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TOPDRESSING RESEARCH FOR CONTROLLING TAKE-ALL ROOT ROT OF ST. AUGUSTINEGRASS

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INTRODUCTION

Turfgrass diseases caused by root-infecting fungi are becoming an increasing problem on residential landscapes and golf courses. In recent years, the take-all root rot disease of St. Augustinegrass has emerged as a major problem on Texas residential lawns. Take-all root rot is caused by a black mycelial fungus (Fig.1) that colonizes roots, stolons and shoots showing symptoms of the disease. The fungal pathogen causing this disease (*Gaeumannomyces graminis var. graminis*) appears to be widely occurring on Texas lawns. Damaging effects of this disease on St. Augustinegrass were first observed and described in Texas by Dr. Joseph Krausz (plant pathologist at Texas A&M University) and in Florida by Dr. Monica Elliott (University of Florida) who observed numerous turfgrass diagnostic samples which were attributed to the disease. In a 1999 survey of St. Augustinegrass lawns in north Dallas, we observed yellow patch symptoms of the disease on 61% of 70 lawns during the month of September (Fig. 3). If this disease progresses it kills the stolons and produces patches of dead grass ranging from 3-10 ft in diameter. High summer temperatures and freezing winter temperatures kill infected grass easily and that is why the disease is such a problem. Because of the widespread nature of this disease, our research investigations sought to develop a practical control measure for St. Augustinegrass lawns.


Fig. 1. Mycelial growth on stolon


Fig. 2. Take-all root rot symptoms on St. Augustinegrass

DESCRIPTION OF FIELD SYMPTOMS

Symptoms of take-all root rot disease appear on St Augustinegrass during late spring and throughout the summer. The disease is primarily attributed to a severe root rot that completely destroys tap roots which anchor St. Augustinegrass stolons to the ground. Visual symptoms of the disease on lawns are initially small patches of turf with yellow leaf blades that appear chlorotic while the healthy grass remains a typical green color (Fig. 3). The yellow patches are thought to be associated with the production of a toxin by the fungus when the turf is growing under stressful conditions. The yellows symptoms of the disease can persist on lawns throughout the summer growing season. Hyphal threads of the soil-borne fungus can often be observed on white stolon internodes and at the base of infected shoots (Fig. 1). Dark brown or black mycelial threads of this fungus are distinctive with scattered black dots (hyphopodia) that anchor the fungus to the plant. Roots of affected plants become short, discolored, and often have dark colored lesions that are visible upon inspection. Eventually the roots become completely rotted and shriveled to form a non-functional root system (Fig 2). In the final stages of decline, diseased stolons gradually succumb to hot summer temperatures or cold weather and produce dead patches of grass that do not recover from injury.

Affected patches of turf can at first be quite small ranging from 1-2 feet in diameter; however, they also appear as larger areas that can range from 5-10 feet in diameter. Diseased areas are not always circular but often appear as roughly circular patterns in the lawn. In our 1999 take-all root rot survey on North Dallas lawns, we observed a higher number of take-all symptoms in shaded areas of lawns compared to areas receiving direct sunlight for most of the day (Fig. 4). Most of the lawns we observed had less than 5% of the lawn showing disease symptoms but we also observed St. Augustinegrass lawns with 75% damage by the disease. The take-all root rot disease is not to be confused with grub damage which can also appear at the same time of the year. The best clue is to look for the yellow or chlorotic patches on St. Augustinegrass turf that has not received mowing for several days. It is easier to observe the chlorotic symptoms on the longer blades of grass as shown in the accompanying photo (Fig. 3). Symptoms of this root rot disease also include the appearance of brown shriveled roots that are killed by the fungus as opposed to white grub damage where the roots are actually removed by insect feeding.


Fig. 3. Yellow patch symptoms

SEARCH FOR A DISEASE CONTROL

We used two approaches to control this disease on area lawns in our year 2000 – 01 investigations. One approach utilized conventional fungicide sprays with: Terraguard® (50% triflumizole) and Bayleton® (50% tridimefon) where applications were made at recommended rates using 2.9L of spray per 10 m^2 (Table 1). A second approach utilized applications of compost topdressings which were capable of enriching suppressive bacterial microflora around exposed stolons where the disease occurs. During the first year of research, we concentrated on the use of bulk compost, chicken manure products, commercial fertilizer products, and manure composts for their suppressive effects on the disease. We tested products that are currently available through local Dallas distributors. In evaluations of five topdressing products placed on diseased lawns, we observed consistently good results with HuMore® compost which is an aerobically composted cow manure product. During the second year, field evaluations the HuMore® topdressing was evaluated on three area lawns. There were visual growth benefits of HuMore® compost applications on St. Augustinegrass home lawns. Benefits of the treatment included, better rooting and growth of St. Augustinegrass stolons, and the gradual elimination of symptoms of the disease over a 5-week period. Improved root formation and excellent turf growth occurred following applications of HuMore® compost at a topdressing rate of 25 lbs product per 100 ft^2 of turf area. Research field plots with the fungicides Terraguard® (4 - 8 oz) or Bayleton® (2 oz) treatments also gave good results for controlling the take-all root rot symptoms on one area lawn (Table 1). Success with the fungicide treatments was much better on a lawn maintained under shaded conditions than on a second lawn maintained with direct sunlight and lower cultural inputs.

A second approach using low pH topdressing products such as sphagnum peat moss has also shown TAP disease suppression in field studies during 2001. Our field comparisons of manure compost *vs.* peat moss topdressings indicate the peat moss to be a more effective long-term approach for reducing "yellows" symptoms of the disease. Some of the older research literature on the fungus causing TAP indicates its aversion to low pH. This might explain how the peat moss (pH = 4.4) controls the fungus on exposed stolons and roots where the disease is active.

CONCLUSIONS

There is no indication of varietal resistance to take-all root rot since the disease has been noted on all of the commercial St. Augustinegrass varieties. The use of fungicide applications is also limited with only a few fungicides that are approved for use on this disease. Although there is good evidence that fungicides are capable of controlling the disease, environmental conditions and vigor of the turf may pose some limitations on the effectiveness of fungicide treatments. At this time we have no explanation as to why we observed a lack of uniformity in fungicide effectiveness on different lawns.

Use of topdressing materials for turfgrasses has recently received attention by scientists in the northeast United States (Nelson, et al, Cornell Univ.). Organic compost mixtures containing various types of animal manure have shown promising results for controlling patch diseases on cool season turfgrasses.

Peat moss topdressing is also reducing symptoms of TAP for longer periods than cow manure compost (Table 1). Additional research will address the best time to apply both topdressing products to control TAP. We are very encouraged by this organic approach to controlling TAP.

Table 1. Mean percent take-all root rot disease on St. Augustinegrass lawn following fungicide treatments. Richardson, Texas, May—August 2000—01.

Year	Treatment[1]	Rate[2]	Mean % Diseased Over Time							
			Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Mean
2000	Terraguard 50W	4	1.0 a	0.1 a	0 a	0 a	0 a	0 a	0 a	0.16 a
	Bayleton 50W	2	0.8 a	0 a	0 a	0 a	0 a	0 a	0 a	0.11 a
	Manure Compost	25	10 b	3.5 b	0.9 a	0.3 a	0 a	0 a	0 a	2.1 a
	Untreated Check	-	1.5 a	0 a	0 a	0 a	0 a	0 a	0 a	0.21 a
2001	Peat moss	35	3 b	0 c	1.2 c	3.0 d	1.0 d	1.0 d	3 d	1.74 c
	Manure Compost	25	5 b	10 b	8 b	10 c	30 b	20 b	25 b	15.47 b
	Compost + Peat	30	-	-	-	30 b	10 c	10 c	12 c	15.50 b
	Untreated Check	-	40 a	46 a	41 a	42 a	60 a	52 a	50 a	27.28 a

1. Treatment Compost + Peat was a 50:50 (v/v) mixture
2. Rates for fungicides Terragurd and Bayleton were oz product/1000 ft^2; Rates for other treatments were lb product/100ft^2

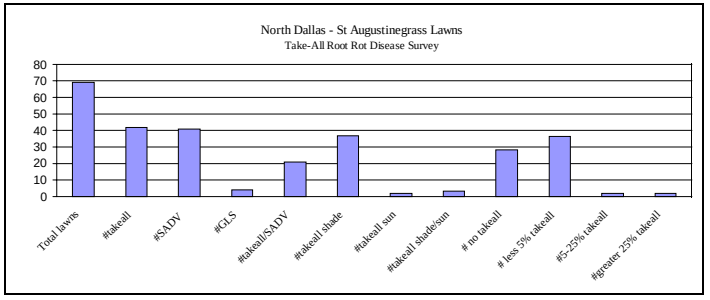

Fig. 4. 1999 take-all root rot survey on North Dallas St. Augustinegrass lawns