

Chase News



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Highlights of OFA Short Course—2010

It is hard to believe another OFA Short Course and trade show has come and gone. It is always fun to attend and marks the midpoint of our year. Marge Daughtrey (Senior Extension Specialist at Cornell University's Long Island Horticultural Research Center) and I spent some time doing talks in the same session, sharing meals and planning a new book. We are here in our Chase Research booth holding our most recent book—*Diseases of Herbaceous Perennials*—which continues to sell well. We also had a chance to meet with Dr. Ray Cloyd, Professor of Entomology at Kansas State University since we talked him into doing the new book project too. This time we will be concentrating on diseases and pests of bedding plants from propagation of cuttings and plugs, through production and into the landscape. Marge and I will be spending a day at Missouri Botanic Gardens in early September hunting for photo opportunities for the book. We are just getting started but all three of us are looking forward to working on this new project.

The session Marge and I spoke in was also shared with Ray and Dr. Ron Oetting, retired Professor of Entomology at the University of Georgia. We were asked to discuss cost effective insect and disease control. Marge covered soil-borne diseases and I covered foliar diseases. Due to scheduling conflicts we did not get to hear each others talks but did share handouts. We will be publishing a series of four articles from each speaker in GPN later this year or early next year.

My other talk for OFA was “Cost Effective Choices for Downy Mil-



Marge Daughtrey and me at OFA short course in Columbus, OH earlier this month

dew Control”. We had a great session with a lot of questions and interaction and I know I learned quite a bit. I covered the following topics:

- Efficacy—preventative vs. curative products
- Rate, application method and interval
- Real cost per month (not just cost of the fungicide container).
- Other factors (spectrum of control, phytotoxicity, residue, REI and mode of action for resistance management)

In the joint session quite a few members of the audience said phytotoxicity was more of a concern than cost of a very effective product. I plan to send out a brief survey asking for anyone interested to rank importance of factors like cost, efficacy, REI, phytotoxicity, residue and others. I expect it will be quite enlightening to see your responses.

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Veranda O is Registered for Ornamentals

In the past year, OHP registered Veranda O for ornamentals, cucurbit vegetables, fruiting vegetables, pome fruits and strawberries. Veranda O is in MOA 19 and is a 11.3% formulation of polyoxin D zinc salt. It has a very short REI of only 4 hours and is registered for use on:

- Alternaria blight
- Anthracnose (*Colletotrichum*)
- Apple scab (*Venturia*)
- Botrytis blight
- *Curvularia*
- Downy mildew (*Peronospora* and *Plasmopara*)
- Powdery mildew (*Oidium*, *Erysiphe* and *Sphaerotheca*)
- Rhizoctonia root and crown rot



We have worked on Veranda O quite a bit over the past two years. You can see that we have worked on a number of the diseases included in the current label and some others like black root rot. Labeled use rates range

Disease	Plant	Interval	Rate	Result
Alternaria leaf spot	impatiens	7 days	3.5-7 oz	Excellent
Black root rot (<i>Thielaviopsis</i>)	pansy	14 days	9 oz	Some to very good
Colletotrichum leaf spot (anthracnose)	cyclamen	7 days	7 oz	None
Myrothecium petiole rot	pansy	14 days	3.5 oz	None
Powdery mildew	gerbera	Once	7 oz	None
Rhizoctonia damping-off	celosia	7 days	3.5 oz	Very good to excellent
Rhizoctonia cutting rot	poinsettia	7 days	3.5-7 oz	Very good to excellent
Stagonospora leaf spot	agapanthus	14 days	4-8 oz	Good

from 4-8 oz/100 gal with a 7-10 day interval for foliar diseases and 14-28 days for Rhizoctonia root and crown rot. Some of the trials we conducted on a 14 day interval showed this might be too long including Myrothecium petiole rot control on pansy or anthracnose on cyclamen. In addition, a single application for powdery mildew on gerbera was ineffective since this product requires repeat applications for best effect.

Our previous work with Endorse (no longer available on ornamentals) showed good to excellent control of Alternaria, very good to excellent control of Botrytis, no control of Colletotrichum, some control of downy mildew and Myrothecium and good control of powdery mildew. We also saw excellent control of Rhizoctonia. These results are what I would expect since the two fungicides have the same active ingredient. We are trials with OHP this year including work on powdery mildew, downy mildew, rust and anthracnose diseases. I am looking forward to seeing what else Veranda O controls.

SOILGARD IMPROVES PANSY AND SNAP-DRAGON GROWTH

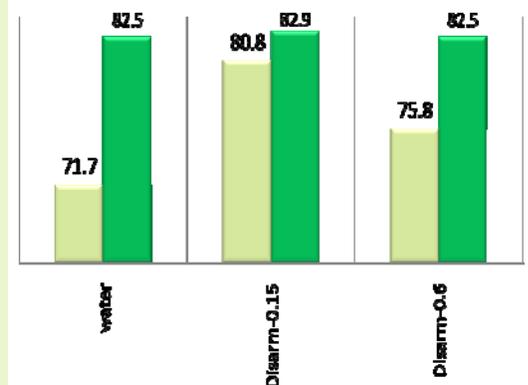
I have been working with biological control of soil-borne disease off and on over the past 20 years or so. This spring I decided to see if SoilGard could help establishment of pansies and snapdragons which we often have problems with during the winter and spring. Luckily OHP was interested in the idea and funded the work.

We started with healthy plugs of pansy (Matrix Yellow) and snapdragon (Potomac Pink) planted in 3.5 inch pots containing Sunshine No. 1 medium. We started by pre-treating the potting medium with SoilGard (1 lb/cubic yard) on 9 April. Four days later we planted the plugs and top-dressed with Osmocote Plus 15-9-12. Treatments included:

- Untreated—water
- Untreated—Disarm O (0.15 oz/100 gal)
- Untreated—Disarm O (0.6 oz/100 gal)
- SoilGard—water
- SoilGard—Disarm O (0.15 oz/100 gal)
- SoilGard—Disarm O (0.6 oz/100 gal)

We applied the Disarm O as a drench twice on a 21 day interval. The top grade, height, and % healthy appearing roots were rated on 27 May for the final time.

We saw more dramatic results with the pansies than the snapdragons but both had much better roots when treated with SoilGard with or without Disarm O. Pansies were also taller in all three SoilGard treatments starting as early as one month after planting. We did not see any additive effects of SoilGard and Disarm O in this trial. The graph below shows the data for the snapdragon roots (% healthy) with the dark green bars the SoilGard treatments compared to the light green unamended potting medium.

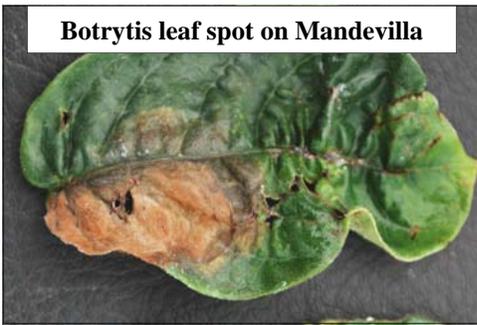


Syngenta Registers Palladium

Palladium is a 62.5% WG active ingredient combination. The use rates for Palladium are 2 to 6 oz/100 gal. Palladium is a pre-mix containing two active ingredients. Fludioxinil (Medallion – group 12) has been very effective against *Alternaria*, *Botrytis*, *Cercospora*, *Cylindrocladium*, *Fusarium*, *Rhizoctonia* and *Sclerotinia*. Cyprodinil (group 9) is labeled for fruit trees and used to control *Alternaria*, *Botrytis*, *Monilinia* (related to *Sclerotinia*), powdery mildew (suppression) and *Venturia*. You can see that combining fludioxinil and cyprodinil gives a broad range fungicide as well as providing for resistance management in the overlapping pathogen groups (especially *Botrytis* and *Sclerotinia*).

Efficacy summary for some trials on ornamental diseases including Palladium by Chase Horticultural Research, Inc.

Disease	Plants tested	Results
Alternaria leaf spot	Impatiens, Zinnia, Pittosporum	Very good to excellent at 2-8 oz on a 7-14 day interval
Botrytis blight	Impatiens, pansy, geraniums, rose	Very good at 6 oz on a 10-14 day interval, excellent 1.5-6 on a 7 day interval, none on rose at 4 oz
Cercospora	Moluccella	Very good at 4-8 oz on a 7 day interval
Colletotrichum leaf spot	Cyclamen, Hydrangea, Mandevilla	Very good at 6 oz on a 7 day interval, none at 4-8 oz on 14 day on Mandevilla and hydrangea
Cylindrocladium cutting rot	Myrtle	Good at 6 oz on a 14 day interval
Fusarium wilt	Cyclamen	None at 3 oz on a 14 day interval
Fusarium leaf spot	Dracaena	Very good at 3 oz on a 7 day interval
Myrothecium petiole rot	Pansy	Good at 2, 4 or 6 on a 14 day interval
Rhizoctonia cutting rot and stem rot	Hydrangea, impatiens, poinsettia	Good to excellent at 2-8 on a 7-14 day interval
Sclerotinia	Petunia, primula	Good to excellent at 2 or 4 on a 7 day interval

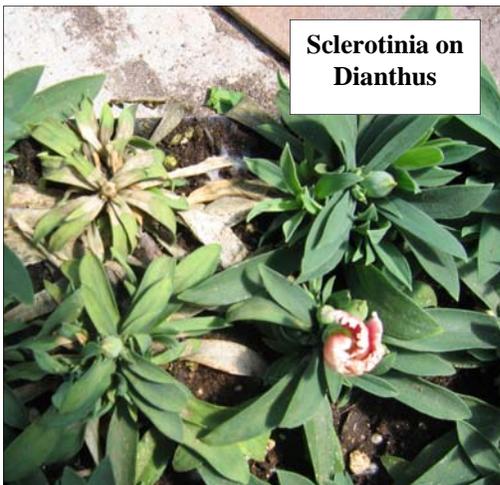


Botrytis leaf spot on Mandevilla

We have been working with Palladium to a limited degree since the late 1990's. The table to the right summarizes some of our trials. Palladium has been very safe in our trials with little visible residue to be of concern. Palladium has shown very high efficacy on Alternaria leaf spot, Botrytis blight, Colletotrichum leaf spot, Rhizoctonia cutting rot and Sclerotinia blight.

Palladium is labeled for use on ornamentals in production greenhouses and nurseries as well as forest nurseries. It has a 12 hour REI and is compatible with many fungicides, liquid fertilizers, insecticides and biological control products in a tank mix. Targets listed on the label include:

- Alternaria leaf spot
- Anthracnose (*Colletotrichum*)
- Cercospora leaf spot
- Cylindrocladium leaf spot
- Fusarium blight and stem rot
- Myrothecium leaf spot and blight
- Phoma basal rot
- Phomopsis dieback
- Rhizoctonia aerial blight
- Septoria leaf spot
- Sclerotinia blight and stem rot
- Southern blight (*Sclerotium rolfsii*)
- Powdery mildew
- Scorch (*Stagonospora*)
- Botrytis blight and gray mold



Sclerotinia on Dianthus



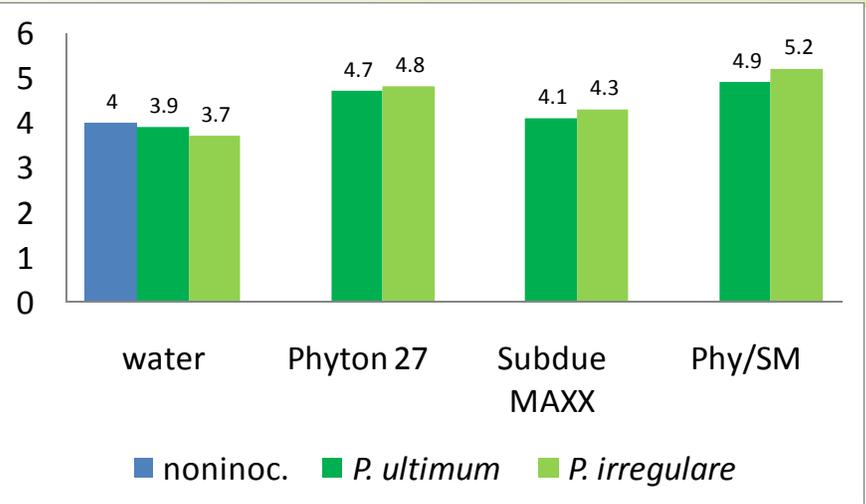
Colletotrichum anthracnose on hydrangea

Improving Pythium Control by Tank-mixing

During the past year we have been testing the benefit of tank-mixing for control of Pythium root rot on ornamentals. We have looked at fungicides traditionally used for control of Pythium root rot as well as some less typical choices. Our most recent trials have investigated control of *Pythium irregulare* (celosia and geranium) and *Pythium ultimum* (celosia).

PHYTON 27 AND SUBDUE MAXX TANK-MIXES

The first trial evaluated the potential for improved control of two species of Pythium that cause damping-off and stunting on celosia. Treatments included drenches of Phyton 27 (20 oz/100 gal), Subdue MAXX (1 oz/100 gal) and the tank-mix of the two. Noninoculated and inoculated controls were included as always. We started by planting 0.05 g/3.5 inch pot of *Celosia* 'Gloria Mix' in Fafard Mix 2B. Pots were fertilized with Osmocote Plus 15-9-12. Four days after planting, the fungicide treatments were applied and 3 days after that, plants were inoculated with either *P. irregulare* or *P. ul-*



um. Fungicides were reapplied one week later.

Evaluations included periodic stand counts and height. The stand counts were only slightly reduced by inoculation although height was significantly lower for those inoculated with *P. irregulare*. The graph above shows the final height data (given in cm) about

one month after inoculation. Phyton 27 alone gave better control of stunting than the Subdue MAXX alone. The tallest plants (and highest stand counts) were found on the pots treated with the tank-mix of Phyton 27 and Subdue MAXX. This might be a good way to make sure you are getting effective control of Pythium root rot when resistance to Subdue MAXX is possible.

KLEENGROW AND FUNGICIDE TANK-MIXES

The second trial we recently completed was an evaluation of possible benefits of adding KleenGrow to two of the more recently registered fungicides for Pythium root rot control on geranium. About two years ago, we performed a test on geraniums in an ebb and flood system and found that a tank-mix of KleenGrow with Subdue MAXX allowed optimal control of Pythium root rot even when neither product alone afforded significant control. This time we tested geraniums (Elanos Bright Red) with some Pythium root rot at test initiation but also inoculated them with *P. irregulare*.

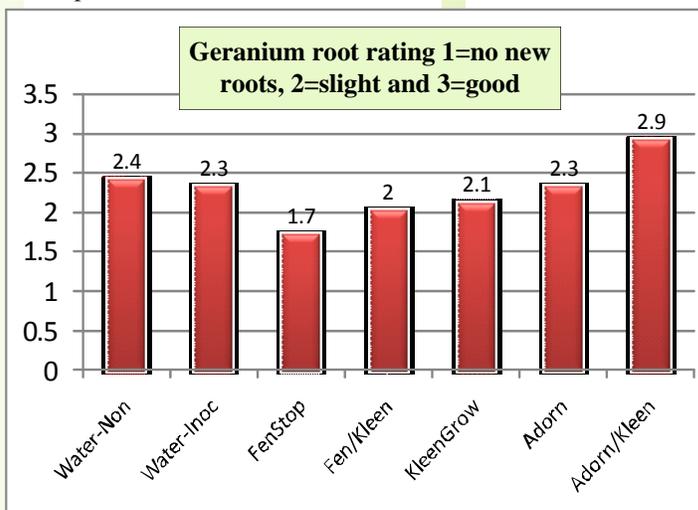
- KleenGrow—25.6 oz/100 gal
- Adorn—1 oz/100 gal
- Adorn and KleenGrow—1 oz and 25.6 oz/100 gal

They were inoculated one week after the first application. Ratings included top grade and height on 28 June and 14 July. We also rated new white root formation on 14 July when the test was complete.

Top grade and height were not significantly affected by treatment. However new white roots were significantly higher for plants treated with the combination Adorn and KleenGrow (below). Adorn was recently labeled for downy mildew, Phytophthora and Pythium and requires tank mixing with another fungicide for the specific target pathogen. KleenGrow has also been very recently

Plants were grown in 4 inch pots containing Fafard Mix 2B and fertilized with Osmocote Plus 15-9-12. They were drenched on a 14 day interval as follows:

- Noninoculated control
- Inoculated control
- FenStop—7 oz/100 gal
- FenStop and KleenGrow—7 oz and 25.6 oz/100 gal



labeled as a fungicide. Use rates are 6-50 oz/100 gal as drench on a 14 day interval.

These results are very encouraging and we will be evaluating KleenGrow with fungicides for other soil-borne fungal pathogens in the near future.

Research Review—Phytophthora

There has been quite a bit of activity in the realm of *Phytophthora* research in the past few months. I summarize here three of these research reports.

PHYTOPHTHORA TROPICALIS ON GLOXINIA—Olson and Benson published on this new disease in Plant Management Network 2010-0708-03-BR. A severe crown rot on gloxinia was first seen in June of 2007 in North Carolina. Isolations showed a *Phytophthora* species which is not unusual for herbaceous ornamentals but this time it was a new species of *Phytophthora* that has been gaining ground in the warmer regions of the US especially. It had previously been only found in Hawaii (for the US). The researchers proved that *P. tropicalis* did cause the death of gloxinia with symptoms appearing about 2 weeks after inoculation. They also tested ability of Stature SC to prevent disease and it was very effective in preventing crown rot when used on a 14 day interval.

Other hosts of this new species have been identified including *Pieris*, *Rhododendron*, *Hedera helix*, *Dianthus*, *Anthurium*, *Leucospermum*, *Radermachera*, *Catharanthus* and *Epipremnum* (pothos). Fungicide trials by Dr. David Norman (University of Florida) on pothos and *Hedera* showed excellent prevention with Adorn, FenStop, Stature, Subdue MAXX and Heritage.

PHYTOPHTHORA CACTORUM AND PHYTOPHTHORA PALMOVORUM CAUSE BLACK ROT ON ORCHIDS IN FLORIDA—Cating, Palmeteer, Stiles and Rayside reported on a serious disease of many orchids in Florida. It has been referred to as black rot, crown rot and heart rot at times and is caused by either *Phytophthora cactorum* or *P. palmivorum*. The disease is most frequently found on *Cattleya*, *Brassiacattleya* and *Laeliocattleya* but is also found on *Aerides*, *Ascocendra*, *Brassovola*, *Dendrobium*, *Gongora*, *Maxillaria*, *Miltonia*, *Oncidium*, *Pahiopedilum*, *Phalaenopsis*, *Rhynchostylis* and *Schomburgkia*.

Symptoms of disease occurred within 3 days of inoculation and were typical water-soaked black spots. Invasion of all above-ground parts of the orchid can follow rapidly ending in complete plant collapse. For a complete report see: Plant Health Progress doi:10.1094/PHP-2010-0614-01-DG.

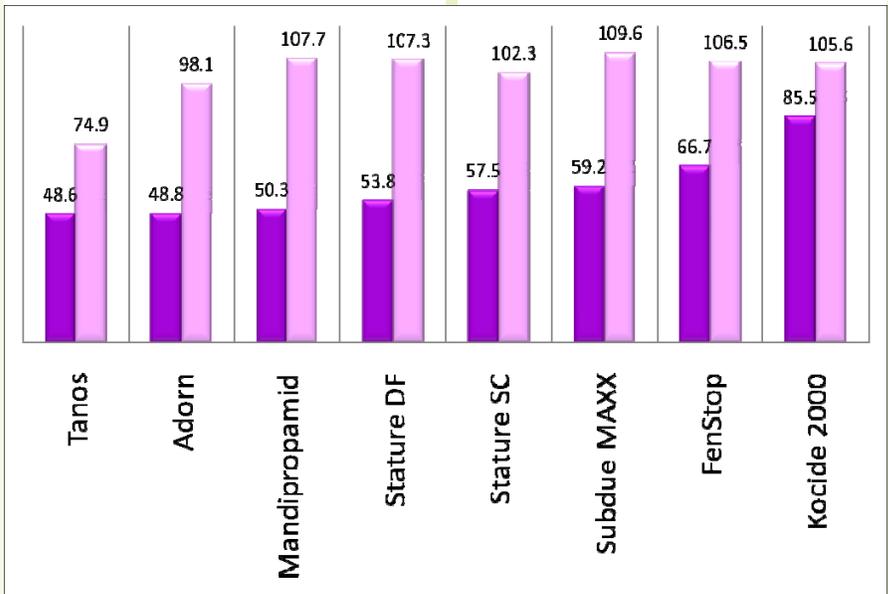
PHYTOPHTHORA CROWN AND ROOT ROT CONTROL ON BELL PEPPER WITH FUNGICIDES—Foster and Hausbeck reported on a series of tests in field-grown bell pepper for control of this devastating disease. Since we do not always have trials on ornamentals, I decided to include a summary of their work.

Their trials were conducted in the field and in a greenhouse comparing the ability of many of the same active ingredients for control of *Phytophthora* on bell pepper as we have on ornamentals. For ease of

They conclude that drench as more effective than foliar application and that a 7 day interval was more effective than a 14 day interval regardless of what fungicide or application method was used.

Their conclusion concerning overall fungicide efficacy is that although Adorn and mandipropamid (not available in ornamentals yet) did provide significant control compared to untreated plants but 40% plant death still occurred. This would likely not be acceptable commercially whether you were growing bell peppers or ornamentals. Under high disease pressure they suggest a combination of fungicide use and resistant cultivars. Unfortunately for ornamental growers, using resistant cultivars is not usually possible.

My conclusion is that if you are facing a *Phytophthora* problem you must use all possible cultural and other IPM tools to



comparison I used the ornamental equivalent in the graph above. This graph above represents a summary of a single greenhouse trial performed comparing the same product applied as a drench (purple) to foliar sprays (pink). The numbers represent the speed and severity of disease in a rating called the AUDPC (area under the disease progress curve).

minimize disease or you may be disappointed in the results obtained with even the best fungicides. It is also clear that even if you are tempted to apply a fungicide as a spray for *Phytophthora* it is more likely to give you the results you want and need if you apply it as a drench.

For a complete report see: Plant Disease 94:697-202 (2010).

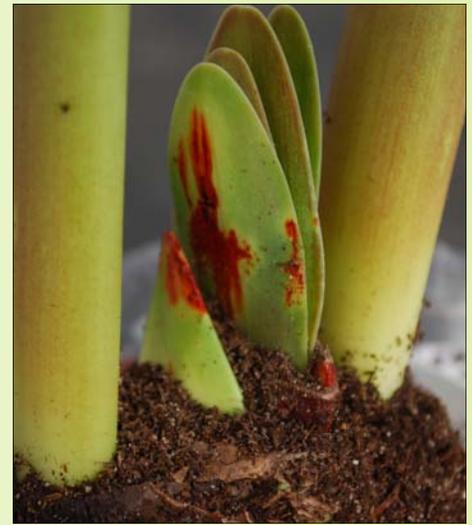
Stagonospora Leaf Spot Control on Agapanthus

I have been seeing *Stagonospora* leaf spot on a number of bulb crops including amaryllis and *Zephyranthes* (rain lily). The disease is caused by *Stagonospora curtsii* and is called red leaf spot, red fire and red blotch. It has also been found on *Nerine*, *Chlorophytum*, *Crinum*, *Gallinthus* and *Narcissus*. I was interested in seeing what the newer fungicides might be able to do against this disease since I could find nothing in my literature searches. However, although the problem causes significant damage in amaryllis grown for both cut flowers and pot crops, nobody wanted to donate the pricy bulbs for a trial.



Red leaf spot on agapanthus (above), rain lily (below, left) and amaryllis (below, right).

So, imagine my happiness when I found some *Agapanthus* (Nile lily) liners with the same disease. The trial started on 25 May when the liners were planted in 4 inch pots containing Fafard Mix 2B. They were top-dressed with Osmocote Plus 15-9-12 and placed in a shaded greenhouse. We applied treatments once before inoculating and then on a 14 day interval for a total of three times. Treatments included:



Treatments included:

- Noninoculated—water
- Inoculated—water
- Heritage—4 oz/100 gal
- Insignia—10 oz/100 gal
- Veranda O—4 oz/100 gal
- Veranda O—8 oz/100 gal
- Disarm O—4 oz/100 gal
- Trinity—3 oz/100 gal
- Trinity—6 oz/100 gal
- Trinity—12 oz/100 gal
- Pageant—12 oz/100 gal

The inoculation did not result in leaf spots in upper parts of the leaves but did result in damage to their bases. The data in the table to the right shows disease severity 2 weeks after the final fungicide application.

Control was best on plants treated with the strobilurins—Insignia, Heritage, Disarm O and Pageant. It was also significant for the 6 and 12 oz rates of Trinity (an experimental sterol inhibitor).

Since on many crops affected by red leaf spot the leaves and flower spikes are infected as they emerge from the soil/potting medium, it may be a good idea to apply products labeled for drenching in this manner before emergences. Alternatively, they could be applied as a heavy spray.

Effect of fungicides on eradication of red leaf spot on agapanthus

Disease was rated from 1 = none, 2=slight, 3=moderate, 4=severe and 5=dead
Numbers followed by the same letter are not significantly different.

Treatment	Rate/100 gal	Disease severity
Noninoculated water	—	2.8 bc
Inoculated water	—	3.2 c
Heritage	4 oz	1.9 ab
Insignia	10 oz	1.7 a
Veranda O	4 oz	2.6 abc
Veranda O	8 oz	2.5 abc
Disarm O	4 oz	2.2 ab
Trinity	3 oz	2.6 abc
Trinity	6 oz	1.9 ab
Trinity	12 oz	2.2 ab
Pageant	12 oz	2.2 ab

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