EVALUATION OF ALIETTE ON CONTROL OF PYTHIUM ULTIMUM ROOT ROT ON GERANIUMS

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Introduction

There are several important diseases of geranium that affect quality and marketability of this greenhouse crop. Root rot caused by various Pythium species can affect most greenhouse crops and often times limit production (1,2,3,4). Direct plant losses and delayed plant growth caused by soil pathogens contribute to higher production costs, unpredictable growth, and reduction in plant quality at marketing time. The use of cultural practices as well as the use of fungicides are necessary to control these soilborne diseases.

Pasteurization of the growing media is often used to eliminate or reduce pathogens from the potting mix before planting seeds or cuttings (2). However, the mix may be recontaminated during any part of the growing cycle. Therefore, application of soil fungicides at planting time and during the growing cycle have been effectively used to help prevent diseases caused by soilborne pathogens.

Objective

The objective of this research was to evaluate the effectiveness of Aliette 80WP applied at several rates as a drench or spray at several rates on control of Pythium ultimum inoculated geranium cultivar 'Wendy Ann'.

Materials and methods

The geranium cultivar 'Wendy Ann' was used as the test plant in this study. One hundred sixty-eight geranium plants were planted in 5" clay pots in pasteurized soil mix (33% soil, 33% vermiculite, 33% peat, 1% fertilizer and lime). Plants were maintained in a greenhouse at 72-74 F and fertilized with 200 ppm of Peter's Geranium Special 15-15-15 twice a week. A soil test taken approximately 2 months after planting, indicated soil nutrient levels were low and plants were immediately fertilized at a rate of 400 ppm, 3 times over a 10 day period.

Fungicide treatments were applied 7 days after planting. Treatments included Subdue 2EC drench (1 oz./1000 ft^2.), Aliette 80WP foliar spray (0.37 oz. a.i./1,000 ft^2), Aliette 80WP foliar spray (0.73 oz. a.i./1,000 ft^2), Aliette 80WP foliar spray (0.73 oz. a.i./1,000 ft^2) plus Chipco 26019 50WP foliar spray (0.37 oz. a.i./1,000 ft^2), and Aliette 80WP drench (12.8 oz/100 gal/400 ft^2). The fungicide treatments were reapplied 3 times at monthly intervals. The spray volume was approximately 425 gpa.

Soil of appropriate treatments were inoculated with Pythium ultimum on 4/11/89, 14 days after planting and 7 days after the first fungicide

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treatments were applied. To prepare inoculum, sterilized green bean sections were inoculated with an agar plug from a 35-48 hr. culture of P. ultimum and incubated in the dark at room temperature for 14 days. The green bean medium was processed in a blender and passed through a 125 um sieve to separate oospores and sporangia from mycelium. The inoculum was diluted with sterile water to achieve a final concentration of 600 colony forming units/ml. Three holes were made with a glass rod into the root zone area each pot and 5 ml of suspension was placed in each hole.

Plants were examined after 86 days and the root rot index, plant height, and dry weights were determined. Dry weights were determined on above-ground tissue only. Plant tissue was at 100°F for 2 weeks and dry weights taken. The root rot index was determined according to the following scale:

0 = healthy
1 = 1-25% roots decayed
2 = 26-50% roots decayed
3 = 51-76% roots decayed
4 = 76-99% roots decayed
5 = dead plants

Conclusions

Root Rot Index (Table 1)

The uninoculated/untreated "healthy" control plants were infected with Pythium sp. as evidenced by culture results of root tissue taken at the conclusion of the experiment. It is believed the plants were infected with Pythium sp. at the time we received them, since the experimental design safeguarded against contamination between treatments, and it was noted at the onset of the experiment that some plants arrived in a less than optimum condition and exhibited symptoms of lower leaf senescence.

1) All fungicide treatments, with the exception of treatment 3 (Aliette 80WP 0.73 oz. a.i./1,000 ft^2/ Foliar), resulted in significantly less root rot disease than the inoculated/untreated disease check.

2) Treatment 5 (Subdue 2EC 1 oz./1,000 ft^2/Drench) resulted in significantly less root rot disease than all other treatments, including the uninoculated/untreated "healthy" control.

3) Treatment 6 (Aliette 80WP 12.8 oz./100 gal/400 ft^2/Drench) resulted in significantly less root rot disease than the Aliette treatments 2 (Aliette 80WP 0.37 oz. a.i./1,000 ft^2/Foliar) and 3 (Aliette 80WP 0.73 oz. a.i./1,000 ft^2/Foliar) and in significantly more root rot disease than treatment 5 (Subdue 2EC 1 oz./1,000 ft^2/Drench).

Plant Height (Table 2)

The "healthy" control (treatment 1) was infected with Pythium sp. and this may have resulted in reduced plant height measurements.

1st Application of Fungicides 4/4/89

1) Treatment 2 (Aliette 80WP 0.37 oz. a.i./1,000 ft^2/Foliar) resulted in significantly greater plant height measurements than treatment 6 (Alictte 80WP 12.8 oz./100 gal/400 ft^2/Drench).

2nd Application of Fungicides 5/3/89

1) No significant difference were observed between fungicide treatments.

2) Treatments 2 (Aliette 80WP 0.37 oz. a.i./A, 1000 ft^2/Foliar) and 4 (Aliette 0.73 oz. a.i./Foliar and Chipco 26019 0.37 oz. a.i./Drench) resulted in significantly greater plant height measurements than treatment 1 ("healthy" control).

3rd Application of Fungicides 5/30/89

1) No significant differences were observed between fungicide treatments.

2) Treatments 3 (Aliette 80WP 0.73 oz. a.i./1,000 ft^2/Foliar) and 4 (Aliette 0.73 oz. a.i./Foliar and Chipco 26019 0.37 oz. a.i./Drench) resulted in significantly greater plant height measurements than treatment 1 ("healthy" control).

Final Evaluation 6/22/89

1) No significant differences were observed between fungicide treatments.

Dry Weight (Table 2)

Final Evaluation 6/22/89

1) No significant differences were observed between fungicide treatments.

2) Treatment 4 (Aliette 0.73 oz. a.i./Foliar and Chipco 26019 0.37 oz. a.i./Drench) resulted in significantly greater dry weight measurements than treatments 1 ("healthy" control) and 7 (disease check).

3) The "healthy" control (treatment 1) was infected with Pythium sp. and this may have resulted in reduced dry weight measurements.

Phytotoxicity

1) No foliar symptoms of phytotoxicity were observed in any of the fungicide treatments.

Plant Death

1) All plants survived the duration of this experiment.

References

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Table 1. Fungicide effectiveness of Aliette 80WP applied as foliar spray and soil drench and Subdue 2EC applied as a soil drench on Pythium ultimum root rot on the geranium cultivar 'Wendy Ann'.

Treatments	Treatment Number	Mean Root Rot Index*
Disease Check Inoculated/untreated	7	3.2 a
Aliette 80WP 0.73 oz. a.i./1,000 ft^2/Foliar	3	2.8 ab
Aliette 80WP 0.37 oz. a.i./1,000 ft^2/Foliar	2	2.6 b
Aliette 80WP 0.73 oz. a.i./1,000 ft^2/Foliar + Chipco 26019 50WP 0.37 oz. a.i./1,000 ft^2/Foliar	4	2.3 bc
Healthy Control Uninoculated/Untreated	1	1.9 c
Aliette 80WP 12.8 oz./100 gal/400 ft^2/Drench	6	1.8 c
Subdue 2EC 1 oz./1,000 ft^2/Drench	5	1.2 d

* Means followed by the same letter do not differ significantly (HSD, p=0.05)

Table 2. Fungicide effectiveness of Aliette 80WP applied as a foliar spray and soil drench and Subdue 2EC applied as a soil drench on plant height and dry weight on the geranium cultivar 'Wendy Ann' inoculated with Pythium ultimum.

		Mean Plant Height (cm)*				Dry Weight (gm)*
Treatments	Treatment Number	4/4/89	5/3/89	5/30/89	6/22/89	6/22/89
Healthy Control Uninoculated/Untreated	1	6.5 ab	9.1 b	11.9 b	13.9 ??	17.0 c
Aliette 80WP 0.37 oz. a.i./1,000 ft^2/Foliar	2	7.3 a	10.7 a	13.5 ab	15.5 ab	20.0 ab
Aliette 80WP 0.73 oz. a.i. /1,000 ft^2/Foliar	3	6.3 ab	10.2 ab	14.3a	16.2 a	20.3 ab
Aliette 80WP 0.73 oz. a.i./1,000 ft^2/Foliar plus	4	6.3 ab	10.8 a	14.8 a	16.7 a	21.1 a
Chipco 26019 50WP 0.37 oz. a.i./1,000 ft^2/Drench						
Subdue 2EC 1 oz./1,000 ft^2/drench	5	6.0 ab	10.0 ab	13.0 ab	15.4 ab	20.2 ab
Aliette 80WP 12.8 oz./100 gal/400 ft/Drench	6	5.6 b	10.5 ab	13.4 ab	15.4 ab	20.4 ab
Disease Check Inoculated/untreated	7	6.9 ab	10.3 ab	13.4 ab	14.9 ab	18.3 bc

* Means followed by the same letter do not differ significantly (HSD, p=0.05).

DAY NEUTRAL CHRYSANTHEMUM DEVELOPED AT THE UNIVERSITY OF MINNESOTA

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A day neutral chrysanthemum, MN Sel. 83-267-3, was recently developed at the University of Minnesota, Department of Horticultural Science by Drs. Neil O. Anderson, Peter D. Ascher and Richard E. Widmer. It was determined to be a three week short day response group plant. Under increasingly stringent long day photoperiods it was superior to standard greenhouse and garden short day cultivars. This new cultivar can be used as a pot mum, a garden mum or (with night lighting, incandescent or HID, as a cut flower.

MN Sel. 83-167-3 has a semi-double decorative flower type, white flowers, short plant height and is insensitive to heat-delay in flower bud initiation and development. It should be noted that when plants are grown during December through February, with low light levels, the flowers will be uniformly purple under any of the following conditions:

1. 62°F night temperatures (N); long day (LD) photoperiod--natural day length plus four-hour night interruption (NI) with incandescent light (2200-0200 hours).
2. 62°F N, short day (SD) photoperiod (0800-1600 hours).
3. 62°F N, LS photoperiod: natural daylength plus 18 hours of 400 watt HID-HPS light (0300-2100 hours).
4. 55°F N, LD photoperiod: natural daylength plus four-hour NI with incandescent light (2200-0200 hours).

A day neutral and heat delay insensitive cultivar will allow the commercial grower to produce a high quality crop under any daylength and high temperatures normally encountered in a greenhouse (86° - 102°F). Thus, this cultivar can be grown under a wide range of temperatures and photoperiods inherent with seasonal and latiudinal changes. MN Sel. 83-267-3 should be adaptable to a wider latitudinal (geographical) and seasonal production range than currently available heat-delay insensitive cultivars.

The day neutral character of this cultivar will eliminate the need for greenhouse growers to manipulate the environment to induce flowering. Thus, there will no longer be a need for the use of black cloth to induce flowering. This will eliminate the costs of initial investments in a black cloth system, maintenance and depreciation of this system, and the labor involved in operating the system twice daily. Furthermore, the commercial practices of 2-3 weeks of vegetative growth, followed by 8 or more weeks of short days for flower bud initiation and development would be unnecessary. a day neutral cultivar does not need to be moved into long and then short days for flowering. It could be flowered under naturally occurring long days (spring to fall) and supplemental long day lighting could be added during winter months (low light conditions and short days) or they could be flowered using current production practices until growers phase out investments in existing black cloth systems.

When plants were grown at a constant temperature of 83°F under a 24 hours photoperiod, with 1 cutting in a 4" pot, a commercially salable flowering plant could be reduced in 8 weeks (from the time the unrooted

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