

Fungicide Selection and Timing for *Rhizoctonia* Large Patch Control

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Objective

Determine which fungicide(s) and application schedules are most effective against *Rhizoctonia* Large Patch

Rationale

An important constraint to widespread use of zoysia is *Rhizoctonia* large patch (RLP) caused by *Rhizoctonia solani* (Kuhn AG 2-2). This pathogen infects zoysia grown in the transitional climate of United States and Asia, but this is a different group of *Rhizoctonia solani* that causes brown patch in cool-season grasses. RLP symptoms are present in the fall and spring as zoysiagrass goes into or comes out of winter dormancy. The disease expresses itself as large circular patches with orange borders. The fungus will not completely kill zoysia, but causes considerable thinning leading to encroachment of bermudagrass and other weeds. This decreases performance and increases maintenance costs.

RLP is favored by high thatch and moist soils, and thus zoysiagrass grown on poorly drained, compacted soils common in the transition zone are particularly susceptible to this pathogen. Commonly recommended cultural controls are to avoid mowing turf when wet, control thatch, avoid spring fertilization, use slow-release forms of nitrogen and raise mowing heights. However, cultural controls cannot be implemented during the winter when no maintenance is done to zoysia. Therefore, fungicides are often used to minimize RLP. Purdue research, supported by empirical evidence, demonstrates that aggressive fungicide use can adequately control RLP. However, questions remain for maximizing control while minimizing fungicide inputs and costs. We are often approached by superintendents maintaining zoysiagrass who are unsure which fungicide to apply for RLP control and equally unsure when to apply. Which fungicide(s) and the timing of application are two questions that need answered. This is part of an overall study evaluating zoysiagrass for use on Indiana fairways.

How it was Done

A pilot experiment was initiated in 2003 on an established stand of ZEN-400 zoysiagrass with a mowing height of 0.5 in at the William H. Daniel Turfgrass Research and Diagnostic Center. The stand used in this study was uniformly infected by the *Rhizoctonia* large patch pathogen. Four fungicides [propiconazole (Banner MAXX[®]), azoxystrobin (Heritage[®]), PCNB (Turficide[®] 400), and flutolanil (Prostar[®] 70WP)] were initially evaluated at two different application timings (before spring green-up and after spring green-up). Timings are based on the growth of the plant instead of calendar dates, so that the results can be applied nationwide and not just locally. Spring applications were evaluated during the spring and early summer to determine which fungicides and timings provided best control. An untreated check was included for comparison.

Fungicides

Banner MAXX[®]

Heritage[®]

Turfcide[®] 400

Prostar[®] 70WP

Application schedules

before spring green-up (approx. April 15)

after spring green-up (approx. May 15)

Data were collected every two weeks starting at the first application date, both visually as percent green-up (green coverage) and digitally (green coverage) using digital image analysis (digital camera and SigmaScan software).

Results to date

- Plots treated with either Heritage or Prostar before spring green-up (10-Apr) had more green coverage than the untreated check on 22 May and 6 June (Tables 1 and 2 and Figure 1).
- More green coverage resulted with an application of Prostar before green-up than after green-up when measured on 22 May (Table 2 and Figure 2).
- In general Prostar and Heritage applications provided more green coverage than Turfcide or Banner applications (Tables 1 and 2).
- By 3 July, treatment effects were not significant when evaluated using visual estimates (Table 1).
- Only one difference was noted when digital images were taken on 3 July. Prostar applied 8 May provided more green coverage than Turfcide applied 10 Apr (Table 2).

Table 1. Effects of fungicide selection and timing on control of *Rhizoctonia* large patch (visual estimates).

Fungicide	Application timing	Date						
		10-Apr ^a	23-Apr	8-May ^b	22-May	6-June	20-June	3-July
-----% green coverage-----								
Prostar	10-Apr	-	35	83	88	85	90	91
Prostar	8-May	-	-	-	71	74	85	89
Heritage	10-Apr	-	35	81	88	84	85	90
Heritage	8-May	-	-	-	76	73	83	92
Turfcide	10-Apr	-	35	82	65	61	70	80
Turfcide	8-May	-	-	-	66	65	79	83
Banner	10-Apr	-	35	81	60	64	71	82
Banner	8-May	-	-	-	59	61	63	79
Untreated check		4	35	79	61	61	71	81
LSD (0.05)			NS	NS	17	14	13	NS

^a 10-Apr = before green-up

^b 8-May = after green-up

Table 2. Effects of fungicide selection and timing on control of *Rhizoctonia* large patch (digital image analysis).

Fungicide	Application timing	Date						
		10-Apr ^a	23-Apr	8-May ^b	22-May	6-June	20-June	3-July
-----digital % green coverage-----								
Prostar	10-Apr	-	35	80	87	89	90	90
Prostar	8-May	-	-	-	72	72	89	93
Heritage	10-Apr	-	34	84	87	82	84	90
Heritage	8-May	-	-	-	78	79	89	92
Turfcide	10-Apr	-	36	80	70	50	63	85
Turfcide	8-May	-	-	-	69	55	77	90
Banner	10-Apr	-	36	78	59	50	65	87
Banner	8-May	-	-	-	66	52	69	86
Untreated check		4	35	78	68	55	71	87
LSD (0.05)			NS	NS	13	20	15	7

^a 10-Apr = before green-up

^b 8-May = after green-up



Figure 1. Sample of green-up (disease control) provide by an application of fungicide.

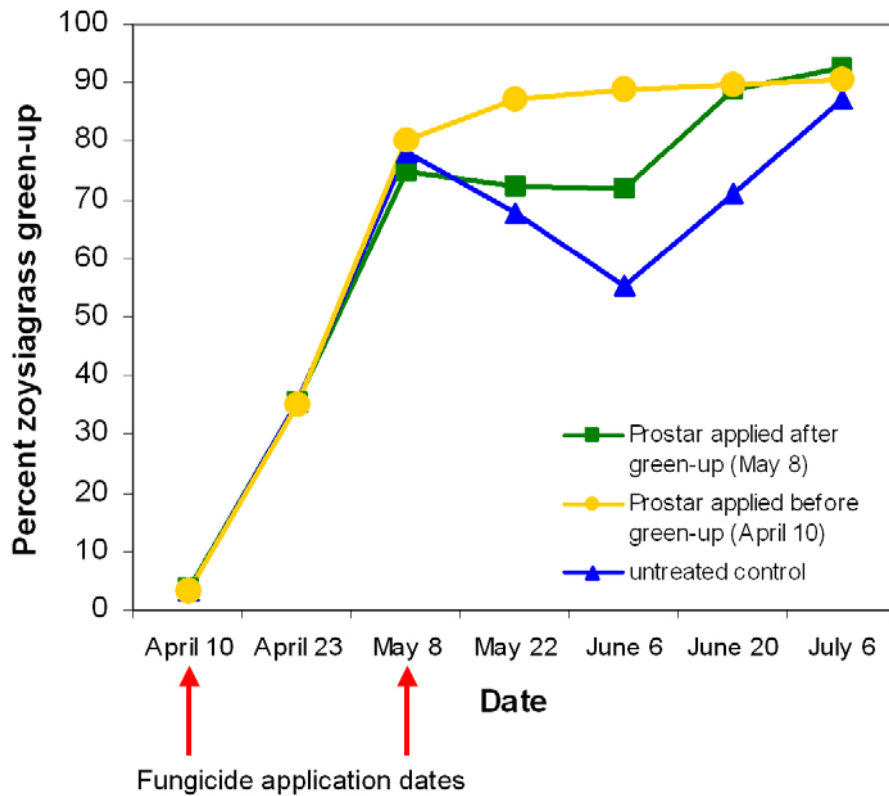


Figure 2. Effects of Prostar timing on spring green coverage of zoysiagrass infected with RLP. In this pilot study applications of Prostar and Heritage provided better disease control (more green cover) than Banner Maxx or Turfcide. This figure also illustrates that an application of Prostar before green-up provided more green coverage when rated on 22 May.