CHASE NEWS

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Downy Mildew Control Update

I receive a monthly publication from England called **ADAS Hardy Ornamental Technical Notes**. In both May and June it listed downy mildew on several crops (*Digitalis*, *Gaillardia*, *Geum*, *Geranium*, *Hebe* and *Lamium*). I have seen these downy mildew diseases on the same ornamentals in the US over the past five years and it started me thinking about how serious this group of pathogens has become.

Do you remember when downy mildew happened in the winter and spring and only on a few crops like pansy and snapdragons? Once every 5-10 years an outbreak would occur on roses. Downy mildew fungus used to happen most often along the Pacific Coast where conditions were cool and damp for a large part of the year. Now downy mildew has become a nationwide problem. It happens on crops as diverse as buddleia, impatiens, coleus and rudbeckia. Check page 3 for images of ten downy mildew diseases on ornamentals. Now downy mildew happens on some crops in the summer and other crops in the winter. There is really no time of year free of downy mildew somewhere in the US.

Fortunately, the growth of the downy mildew problem has led to an expansion of the fungicides available for control of these difficult diseases. The most effective products in our trials are listed in the table to the right. The newest labeled products are FenStop (fenamidone form OHP) and Segway (cyazofamid from FMC). There are a number of others under development as well.

For the best control of downy mildew, sprays must be preventative. While some of the products can give some curative control they always work better preventatively. Be sure to read the labels for all products and alternate between chemical classes to reduce chances for resistance development.

Product	Result
Actinovate	None
Aliette	Excellent
Alude	Excellent
Banner MAXX	Very good
Camelot	Poor to very good
Clevis	Very good to excellent
Compass O	Good to very good
Segway	Excellent
Cygnus	Some to excellent
Daconil Ultrex	Some
Decree	None
Dithane	Good to very good
Endorse	Very good
FenStop	Very good to excellent
Fosphite	Good
Heritage	Very good to excellent
Insignia	Good to excellent
Junction	None to very good
Kocide TNO	Poor to very good
Medallion	None
MilStop	None to excellent
Phyton 27	Very good
PlantShield	Poor to fair
Protect T & O	Fair to good
Cease (Rhapsody)	Some to good
Spectro	None
Stature DM	Excellent
Strike	Poor to excellent
Subdue MAXX	Excellent
Terrazole	Excellent
Triact	Poor to fair
Vital	Very good to excellent

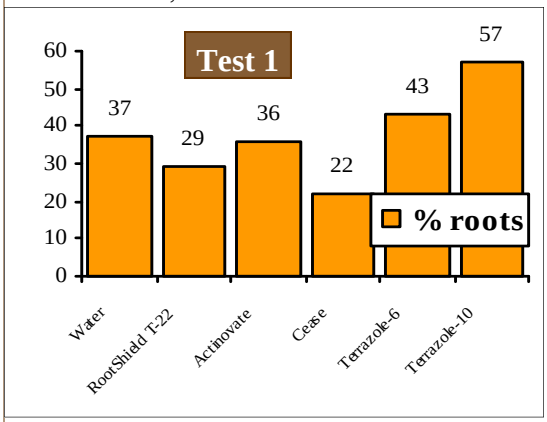
Inside this issue:

Callas and Fungicide/Bactericide Drenches

Have you ever wondered whether or not the bulbs or plugs or seeds you are using have a problem? If they have been problematic in the past you might decide to do preventative fungicide/bactericide applications. Indeed most plant pathologists will tell you that preventative applications work better than curative applications. Additionally, there are some situations that require preventative products be used since there is nothing that can cure these diseases once they start. Unfortunately, knowing when to apply a fungicide is not easy to determine. Do you have healthy calla bulbs? If they are infected, is the main problem Pythium or Erwinia or something else altogether? If they are healthy, then fungicides and bactericides may be harmful. If they have Erwinia then some fungicides for Pythium may be harmful.

We have been testing a variety of fungicides and bactericides for possible benefits in container culture of callas over the past few years. This year we did three trials—shown here. The treatments are summarized in the table with rates/100 gal, drench interval and total number of applications. The results of the root growth are shown in the three graphs on this page.

In the first trial, we used calla bulbs from a domestic source. The best roots were far and away found in the two Terrazole treatments with the 10 oz/100 gal rate the best. These bulbs were infected primarily with Pythium. The other treatments were either worse than the water control or the same. These are similar to results of many of our previous trials. It appears that Calla roots are sometimes sensitive to the very products we are using to protect them.



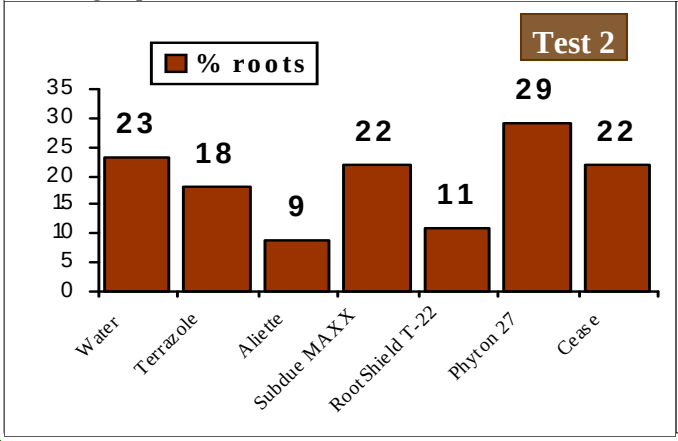
Treatment list for Calla container trials

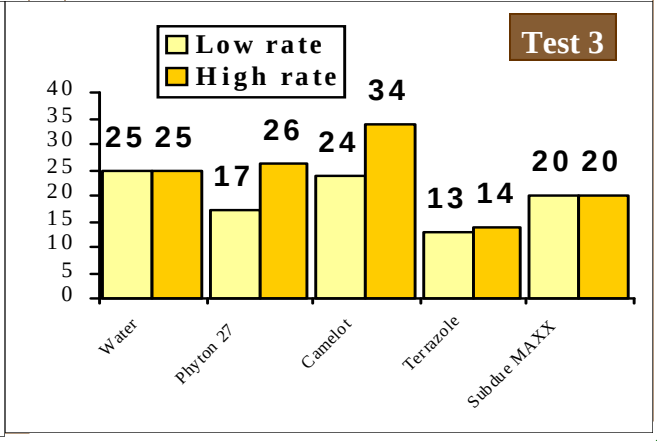
Product	Test 1	Test 2	Test 3
Terrazole 35W	6, 10 oz	10 oz	6, 10 oz
Aliette 80WDG	—	12.8 oz	—
Subdue MAXX	—	1 oz	1, 2 oz
RootShield T-22	4 oz	4 oz	—
Phyton 27	—	25 oz	20, 50 oz
Cease (Rhapsody)	1%	2%	—
Camelot	—	—	20, 48 oz
Actinovate	6 oz	—	—
interval	monthly	monthly	weekly
# applications	3	3	6

The second trial used calla bulbs originally from an off-shore source and results were different (Test 2, below, left). In this case, the best treatment was Phyton 27. These bulbs did have an Erwinia infection. The only product in Test 2 that could have helped with Erwinia was the Phyton 27.

The final trial also employed off-shore bulbs of a different cultivar. In this case the best product in the trial was the higher rate of Camelot. On this cultivar the lower rate of Phyton 27 was not effective.

Unfortunately, the only way to know which product to use in pot callas is to get an accurate diagnosis for that batch of bulbs. Erwinia infections are only treated with copper containing products while Pythium infections must be treated with products like Terrazole. Using fungicides when the bulbs are healthy can damage them so a broad-spectrum protectant approach is not the answer here.





Downy Mildew Portrait Gallery

Clockwise from the top middle-

Hebe,

Rudbeckia,

Digitalis,

Lamium,

Salvia (blue),

Veronica,

Helichrysum,

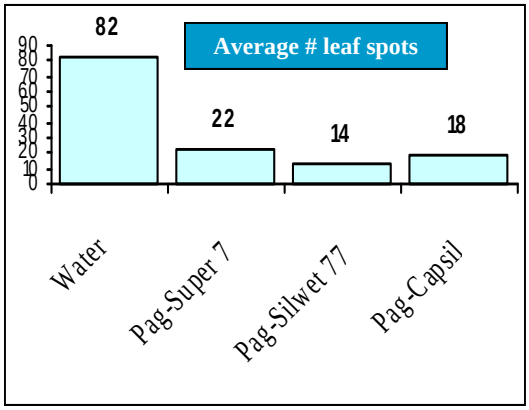
Agastache,

Coleus and

Argyranthemum

Effect of Wetting Agents on Alternaria Leaf Spot Control on Alstroemeria

For the past six months or so, we have been concentrating on the effects of wetting agents on efficacy of fungicides. We are doing some of the tests in our greenhouses and others in cooperation with growers in their fields. Early this month, we evaluated a trial on Alternaria leaf spot on Alstroemeria. The setting was a field in San Diego County and the trial was conducted by Buzz Uber. Plants were sprayed six times on a 14 day interval. We tested three wetting agents with Pageant fungicide (18.5 oz/100 gal). The wetting agents were Super 7 (4 oz/100 gal), Silwet 77 (2 oz) and Capsil (4 oz). On June 4, we counted the number of spots and results are shown in the graph to the right. As you can see all of the Pageant-wetting agent combinations gave good control of the disease but differences were not significant between the wetting agents. We will do a similar test with other wetting agents and a different fungicide when the opportunity arises.

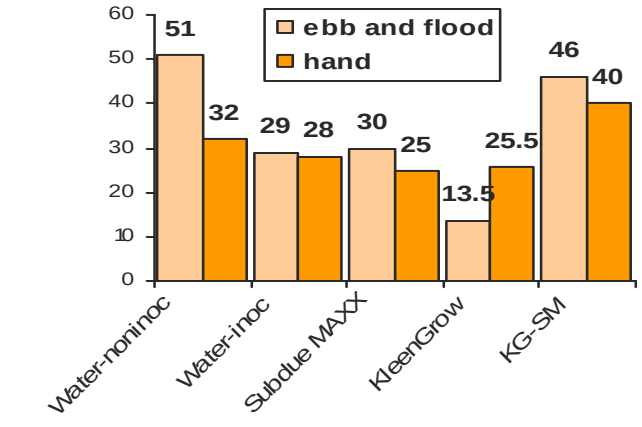


KleenGrow and Subdue MAXX for Pythium Root Rot on Geranium

We have a small set of ebb and flood trays that we use for evaluation of products for control of root diseases. In a trial using Pythium root rot on Geranium, we evaluated both the effect of ebb and flood on root rot severity and the effect of KleenGrow (PACE 49). This disinfectant-fungicide is registered throughout most of the US (not CA or NY). We tested KleenGrow and Subdue MAXX alone and in combination using ebb and flood to deliver the products compared to the same treatments applied as drenches and irrigated by hand. Plants were irrigated 28 times in the 8 weeks the trial was conducted based on water needs. The drench applications were made weekly for the KleenGrow treatments and monthly for the Subdue MAXX treatments. Treatment rates are shown in the table to the right. At the end of the trial, we evaluated top grade, height and the percentage of healthy roots on each plant.

Treatment	Rate in ebb and flood	Rate in hand water
Water noninoculated	——-	——-
Water inoculated	——-	——-
Subdue MAXX	1 oz/100 gal	1 oz/100 gal
KleenGrow	2%	1%
KleenGrow and Subdue MAXX	2% and 0.5 oz/100 gal	2% and 1 oz/100 gal

Percent healthy roots on Geranium infected with Pythium



Near the end of the trial (around 7 weeks), the Subdue MAXX in the ebb and flood delivery started to cause marginal burning on the geraniums. Plant height was significantly lower in the hand watered plants than in the ebb and flood in general but shortest in the KleenGrow treatments. Top grade was lowest for the hand watered inoculated control treatment and highest for the noninoculated treatments.

All of the geraniums in the trial looked very similar until we examined their root systems. The most healthy roots in the trial were found in the noninoculated control watered in the ebb and flood and the least healthy roots were on plants treated with KleenGrow alone in ebb and flood. The constant exposure to KleenGrow apparently caused some root damage in the ebb and flood. The isolate of Pythium irregulare we used in this trial is resistant to Subdue MAXX and obviously resulted in no benefits when this fungicide was used alone. It was surprising to see that the best fungicide treatments were the combination of KleenGrow and Subdue MAXX in either irrigation regime. These results indicate that using both products resulted in a synergistic benefit to root growth and apparently control of Pythium root rot on Geranium. Further testing with other pathogens and fungicides would be interesting. We are continuing to compare ebb and flood irrigation and hand watering for their effects on control of Pythium root rot on Geranium. Watch for a report in about 2 months.

Products in Review—FenStop

We started working with FenStop in 1999 for control of Pythium root rot, Phytophthora aerial blight and downy mildew on some ornamentals. FenStop has reduced risk status as many of the other imidazolinone fungicides including the strobilurin fungicides (Heritage, Compass O, Insignia and Cygnus). FenStop has low toxicity for bees, birds and earthworms but is moderately to highly toxic to fish. It's half life in soil is less than two weeks and it has a low leaching potential. When applied to the soil, the product is upwardly systemic and locally systemic (translaminar activity) when applied to leaves.

Downy mildew on Coleus

Original testing targeted higher rates of FenStop but the current label has settled on rates of 7-14 oz/100 gal. Our first trial on Phytophthora aerial blight on vinca showed 100% prevention with 14, 28 or 42 oz/100 gal when sprayed on a weekly interval. The second year, we tried the same rates but applied the product on a 14-day spray schedule. This time we saw slight symptoms develop, especially at the 14 and 28 oz rates. The higher rate was necessary to extend the interval of treatment from 7 to 14 days. We also tested control of Pythium root rot on Geranium and the best treatment was FenStop applied as drench on a monthly interval at 14 oz/100 gal.

Downy mildew on Impatiens

One of our first trial for downy mildew was on snapdragons. FenStop was applied as a spray on a 14-day interval with 100% prevention at 7 oz/100 gal. In a 2002 pansy downy mildew trial, we tested FenStop as a drench, sprench or spray application at 5 to 7 oz/100 gal. Imagine my utter shock and enthusiasm when we saw that even a 5 oz drench gave 100% prevention of this downy mildew. Finally, we have tested FenStop under field conditions for eradication of downy mildew on *Limonium*. Plants were sprayed on a weekly interval four times and best plant growth was found when they were sprayed with Subdue MAXX and Dithane T/O (1 oz and 16 oz/00 gal, respectively) or FenStop with or without Dithane T/O (7 oz and 16 oz/100 gal, respectively). Remember that the use of Subdue MAXX on ornamentals for downy mildew control is not currently legal.

FenStop is currently labeled for greenhouse use only. It does provide very good to excellent control of downy mildew and good to excellent control of Pythium root rot and Phytophthora crown rot and aerial blight.

Phytophthora stem rot on poinsettia (left), Pythium cutting rot on Geranium (middle) and Pythium root rot on lily (right)

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