks returned to that of the original root zone mix (pH = 7.5 - 7.8) by fall of 1999. On 1 June-98, 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. Subplots within each target pH block were treated with ammonium sulfate (21-0-0) or a complete fertilizer (18-4-10) at a rate equivalent to 0.75 lb N/1000 ft² twice each fall and once each spring since Sep 1998. Fungicide (Banner Maxx at 2.0 fl oz/1000 ft²) once each fall and spring. Disease development was evaluated using a visual severity index described in the table below.

Results

Beginning in spring, 1999, take all patch symptoms were expressed precisely at the inoculation sites in many of the experimental plots. In 1999, symptom expression was evident from early Apr through June. In 2000, symptoms were not observed until late May, then subsided a month later. Based on the results to date, the following conclusions may be drawn.

- In 1999, slight differences in take all patch severity occurred where pH was adjusted by soil amendments during spring 1998. Mildest symptoms occurred in plots with the lowest (5.5) target pH. The pre-plant pH adjustment treatment had no effect on disease severity as it occurred in 2000.

- Take all patch symptoms were more severe in the treatment that included a balanced fertilizer (18-4-10) and no fungicide than in nearly all other treatments for both years.
- The acidifying fertilizer (21-0-0) and fungicide treatments resulted in significant disease suppression in 1999, but had less of an effect in 2000.
- Plots treated with fungicide resulted in less severe symptoms than unsprayed plots in almost all cases in both years.
- Although it was expected that symptom expression would increase during periods of heat stress, no changes in plot appearance occurred during the early July 1999 heat wave. In fact, symptoms did not reappear in summer or fall of 1999. Initial outbreaks were observed nearly six weeks later than expected in 2000.

Take All Patch Management Suggestions

- If fungicides are used for take all patch control, then effective products must be applied when the pathogen is active. The take all patch pathogen is active when soil temperatures in the upper 2 inches of soil are between 55 and 70°F. Fall and spring applications are advisable. Summer applications are not likely to do much good if the fungus is dormant in the soil and plant roots.
- Creeping bentgrass can recover from take all patch infection only if new root growth is extensive enough to compensate for roots damaged by infection. Practices that encourage vigorous root growth are most likely to lessen the effects of the disease.
- Symptoms of take all patch continue through the summer because roots are damaged to the extent that water uptake becomes limited. Plants continue to wilt and die. Practices that reduce summer stress may lessen symptom severity. These include thatch management, proper irrigation, traffic control to reduce compaction, and adjusting mowing height.

Table 1. Take all patch severity for spring 1999 and from 26 May through 23 June 2000, in plots treated with fungicide and nitrogen fertilizers.

Fungicide treatment	N source	1999			2000		
		Apr	May	June	May	June	June
Fungicide	21-0-0	0.31 c ^{ab}	0.75 c	0.27 b	0.58 b	1.00 b	0.42 b
Fungicide	18-4-10	0.31 c	1.41 b	0.58 b	0.67 b	1.17 b	0.50 b
No fungicide	21-0-0	0.97 b	1.47 b	1.03 a	0.83 b	1.44 a	0.92 a
No fungicide	18-4-10	2.19 a	2.31 a	1.11 a	1.17 a	1.39 a	0.92 a

^a Take all patch severity index:

0 = take all patch symptoms were not evident

1 = take all patch symptoms consisted of inconspicuous patches (up to 12" diameter) of thin turf at the inoculation sites

2 = take all patch symptoms consisted of well defined patches (up top 12" diameter) of thin and chlorotic turf at the inoculation sites

3 = take all patch symptoms consisted of well defined patches (greater than 12" diameter) of orange and brown turf around the inoculation sites

^b Means within columns followed by different letters are significantly different from each other.