

Evaluation of Fosphite Rates Against *Pythium ultimum*, Damping –off Disease on Bentgrass

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Abstract

Fosphite was applied as a foliar application at different rates compared to Aliette at the labeled rate, to evaluate the efficacy and to provide protection against damping-off disease *Pythium ultimum* on Bentgrass. The result showed those Fosphite treatments at 0.25%, 0.5% and 1% and Aliette significantly ($p \leq 0.05$) reduced the damping off disease symptoms on Bentgrass over the control.

Introduction

Damping-off is a common disease of Bentgrass while causes extensive losses through production of low-quality plants. Many *Pythium spp.* are responsible for causing damping-off. The disease symptoms are yellow and brown patches and sometimes white, cottony mycelium is evident for the disease. This trial aimed to evaluate the efficacy of different Fosphite rates and Aliette (as the standard fungicide) for the control of damping-off disease on Bentgrass.

Materials and Methods

Twenty-four Bentgrass patches (2-½ ft² each) were used in this trial. Four patches were used for each treatment as replications. Two fungicides were tested for effectiveness. Fosphite was used at rates of 0.125 %, 0.25 %, 0.5 % and 1 % v/v, and Chipco Aliette WDG (Rhone Poulenc) was used at a rate of 4 pounds per 100 gallons of water. All were applied as a foliar spray (spray until wet). Control patches were untreated and sprayed with water.

Bentgrass patches were infected with *Pythium ultimum*. The fungus was grown on 10% vegetable juice agar for five days at 25 °C. Culture dishes were flooded with sterile deionized water and incubated at room temperature for one hour before zoospore suspensions from several dishes were collected. The zoospore concentration was determined using a hemacytometer and the suspension was adjusted to 10,000 zoospores per milliliter.

Bentgrass patches were transplanted on soil that was inoculated with *Pythium ultimum*. Inoculation of the soil with fungus was carried out 7 days before transplanting. The fungus was allowed 7 days to grow in the soil before it was used for transplanting. The experimental design was randomized complete block with four replications. Treatment was applied with a hand-sprayer to the patches once on the first week. Aliette was applied at the recommended rate of 4-lb./100 gallon of water also on the first week. Bentgrass patches were completely wet (23 ml water/ ft²) after application. They were rated prior to the initial application and also each week for the next four weeks. Ratings were based on University of California Pathogenically Rating Scale 0-5 according to the disease incidence and severity (0 is no disease, 5 is terminally infected). The plants were visually evaluated. The following scale was used:

| | |
|---|--|
| 0 | No disease |
| 1 | 1-3 spots present on patches but not obvious |
| 2 | 1-3 spots obviously present on the patches |

- 3 4-12 spots present on patches
- 4 Spots present on patches
- 5 patches severely diseased

Results and Discussion:

The *Pythium ultimum* disease rating at the pre-count for all Bentgrass ranged from 2.50 to 2.75. There was no significant ($p \leq 0.05$) difference on the disease ratings among all the patches.

At the first and second week post treatment, all the treatment applications had no significant ($p \leq 0.05$) difference on disease rating. Smillie et al. (1989) indicated that phosphite when present in the plant might cause modification of the fungal cell surface in such a way the plant start recognizing it as foreign and respond with its normal defense mechanisms which happen very slowly. The disease rating for the control patches increased to 3.50 at the third week after treatment applications. Treatments of Fosphite 0.5%, 1.0% and Aliette significantly ($p \leq 0.05$) reduce the disease over the control at the third week. Although the Fosphite treatments 0.125% and 0.25% had lower disease rating than the control but the difference was not statistically significant ($p \leq 0.05$). These results match with those of Fenn and Coffey (1985) as they stated that low concentrations of phosphorus lightly reduce the disease. There were no significant differences on the disease rating among the treatments of Fosphite 0.125%, 0.25%, 0.50% and Aliette. However, Fosphite at 1.0% had significant ($p \leq 0.05$) lower disease rating than Aliette. At the fourth week after the treatment application, all treatments except the Fosphite at 0.125% had significant ($p \leq 0.05$) lower disease rating than control. Fosphite at 1.0% had the lowest disease rating followed by Aliette.

The results indicated that Fosphite treatments at 0.25%, 0.50% and 1.0% are effective on the control of disease caused by *Pythium ultimum*.

Table 1. Effect of Fosphite and Aliette on disease control by *Pythium ultimum* on Bentgrass patches.

| | Disease Rating | | | | |
|-----------------------------------|----------------|---------------|---------------|----------------|----------------|
| | Pre-count* | Week 1* | Week 2* | Week 3* | Week 4* |
| Fosphite 0.125% | 2.50 a | 2.50 a | 2.50 a | 3.00 ab | 3.25 ab |
| Fosphite 0.25 % | 2.75 a | 2.75 a | 2.75 a | 2.75 ab | 2.75 bc |
| Fosphite 0.5% | 2.50 a | 2.25 a | 2.25 a | 2.50 b | 2.50 bc |
| Fosphite 1.0% | 2.75 a | 2.50 a | 2.00 a | 1.75 c | 1.50 d |
| Control | 2.50 a | 2.75 a | 3.00 a | 3.50 a | 4.00 a |
| Aliette 4 lb./100 gallon of water | 2.75 a | 2.50 a | 2.50 a | 2.50 b | 2.25 cd |

* Means in the same column not followed by the same letter differ significantly ($p \leq 0.05$) as determined by DMRT.

References

Fenn, M. and M. Coffey, 1985: Further evidence for direct mode of action of Fosetyl-Al and phosphorous acid. *Phytopathology* 75 (9) 1064-1068.

Smillie R, Grant, B. and Guest, D., 1989: The mode of action of phosphite: evidence for both direct and indirect modes of action on three *Phytophthora spp.* In plants. *Phytopathology* 79 (9): 921-926