Effects of early season fungicide application on dollar spot outbreaks, 2011

PURDUE UNIVERSITY
TURFGRASS SCIENCE

R. Latin and J. Daniels, Department of Botany and Plant Pathology, Purdue University

SUMMARY: Recent promotional and anecdotal evidence suggest that early season – as early as the first or second mowing for putting greens – fungicide applications will delay dollar spot outbreaks and improve fungicide performance. There are no published research results that directly support the notion that early season fungicide are worthy of consideration. This research was designed to evaluate the contributions of early season fungicide applications towards dollar spot control on creeping bentgrass putting greens. Results show that plots treated in March and April of 2011 sustained significantly greater amounts of dollar spot than when plots were treated shortly prior to the first natural outbreak of the disease. This supports the principles that fungicides will be effective only when the pathogen is active and that fungicide residues are depleted rapidly from turf.

Materials and Methods

The research was conducted at the Purdue University Daniel Turfgrass Research and Diagnostic Center in West Lafayette, IN. The plots were located on a sward (identified as 16.9) of Pennlinks creeping bentgrass maintained at a height of 0.18 in. Irrigation and aerification operations were done according to standard practices for creeping bentgrass putting greens. During spring 2011, fertilizer (18-4-10) was applied at a rate of approximately 0.5 lb N per 1000 sq ft on April 11, May 16, and June 17. Individual treatment plots measured 3.3 ft by 6.6 ft (1m x 2m) and were randomized within each of the 4 replications.

The site had been thoroughly involved with dollar spot in past years. Therefore, no supplemental inoculum was applied.

The fungicide treatment used for all sprays was a tank mix of Banner Maxx (1.0 fl oz/M) and Chipco 26019 (2.0 oz/M). Applications were made using a custom-built boom sprayer. Three Tee-Jet air induction nozzles (AI9503EVS for the middle, AIUB8503EVS for both sides) were mounted approximately 12 in. apart on the boom located 14 in. from the ground. The sprayer was calibrated to deliver 2 gal per 1000 sq ft at 40 psi.

Fungicide was applied to each replicated treatment only once, on each of the following dates: March 23, March 30, April 6, April 13, April 20, April 27, May 4, May 11, and May 18. A designated "no-fungicide" check plot also was included. We were prepared to continue the applications through July 1, but stopped our weekly spray program once the natural outbreak of dollar spot occurred in the check plots.

The plots were inspected 3 times per week beginning with the initial application. Once symptoms began to appear in the plots, disease severity (infection centers per plot) was recorded on alternate days for a week. Disease severity data were subjected to analysis of variance and means separation procedures.

We used our Purdue Turfcast system to determine the daily environmental favorability for infection beginning on March 16. The daily values were compiled over time to describe the environmental favorability for dollar spot development over the experimental period.

Latin, R., and J. Daniels. 2012. Effects of early season fungicide application on dollar spot outbreaks, 2011. 2011 Annu. Rep. - Purdue Univ. Turfgrass Sci. Progr. p. 72-73.

Results and Discussion

Results of the 2011 experiment are presented in Figure 1. The right hand axis (Cumulative EFI) represents a running total of daily favorability for dollar spot infection based on temperature and moisture. (Environmental favorability index (EFI) values describe the daily disease pressure based on weather). The slow increase in EFI values from March 14 through April 20 indicates that infection and pathogen growth were limited. However, after that, the line trends markedly upward, showing increasingly favorable conditions for pathogen growth and disease development. The left hand vertical axis represents the average number of dollar spots that appeared in plots on May 24, just after the first natural outbreak of disease at the experimental site.

Results show that the date of fungicide application clearly influenced the level of dollar spot control. Fungicide applications during the weeks just prior to the initial outbreak of dollar spot symptoms provided excellent control—they averaged less than one spot per plot. Fungicide sprays applied prior to May 2, sustained significantly greater disease development.

Results reinforce the principle that in order to be effective, fungicide applications must be made while the pathogen is active. Only an active pathogen is able acquire the chemical toxin. If the pathogen is inactive, then toxic amounts of fungicide will not accumulate in fungal cells, and the treatment will have little or no effect on pathogen growth. Furthermore--in most cases--early season fungicide applications fail to contribute to acceptable dollar spot control because by the time pathogen activity accelerates, fungicide residues are often depleted to the point where there is insufficient chemical toxin to restrict fungal growth. This does not preclude the possibility that early season applications can be effective in some years. However, when they are effective, it is only because temperature and moisture conditions favored pathogen growth, and the growing fungal hyphae encountered sufficient amounts of fungicide to kill cells and stop further growth.

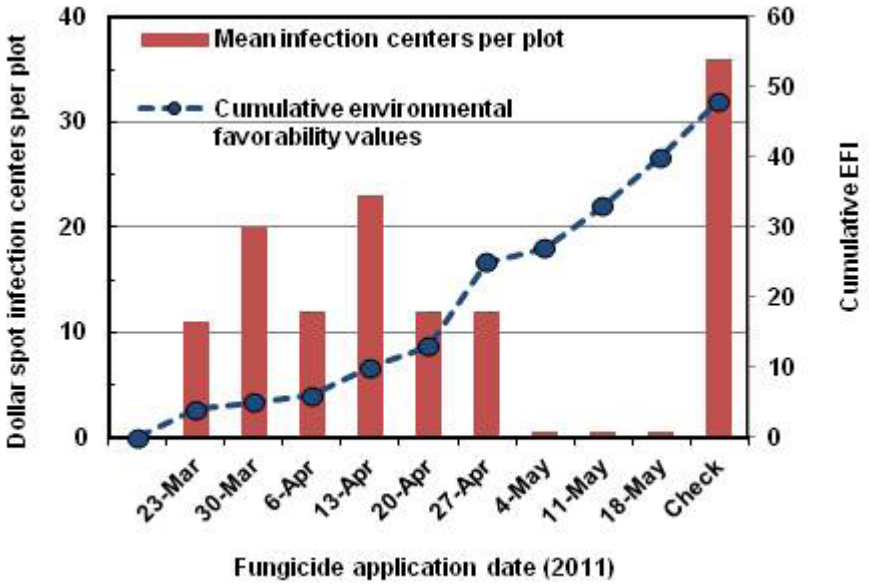

Figure 1. Dollar spot severity (recorded on May 24) associated with replicated plots sprayed once—beginning in mid-March through May 23, 2011. The column on the far right represents a no fungicide check plot. The dashed line tracks environmental favorability of infection by the dollar spot pathogen.