

## Evaluation of Fosphite Rates Against *Pythium ultimum*, Damping-off Disease on Dieffenbachia

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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 Dieffenbachia plants. 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 Dieffenbachia plants over the control.

### Introduction

The widespread damping-off disease causes Dieffenbachia ornamental plants to die and brings major economic loss to growers. *Pythium spp.* fungi cause this soilborne disease. The disease symptoms include a brown, watery, soft rot that will eventually lead to unmarketable plants. The fungus can also attack seedlings before emerging from soil. 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 Dieffenbachia.

### Materials and Methods

Twenty- four Dieffenbachia plants were used in this trial. Four plants were used for each treatment as replications. Two fungicides were tested for effectiveness. Fosphite was used at a rate 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. Both were applied as a foliar spray (spray until wet). Control plants were untreated and sprayed with water.

Dieffenbachia plants 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.

Dieffenbachia plants 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. Dieffenbachia plants were completely wet 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 (0 is no disease, 5 is terminally infected). The plants were visually evaluated. The following scale was used: Pathogenically Rating Scale 0-5 (0 is no disease, 5 is terminally infected). The plants were visually evaluated. The following scale was used:

- 0 No spots
- 1 1-3 spots present on leaves but not obvious
- 2 1-3 spots obviously present on bracts
- 3 4-12 spots present on bracts and leaves
- 4 Spots present on bracts, leaves, flowers and stems
- 5 Plant totally blighted

### Results and Discussion:

The *Pythium ultimum* disease rating at the pre-count for all Dieffenbachia ranged from 2.25 to 3.00. There was no significant ( $p \leq 0.05$ ) difference on the disease ratings among all the plants. The disease rating for the control plants increased to 4 at the first week after treatment applications. Treatments of Fosphite 0.25%, 0.50%, 1.0% and Aliette significantly ( $p \leq 0.05$ ) reduced the disease rating. Although the Fosphite treatment 0.125% 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 reduced the disease. All the treatment applications had significantly ( $p \leq 0.05$ ) reduced on the disease ratings of the plants than the control at the second week. There were no significant differences on the disease rating among the treatments of Fosphite 0.25%, 0.50%, 1.0% and Aliette at the third week. At the third and 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% and Aliette had the lowest disease rating. 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 Dieffenbachia plants.

	Disease Rating				
	Pre-count*	Week 1*	Week 2*	Week 3*	Week 4*
<b>Fosphite 0.125 %</b>	<b>3.00 a</b>	<b>3.75ab</b>	<b>4.00 b</b>	<b>4.25a</b>	<b>4.50a</b>
Fosphite 0.25 %	3.00 a	3.00 bc	3.00 c	3.00 b	3.00 b
Fosphite 0.5%	2.75 a	2.75 c	2.75 cd	2.75 b	2.75 b
Fosphite 1.0%	2.50 a	2.25 c	2.25 d	2.25 b	2.25 b
Control	3.00 a	4.00a	5.00a	5.00a	5.00a
Aliette 4 lb./100 gallon of water	2.25 a	2.5 c	2.25 d	2.25 b	2.25 b

\*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.