

# CHASE NEWS

Chase Horticultural Research, Inc.

Volume 8—Issue 8 (August)

## DIAGNOSTIC SPECIAL CONTINUES THROUGH END OF 2009

It is beginning to look like our economy is starting to improve. We have been seeing more interest in our prepaid diagnostic offer—10 samples for \$750. This is a 25% savings and they are valid for 2 years. We started this offer late last year and want to continue it through the end of 2009. This is by far the best time to make sure that you get a fast, accurate diagnosis complete with a custom control strategy. Wasting dollars on fungicides that are the wrong choice leads to poor crop quality and crop failures.

Our basis of performing diagnoses is first to identify that the cause is still alive. Otherwise, why would you treat it? So, we culture most of the samples we receive. We also follow-up with additional testing where needed. One example of this is in the testing a suspect (*Agrobacterium tumefaciens*) on carrot disks. Some labs test on tomato seedlings but carrots have worked well for us. This bioassay does take an additional two weeks but comes at no extra cost. We also test some Pythium isolates for possible Subdue MAXX resistance. This test requires 2 days and also comes at no additional cost in most cases. Finally, since we do run a research facility we also will test “new” diseases when possible. We recently tested an isolate of *Aureobasidium* on poinsettia with negative results.

Crown gall on aster (left) and carrot disk test (right). The carrot on top shows no reaction to the test bacterium while that on the bottom shows a positive all production—raised ring in the center.



I have included to the right a set of images to demonstrate how hard it is to diagnose samples by sight alone. The top flat is vinca with *Rhizoctonia* damping-off. The best fungicide control would be Medallion or a strobilurin. The middle flat is impatiens with *Pythium* damping-off. The best fungicide controls would be Subdue MAXX, Terrazole or Segway. The bottom flat is celosia with *Xanthomonas* blight and the best control would be a copper bactericide. Clearly, if you guess wrong you will pick the wrong control.

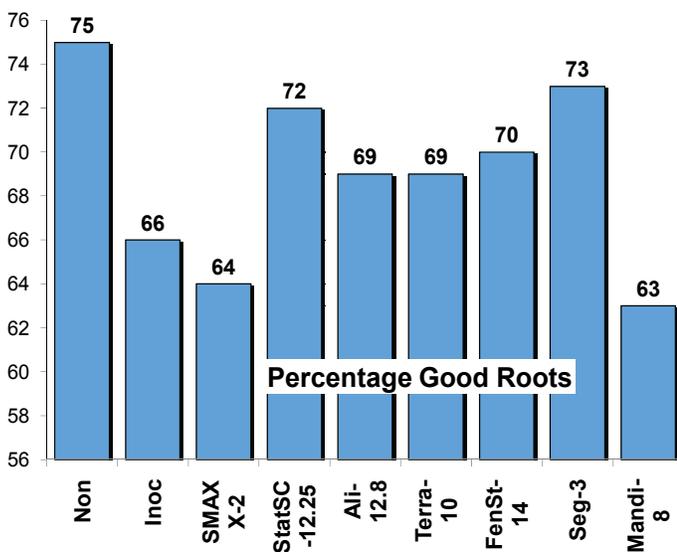
Stop guessing! It is costing you money.



## CONTENTS

<b>WOODY ORNAMENTAL FOCUS (Phytophthora Root Rot Control on Rosemary, Liverwort Eradication in Boxwood Liners )</b>	<b>2</b>
<b>PERENNIAL PLANTS PAGE (Infected Stock Plants Yield Infected Cutting, Photo Shoot at APS, Watch For These Diseases)</b>	<b>3</b>
<b>RESEARCH UPDATES (Rhizoctonia Damping-off on Celosia, Roguing Phalaenopsis with Erwinia Soft Rot, Fungicides for Control of Strawberry Anthracnose)</b>	<b>4</b>
<b>BOTRYTIS CONTROL UPDATE</b>	<b>5</b>
<b>FUNGICIDES IN REVIEW - Veranda O</b>	<b>6</b>

**PHYTOPHTHORA ROOT ROT CONTROL ON ROSEMARY** Summer brings out the Phytophthora root and crown rot in many crops including rosemary. This year we tested control of Phytophthora root rot on rosemary by drenching twice on a monthly interval. Plants were inoculated with *P. parasitica* five days after the first fungicide drench. Treatments included: non-inoculated control, inoculated control, Subdue MAXX (2 oz/100 gal), Stature SC (12.25 oz), Aliette (12.8 oz), Terrazole (10 oz), FenStop (14 oz), Segway (3 oz), mandipropamid (experimental from Syngenta at 8 oz), and Adorn (new from Valent at 2 oz).



We rated the top grade and height as well as the percentage of healthy appearing roots at the end of the trial (2 weeks after the final fungicide drench). The tops showed no signs of any differences between treatments. In contrast, the roots did show the effect of the fungicides on controlling Phytophthora root rot in this trial. The best results were seen with Segway and Stature SC. Least control was seen with Subdue MAXX and mandipropamid with other fungicides showing intermediate results. Each of these products has been shown to be very effective on Phytophthora diseases in other trials.



## LIVERWORT ERADICATION IN BOXWOOD LINERS



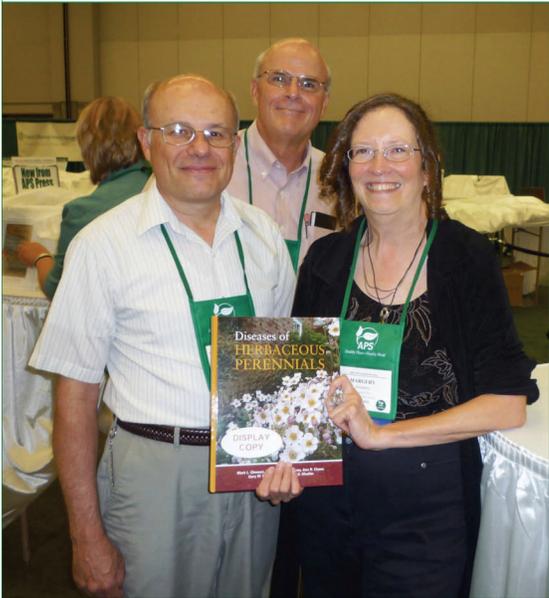
We recently completed a trial on liverwort eradication. We started with liners of boxwood that had as much liverwort growth as boxwood cutting growth. We evaluated liverwort survival every week and also the safety on the boxwood cuttings. At no time in the trial did we see any damage at all from the treatments on the boxwood. We tested both curative and preventative rates of X3 and ZeroTol and used them either once or on a weekly interval. These products have similar chemistries. By the end of the trial, none of the products clearly eradicated the liverworts. However, we did see the greatest reduction in liverwort viability when the X3 was applied weekly at the curative rate. We checked for increases in liverwort growth as well and found that the treatments that controlled this the best were X3 at the curative rate applied either once or weekly.

Treatment	Rate/100 gal.	Decrease in % coverage	# of pots with increase
Water	-----	8	3
X3	0.2% once	19	1
X3	0.2% weekly	28	1
X3	0.04% once	12	4
X3	0.04% weekly	17	5
ZeroTol	1% once	10	5
ZeroTol	1% weekly	19	3
ZeroTol	0.2% once	15	5
ZeroTol	0.2% weekly	10	5

This single trial indicates that X3 may be more effective in eradicating liverworts than ZeroTol but that neither product is exceptionally effective once the liverworts are well established. We will do more trials as the opportunity presents itself.

**BOOK SIGNING FOR DISEASES OF HERBACEOUS PERENNIALS**

On the first of August, the American Phytopathological Society (publishers of the volume) in Portland Oregon. Three of the five authors were present for the signing of this popular new book. They are (left to right): Gary Moorman, Mark Gleason and Marge Daughtrey. You can purchase this book from Chase Horticultural Research directly through our online store. We have had a great response at trade shows starting with OFA and most recently at the BFG EXPO in Minnesota. For your copy, call at 530-620-1624 or email mike@chasehorticulturalresearch.

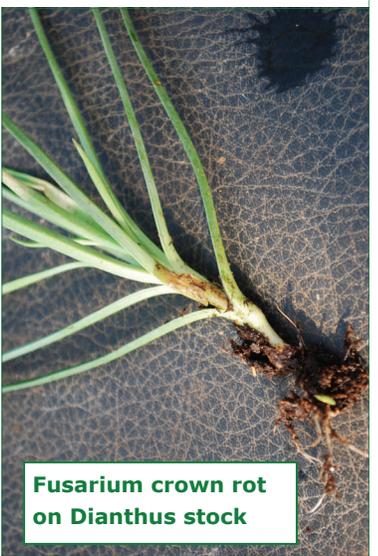


**INFECTED STOCK PLANTS YIELD INFECTED CUTTINGS**

Perennial crops are often produced from cuttings that originate both off shore and in our own facilities from stock plants we maintain. Many of these cuttings are disease-free, but sometimes they only look good. Weeks after sticking they can develop diseases and we wonder where they come from. Last month we received some samples of Dianthus cuttings and found them infected with *Fusarium* sp. As a follow-up, the grower submitted both stock plants and a new batch of cuttings. Both were infected with *Fusarium* sp. It was good to know where the disease originated but unfortunately, the grower had to use these stock and there really is no great fungicide for *Fusarium* diseases. The best products in our trials have been strobilurins (like Heritage, Insignia and Pageant), Medallion and Terraguard. If you find yourself in this type of situation, consider spraying the stock plants the day before taking cuttings since both Medallion and Terraguard occasionally delay rooting on some crops. Stock plant spraying has been effective in controlling cutting losses without delaying rooting. Other crops that might have this problem (usually *Fusarium* and *Cylindrocladium* diseases) include *Erysimum*, *Phormium*, chrysanthemum, rose, azalea and myrtle.



Fusarium cutting rot on Dianthus



Fusarium crown rot on Dianthus stock



Penstemon rust



INSV on Iris

**WATCH FOR THESE DISEASES**



Colletotrichum on Mandevilla



Phytophthora root and crown rot on daylily

**RHIZOCTONIA DAMPING-OFF ON CELOSIA**

Since it is once again summer, we are working on Rhizoctonia. Every year we do some on Rhizoctonia stem rot on poinsettia cuttings as well as damping-off on Celosia seeds. We started a trial on 12 August by sowing Celosia seeds into 3.5 inch pots containing Fafard Mix 2. The day of seeding we apply whatever fungicide products are in the test as a splash and then about 2 days after that we inoculate with a very low dose of *Rhizoctonia solani* ground in water. The Celosia start to germinate within a week of sowing and we count them every week. In this trial we tested two experimental biological agents as well as Disarm O (OHP), Veranda O (OHP) compared to Medallion (Syngenta) which is our standard of choice for Rhizoctonia. The products were only applied twice on a weekly interval. At the end of the trial we also measured plant height as some products have controlled Rhizoctonia in the past but also caused stunting. Excellent control of Rhizoctonia damping-off occurred with Medallion (0.5 oz/100 gal) and Veranda O (7 oz/100 gal). Disarm O was also good at both rates tested as well as Veranda O at 3.5 oz/100 gal. The experimental biological provided no control of Rhizoctonia damping-off in this trial. Disarm O did cause significant stunting of the celosia seedlings.

Treatments are in the same order as shown in the table above (A=noninoculated control, etc.)

**ROGUING PHALAENOPSIS INFECTED WITH ERWINIA SOFT ROT**

McMillan, Palmateer and Vendarme reported on the effect of removing orchid plants infected with *Erwinia* soft rot in the 2007 Proceedings of the Florida State Horticultural Society (120:353-355). *Erwinia carotovora* is the cause of the disease and easily spreads in splashed irrigation water. Plants were typically established two per pot and in five studies, the authors tested the effect of removing infected plants from pots as soon as they were found. They report that in all five studies, there was no benefit in removing the infected plant in stopping spread of the disease. The authors conclude that by the time the infected plant is symptomatic it is likely that disease has already spread to adjacent plants. They conclude that removal of the entire plant is a more cost effective practice.

Treatment	Rate/ 100 gal.	# seedlings/ pot	Height (cm)
Water Noninoculated	-----	30.9 c	4.5 c
Water Inoculated	-----	2.5 a	1.9 a
Medallion	0.5 oz	26.5 bc	4.0 b
Disarm O	2 oz	23.1 b	3.1 b
Disarm O	4 oz	23.3 b	2.9 b
Veranda O	3.5 oz	21.1 b	4.2 c
Veranda O	7 oz	29.9 c	4.0 c
Experimental 1	4 oz	2.5 a	2.1 a
Experimental 2	4 oz	1.9 a	1.9 a

Numbers in the same column followed by the same letter are not statistically different.

**FUNGICIDES FOR CONTROL OF STRAWBERRY ANTHRACNOSE**

Several recent studies have identified that the same *Colletotrichum* spp. that attack strawberry can attack some ornamentals including cyclamen. Although we do not have all of the same fungicides available in ornamentals, it is important to examine the results of trials on non-ornamental crops when the same disease is studied.

McKenzie, Mertely and Peres, University of Florida researchers, recently reported on a single fungicide application on field grown strawberries. Azoxystrobin (Heritage), pyraclostrobin (Insignia) and thiophanate methyl (such as 3336 and OHP6672) each reduced plant death but that a more effective strategy involved weekly applications of these fungicides. Other products in their trial, including captan, thiram and potassium phosphate were less effective or ineffective. These results further stress the need for repeat applications of fungicides for diseases like crown rot on strawberry. Anthracnose in general, can be exceptionally difficult to control regardless of the crop being produced. For a complete report see Plant Disease 93:815-820.

In the past few years we have had quite a few new fungicides to test for control of ornamental diseases. These have included many new active ingredients for downy mildew, Phytophthora and a few for Botrytis. Some of the active ingredients are in new mode of action groups while others represent older groups such as strobilurins. Dr. Mary Hausbeck recently reported on one trial for control of Botrytis blight on geranium in her plant health column in GMPro (August 2009). She tested experimental compounds as well as industry standards with the best control using fluazinam 500F, Palladium 62.5 (combination of cyprodinil and fludioxinil), Daconil Weather Stik and Veranda O (polyoxin D).

Mary also reports many of her trials in Plant Disease Management Reports. She tested Palladium, SP2050, Daconil Weather Stik (1.4 pint/100 gal), Endorse and V-10135 in a separate trial on geranium. In this case, Palladium caused significant phytotoxicity but did give very good disease control again. Daconil was also very good but the other fungicides were less effective. In another trial on primrose, Mary tested the same fungicides and had the best results with Daconil, Pageant and Endorse.

Dr. James Buck (University of Georgia) also reported on a Botrytis trial on begonia in Plant Disease Management Reports. His test compared various rates of Palladium compared to Medallion (1 oz/100 gal) and Chipco 26019 (2.5 lb). In his trial, the higher rate of Palladium was best with Medallion and Chipco 26019 also good. One of the active ingredients in Palladium is fludioxinil (also found in Medallion).

Product	Mode of Action Grouping	Botrytis
26/36 Fungicide	1 and 2	Some/excellent
Actinovate	nc	Some/good
Camelot	M1	Fair
Chipco 26019, Chipco 26GT	2	Excellent
Cleary 3336, Fungo, OHP-6672	1	Poor/some
Clevis	3 and M3	Poor/very good
Compass O	11	Very good
Daconil Ultrex	M5	Very good/excellent
Decree	17	Very good/excellent
Dithane	M3	Good/excellent
Endorse	19	Very good/excellent
Fungaflor-TR	3	Some/very good
Heritage	11	Fair/good
Insignia	11	Poor/very good
Junction	M1 and M2	Fair
Kocide TNO	M1	Fair
Medallion	12	Very good/excellent
Milstop	nc	Some/very good
Pageant	7 and 11	Very good/excellent
Phyton 27	M1	Poor/good
Protect T & O	M3	Very good
Rhapsody, Cease	nc	Some
Spectro	1 and M5	Poor/good

So there are quite a few products being trialed for Botrytis from numbered compounds like V-10135 and SP2050 to unregistered named products like Palladium.

I recently tried to find a registered fungicide for use on cut flower for post-harvest control of Botrytis blight. This is really hard with just a few products labeled under rather specific conditions. So I am still keeping my eye out for information on control of Botrytis storage rot on any crop. Although the treatments were not post-harvest, I did see some research on raspberry. In this study (Plant Health Progress doi:10.1094/PHP-2008-1015-01-RS), the active ingredients were those found in Palladium (fludioxinil and cyprodinil) and Decree (fenhexamid) as a field application prior to harvest. The benefit of cold storage by itself was once again proven more effective than any fungicide for control of Botrytis. Both fungicides were more effective than using nothing and the applications closer to harvest were most effective.

The table to the left is a summary of many of our trials on Botrytis control on ornamentals. The best products overall are those with chlorothalonil (like Daconil), Chipco 26019, Decree and Medallion. Many others have shown some control of Botrytis in our trials.



We have been working for the past year on two new fungicides for ornamentals from OHP. The first is Veranda O which contains the active ingredient polyoxo-rim D. This fungicide represents a newer formulation of the active ingredient found in Endorse. The summary of our trials is shown in the table to the right. We have found Veranda O to be relatively broad-spectrum with activity against diseases from Alternaria leaf spot to Botrytis blight and Rhizoctonia damping-off. We performed a trial on Botrytis on geranium and found the same results as those reported by Dr. Mary Hausbeck at Michigan State University. We have not seen any phytotoxicity with this formulation at the rates tested. One of the drawbacks to the En-



Rhizoctonia cutting rot on poinsettia

endorse formulation was the high rate and accompanying residue. The rates of Veranda O that we tested were 3.5 to 7 oz/100 gal and residue was minimal. Veranda O is registered for ornamentals and available now from OHP. Be sure to read the label and follow it closely—the label is the law!

### Summary of Trials on Veranda O

Disease	Rate/ 100 gal	Efficacy
Alternaria leaf spot on Impatiens	3.5 to 7 oz	Very good to excellent
Anthrachnose on cyclamen	7 oz	Some
Botrytis leaf spot on geranium*	4-8 oz	Very good
Cercospora leaf spot on pansy	7 oz	Very good
Fusarium stem rot on Zygocactus	7 oz	Some
Myrothecium leaf spot on salvia	7 oz	Some
Myrothecium petiole rot on pansy	3.5 oz	Some
Rhizoctonia damping-off on celosia	3.5 to 7 oz	Excellent
Rhizoctonia cutting rot on poinsettia	3.5 to 7 oz	Very good

\* This trial was reported by Dr. M. Hausbeck, MSU.

### Summary of Trials on Disarm O

Disease	Rate/ 100 gal	Efficacy
Anthrachnose on cyclamen	4 oz	Excellent
Botrytis leaf spot on geranium*	3-6 oz	None to some
Cercospora leaf spot on pansy	4 oz	Very good to excellent
Fusarium stem rot on Zygocactus	4 oz	None
Myrothecium leaf spot on salvia	4 oz	Very good to excellent
Myrothecium petiole rot on pansy	4 oz	Very good
Pythium root rot on geranium	2-4 oz	Excellent

\* This trial was reported by Dr. M. Hausbeck, MSU.

The other new product we have been testing is Disarm O (active ingredient fluoxastrobin). This strobilurin fungicide has many of the same attributes in efficacy range as the majority of other strobilurins. Many of our trials included side-by-side comparisons with strobilurins currently on the market including Heritage and Insignia. As you can see from the table to the left, the efficacy of Disarm O was very good to excellent for most of the diseases we tested. The exception was Botrytis blight which has not been a notable target for any of the strobilurins in our testing. In addition, Insignia and Heritage have been good on Fusarium stem rot on Zygocactus but Disarm O did not give any control in the single trial we performed. The most interesting result was seen in the Pythium root rot on geranium trial. In this case, Disarm O gave excellent control when used at either 2 or 4 oz/100 gal. Disarm O has a federal label but is not yet available.