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TURFGRASS TRENDS

CURING TAKE-ALL PATCH

Curative Control of Take-all Patch Successful in Decline Phase

By Steven J. McDonald and Mike A. Fidanza

Take-all patch (*Gaeumannomyces graminis* var. avenae) can be a troublesome disease to control in young stands of creeping bentgrass (*Agrostis stolonifera*) (Smiley et al., 2005). Take-all patch (TAP) is a root disease that often affects creeping bentgrass maintained on golf course tees, greens and fairways. This disease can be especially damaging to turf grown in sand-based soils with a pH greater than 6.5.

PHOTO 1

Take-all patch manifests as circular or oblong orange to tan patches, which can wilt quickly in mid-summer.

In late spring, symptoms of TAP include circular or oblong, orange to tan patches in the turf canopy. During the heat of mid-summer, however, those patches tend to wilt quickly, turn reddish-purple and eventually white to straw color (Photo 1).

Typically after 10-12 years, and sometimes as soon as two to four years, TAP goes through a decline phase in which the disease becomes less and less severe and may not persist or occur during the summer (Dernoeden, 1983).

Previous research efforts have shown that adjusting soil chemical properties by acidifying soil can reduce the severity of TAP (Goss and Gould, 1967). Furthermore, the micronutrient manganese (Mn) has been shown to suppress TAP (Hill et al., 1999, Heckman et al., 2003). The research showed that applications of Mn over the course of one year could decrease the severity of take all patch.

Preventive applications of fungicides are commonly used to control TAP of younger stands of bentgrass (Latin, 2005). Best TAP control was observed after applications of fungicides in the late autumn and again the following early spring. Fungicide treatments should be applied in high water-carrier volume (more than 2 gallons per 1,000 square feet) and/or watered-in (0.2 inches of water). In many instances, however, it can be logistically difficult for golf course superintendents to make preventive fungicide applications. Research is extremely limited on the impact of fungicide, Mn, and wetting agent materials applied alone or in tank-mixes to suppress TAP symptoms in the

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TABLE 1

Treatment List

Product or products	Active Ingredient/ Nutrient/Composition	Rate or nutrients supplied
Heritage TL	Azoxystrobin	2 fl oz/1,000ft² product
Headway	Azoxystrobin + propiconazole	3 fl oz/1,000ft² product
Headway + 0-0-0-5% Mn + Flow Thru Wetting Agent	Azoxystrobin + propiconazole + Mn + proprietary blend of surfactants	3 fl oz product + 0.01 lb Mn + 3 /1,000ft² product
Lynx[x]	Tebuconazole	1.5 fl oz/1,000ft² product
Tartan	Trifloxystrobin + Triademefon	2 fl oz/1,000ft² product
Insignia	Pyraclostrobin	0.9 oz/1,000ft² product
Nutrient + Wetting Agent Program (0-0-0-5% Mn, Techmangum 32%$MnSO_4$, 12-0-0, and Flow Thru Wetting Agent)	Mn + Mn, N + S, proprietary blend of surfactants	0.07 lb Mn, 0.27 lb S, 0.12 lb N + 3 fl oz/1,000ft² product
Untreated Control	-	-

[x] *Lynx is the proposed name for tebuconazole and it is not currently registered by the U.S. Environmental Protection Agency.*

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summer. Therefore, the purpose of this field study was to evaluate a method to provide the best curative control of TAP in a creeping bentgrass fairway.

Curative control

A curative TAP trial was conducted on the seventh fairway at Bellewood Golf Club in North Coventry, Penn.

Prior to the study year, this site had been annually damaged by TAP. The fairways were originally seeded to PennTrio creeping bentgrass in 1998. Soil at the site had a pH of 6.4 with 5.4 percent organic matter. Generally, 2 pounds of nitrogen per 1,000 square feet was supplied to the fairways annually, and there was 1 pound potassium applied in April 2006.

Black ectotrophic hyphae typical of *Gaeumannomyces graminis* var. avenae had been microscopically identified on infected creeping bentgrass roots at the site about two weeks before initiation of the study. The site had an average of 15 to 20 percent blighted turf at the start of the study. Treatment information is outlined in Table 1. All treatments were applied at approximately 14-day intervals. Those dates were June 14 and 29, and July 12, 2006. Treatments were applied in 4 gallons of water per 1,000 square feet.

A light syringe (0.2 inch) was applied to the study area the evening following applications. Individual plots measured 5 feet by 5 feet, and arranged in a randomized complete block design with three replications (Photo 2, p. 52).

Disease ratings were assessed as a percent of plot area blighted by TAP on linear 0 to 100 scale, with 0 = no disease and 100 = entire plot area blighted.

PHOTO 2

Test plots were 5 feet by 5 feet and were arranged in a randomized complete block design with three replications.

Results and summary

On June 21 (seven days after the initial treatment), no statistical differences were observed among all treatments, including the untreated check (Table 1). However, all treatments except Tartan (21 percent TAP) were associated with a noticeable reduction of TAP severity (10.4 to 19 percent), when compared to the untreated control (22.3 percent TAP).

A similar trend was observed on June 29 and all plots were retreated on June 29. By July 12, statistically significant treatment differences were observed. Turf treated with the nutrient plus wetting agent program (1.7 percent TAP), and all fungicide-treated plots (0.3 to 4.6 percent TAP) except those plots that received Insignia (8.6 percent TAP), exhibited statistically lower TAP compared to the untreated plots (13.3 percent TAP). Following a stretch

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QUICK TIP

The process of respiration uses oxygen as an oxidizing agent to generate energy to sustain life. Indirectly, oxygen must also be present in soil for bacteria to convert ammonium to nitrates, a process referred to as nitrification. Adversely, denitrification is the conversion of nitrates to nitrogen gases under anaerobic conditions where oxygen is absent. This loss by gas reduces the efficiency of nitrogen fertilizers that turf managers apply. And these nitrogen gases contribute to increased levels of greenhouse gases. One way to increase oxygen levels in soil is by aeration, but aerifying this time of year is difficult for many reasons. Golfers dislike the disruption of the putting surface, so any form of a less-invasive aerification method is well received. Those little holes on the green provide many benefits to both plants and humans. So next time someone complains after aerification, talk it up with scientific jargon, and blow their minds.

TABLE 2

Percent of plot area visually blighted by take-all patch as influenced by fungicide and/or nutrient application in a creeping bentgrass fairway at Bellewood Golf Club, North Coventry Pa.; 2006.

Treatment [x]	Percent of plot area blighted [y]		
	----------0-100----------		
	21 June	29 June	12 July
Heritage TL	13.7 a [z]	8.3 a	2.3 d
Headway	16.3 a	7.7 a	4.6 bcd
Headway + 0-0-0-5%Mn + WA	16.7 a	5.3 a	0.3 d
Lynx	19.0 a	8.0 a	2.3 d
Tartan	21.0 a	11.3 a	3.3 cd
Insignia	16.7 a	6.0 a	8.6 ab
Nutrient + Wetting Agent Program	10.4 a	5.0 a	1.7 d
Techmangum			
0-0-0-5%Mn			
12-0-0-26			
Flow thru wetting agent (WA)			
Untreated Control	22.3 a	10.7 a	13.3 a

x All treatments were applied on June 14 and 29, and July 13 2006.

y Percent of plot area blighted was rated on a 0 to 100 scale with 0= no disease and 100= entire plot area blighted with take-all patch.

z Means in each column followed by different letters are significantly different (P ≤0.05) according to the Fischer's Protected least significant difference test.

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of cooler, wet weather in early July, TAP activity was slowed and reduced by mid-July.

By late July, plots that were completely TAP free (no blight symptoms) were those treated with Heritage TL, Headway plus 0-0-0-5 percent MN plus wetting agent, Lynx, and Tartan (data not shown). All other treatments including the untreated check had an average greater than 3 percent blight. The study area was again evaluated on Aug. 2, and no TAP was visible within any plots.

Due to the quick recovery of the creeping bentgrass within the study area and in the surrounding fairway, the TAP on this fairway was considered to be in the "decline phase." Data from this one-year study indicate that curatively managing TAP in the decline phase can be partially successful with applications of fungicides or fungicides and nutrients in tank-mix combinations. Future research is planned for the 2007 season evaluating preventive as well as curative control options for TAP in creeping bentgrass.

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