Effect of First Application Timing on the Control of Anthracnose

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Recently, anthracnose basal rot and foliar blight, caused by *Colletotrichum graminicola*, has become an important disease in Wisconsin and other parts of the US. During the past two summers, my research program carried out field experiments to understand why some fungicides have reduced efficacy for anthracnose control and ultimately to find the most effective fungicides which will aid in control recommendations. This past summer's field experiments were run to test fungicide efficacy for controlling anthracnose at the Blackhawk Country Club (BCC) in Madison and the Plum Lake Golf Course (PLGC) in Sayner, WI. This project was funded by WTA and NGLGCSA. Primary objectives resulting from two separate experiments at both sites were 1) to reaffirm research results of what we found in 2002's experiment, 2) to determine if timing of initial fungicide applications has an effect on disease control, and 3) to evaluate interactions between fungicides, plant growth regulators, and fertilizers for the disease control. In this article, objectives #1 and 2 will be discussed from the results of the first experiment. In the next Grass Roots article, objective #3 will be discussed from data obtained in the second experiment.

Materials and Methods

Fungicides that are labeled for controlling anthracnose and were selected for this study are listed in Table 1. The experimental plot at Blackhawk Country Club in Madison, WI was set up on an annual bluegrass/creeping bentgrass fairway where more than 60% of the turfgrass population was estimated to be *Poa annua* species. The fairway stand at Plum Lake Golf Course in Sayner, WI was nearly 100% *P. annua*. Over the years, high disease pressure has been consistently observed at both locations. The experimental design was a split-plot with four application timings (initial application on June 5, June 16, June 30, and July 14 at the BCC and June 8, June 17, June 29, and July 15 at the PLGC) as sub-plot treatments in a randomized complete block design. The fungicides were applied to entire whole-plot (Table 1) and the individual plot size was 3 ft x 5 ft. Preventive chemical applications (14 day interval) from the initial application were continued on June 16, June 30, July 14, and July 28, and August 11 at the BCC and June 17, June 29, July 15, July 29, and August 14 at the PLGC, 2003. Liquid treatments were applied with a CO2-powered boom sprayer using XR Teejet 8005 VS nozzles at 30 psi in water equivalent to 2 gal per M. Both sites are maintained at 0.5" mowing height, and the plots did not receive fertility or plant protection treatments during the studies.

Disease ratings (percentage of plot area with symptoms) of the plots were visually recorded on September 2nd and 12th, 2003 at the BCC but not at the PLGC because no disease was noticed at PLGC. The first disease symptoms at the BCC were noticed around the first week of August which was almost one month later than the previous year. In addition, the total percentage of *P. annua* populations per plot was visually estimated on June 6, 2003. Since the anthracnose occurred only on *P. annua* species, the percentage of the diseased areas of *Poa* was recalculated by estimating the percentage of the entire plot that was diseased and then dividing that amount by the proportion of *P. annua* present in the plot. The final data analysis using the recalculated damage percentage was carried out and presented in Table.

Results

Daconil Ultrex® (contact fungicide) performed very well as observed in the previous year. In addition, Banner MAXX® and Endorse® controlled the anthracnose as well as Daconil Ultrex®. However, in a statistical point of view, these fungicides differ in effi-

Table. Systemic and contact fungicides evaluated for the control of anthracnose disease of *Poa annua* at the Blackhawk Country Club in Madison, WI.

Treatment	Rate (oz a.i./M sq ft)	Mean (%) of diseased area[a]
Bayleton (Triadimefon: 50WDG)	0.5	39.2 a
Cleary's 3336 (Thiophanate-methyl: 4F)	4 FL	32.8 ab
Compass (Trifloxystrobin: 50WG)	0.15	26.1 abc
Control		20.9 abc
Heritage (Azoxystrobin: 50WDG)	0.2	19.3 abc
Chipco Signature (Fosetyl-al: 80WG)	4	12.0 bc
Endorse (Polyoxin D: 2.5WP)	4	6.3 c
Banner Maxx (Propiconazole: 1.24MC)	1 FL	5.1 c
Daconil Ultrex (Chlorothalonil: 82.5WDG)	2.75	2.1 c

[a]Values followed by the same letter do not significantly differ ($\alpha = 0.05$).

cacy from Cleary's 3336® and Bayleton®, but not from the other fungicides despite a difference in the mean percentage of the diseased area (see Table). One of the reasons for the huge variation was probably due to the fact that this was an uninoculated field experiment. In addition, anthracnose severity is highly correlated with factors such as drought, traffic, and other stresses, so the unequal level of stresses may have also contributed to the variation. Another reason is that less disease pressure impacted by this year's less favorable environmental conditions might contribute the variation. However, the overall trend of fungicide efficacy for controlling the disease was observed this year as in the 2002 study.

No significant treatment effect (4 application timings: June 5, June 16, June 30, and July 14) was detected in our experiment. In other words, if we start to apply preventive fungicides much earlier than the actual time of first disease occurrence, it does not help for the disease control as compared to applications made right before disease development. The timing schedules were determined using last year's data as a model and where the disease starts to show up around first week of July. When I compared air and soil temperatures from May through October of 2002 and 2003, lower temperatures and a shorter window of delayed warm temperatures were observed this year when compared to last year. Therefore, my interpretation is that since we had started the first application treatments much earlier than the disease outbreak, the effect of the treatments with different timings was not experimentally compared. That is why the field experiment still provides curiosity and joy to hundreds of researchers throughout the world.

Conclusion

It was very difficult to perform a field evaluation of fungicides for the control of anthracnose due to environmental variation and other factors such as the mixed growth of annual bluegrass and bentgrass species in the same area and a huge variation of disease expression due to natural inoculation or stresses. Another year of data is required before drawing any final conclusion. More biologically related research should be done because this disease is not simple as many researchers and superintendents may think. Many biological questions on this creature that we did not know about have created conflicts among turf pathologists. Hopefully, I will design a more in-depth experiment to understand the biology of the disease step by step this year.

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