

Phyllosticta and Glomerella leaf spot and dieback



I have been out trolling for diseases in some of the big box stores in the past few weeks. I had a couple of specific leaf spots on woody ornamentals to find but collected everything I ran across. After my fourth location of the same chain I also visited a container nursery. One thing really stood out in all of these places was a combination of leaf spots and dieback. It was very common to find scattered leaf spots that led to stem infections and eventually dieback. At the stage I saw, it was not always obvious that the origin of the dieback had been a leaf spot.

The plants and specific pathogens we recovered are listed in the table below. With so many new isolates of similar fungi, we decided to do a lab test to find out which fungicides might be most effective in controlling them. We plan to do several trials in the spring and summer on plant material but wanted a head start.

Table 2. Control of *in vitro* growth for isolates of anthracnose fungi.

Fungicide oz/100 gal	<i>Phyllosticta</i>	<i>Glomerella</i>
Chipco 26019-16	Good	Good
Daconil Ultrex-22.4	Some	Very good
Heritage-4	Some	Good-very good
Phyton 27-25	Poor-very good	Good
Terraguard-8	Excellent	Excellent
Medallion-4	Very good-excellent	Good-very good
3336-16	Poor	Good

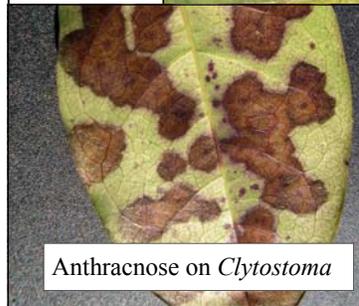
Table 1. Diseases of ornamentals caused by anthracnose fungi.

<i>Colletotrichum</i>	<i>Glomerella</i>	<i>Phyllosticta</i>
<i>Nandina</i>	<i>Phormium</i>	<i>Clytostoma</i>
<i>Clytostoma</i>	<i>Hydrangea</i>	<i>Ficus pumila</i>
	<i>Camellia</i>	<i>Clematis</i> (two)
		<i>Ceanothus</i>
		<i>Gardenia</i>
		<i>Loreopetalum</i>

This Petri dish trial showed that Terraguard and Medallion were very effective on both types of anthracnose fungi while other products were not equally effective (Table 2). *Glomerella* spp. appear to be more easily controlled than



Anthracnose on *Gardenia*



Anthracnose on *Clytostoma*

Phyllosticta spp. Be sure to watch for plant trials on these diseases coming up this summer.

Phyllosticta leaf spot and dieback on *Ficus pumila*



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Eradicating Botrytis on Geranium Cuttings and Cyclamen Plants

We are finding quite a bit of Botrytis blight on flowers and plants all over the country. After all, it is winter and the best time for Botrytis to spread and wreak havoc. In our greenhouses we found a couple of opportunities to test the ability of the best Botrytis fungicides to eradicate an active infection on geranium cuttings and Cyclamen plants.



Test 1

We choose some badly infected plants and applied each product a single time. We found that the most effective reduction was achieved with Medallion at 4 oz/100 gal. It was 100% effective on the geranium cuttings and moderately effective on the Cyclamen plants. Chipco 26019 (16 oz/100 gal) gave a little control on the Cyclamen but was not effective on the

geranium cuttings. Decree (24 oz/100 gal) and Daconil Ultrex (22.4 oz/100 gal) were not effective in a single application on either plant.

Test 2

During the same time frame we tested a variety of well-known fungicides against Botrytis on Cyclamen in multiple applications. Plants were badly infected with Botrytis blight when we started the trial. The products were applied three times on a weekly interval. Disease was rated every week to monitor progress of the treatment and the final rating (one week after the last application) is shown in the table below. Severity of Botrytis damage was evaluated at this point by counting the number of damaged leaves and flowers on each plant.



None of the fungicides resulted in statistically significant control of Botrytis at the end of the trial although differences were significant at earlier ratings. Least Botrytis damage (leaves and flowers) was found on plants treated with Phyton 27, STBX016 (an experimental product under development at Phyton Corp.) or Medallion.

Treatment	Rate/ 100 gal	Botrytis grade
Water	-----	2.3 a
Decree	24 oz	2.2 a
Phyton 27	15 oz	1.2 a
STBX016	15 oz	1.2 a
Zerotol	1%/0.33%	1.9 a
STBX013	0.2%/0.1%	1.5 a
Medallion	4 oz	1.3 a
Daconil Ultrex	1.4 lb	2.2 a
Chipco 26019	16 oz	1.7 a

It is clear that trying a product once only and hoping for eradication is asking too much of even the best Botrytis fungicides. Reapplications on a weekly interval for at least three weeks would be needed to reach maximum benefits of any of these fungicides. As always it is best not to wait until disease is severe to apply fungicides—prevention is best!

Coniothyrium Canker on Rose-Update

We have been working with the California rose growers for the past few months trying to develop some new control strategies for diseases like Coniothyrium canker. This disease has proven difficult to work with in one respect—inconsistency of results. We have performed three trials on rose canes.

Coniothyrium canker on Dr. Huey Rose canes



Results from the first trial were different from those of the second two trials. In some cases, products failed to control disease in the first trial and provided control in the other two trials. The table below shows the overall results of the three trials. Most consistent and highest degree of control was seen with the strobilurins, Insignia (BAS500 from BASF) and Compass O.

Degree of control of Coniothyrium canker on rose canes.

Treatment	Rate/100 gal	Degree of Control
Insignia	16 oz	Good
Compass O	4 oz	Good
Heritage	4 oz	Some
Chipco 26019	16 oz	Some
Phyton 27	25 oz	Some
Medallion	4 oz	Some
Daconil Ultrex	22.4 oz	Some

It was interesting that Heritage did not do as well in this disease. This may be due to the difference in the systemic nature of the three strobilurins. Heritage is upwardly systemic while both Insignia and Compass O only show translaminar activity. The fact that they remain near the surface while Heritage may move into the cane could affect the level of control. It is also possible we will see better control with Heritage on growing roses rather than cane sections. This is clearly the next trial we need to perform.

Hurricane is Coming

Syngenta is finally launching Hurricane WP. Most of the work on Hurricane occurred in 1999 and 2000. This product was called Broadside at that time and is a combination of fludioxinil-32% (Medallion 50WP) and mefenoxam-15.5% (Subdue MAXX). One trial showed no control of Fusarium wilt on Cyclamen at 1.5 oz/100 gal although some control was seen with Medallion at 2 oz/100 gal in the same trial. In contrast, both Medallion (1 oz) and Hurricane (1.5 oz) gave very good control of *Cylindrocladium* cutting rot on Azalea. Very good to excellent control was seen

when Hurricane was used at 1.5 oz/100 gal for *Rhizoctonia* aerial blight on Boston fern or *Rhizoctonia* damping-off on Impatiens (sprench – not drench!!!). The product will be labeled as a drench initially with intent to add foliar applications. The most important part of this is the ability to legally use the product for downy mildew, Botrytis, Alternaria and other foliar diseases. The foliar application will likely be accompanied by a 48 hr REI.

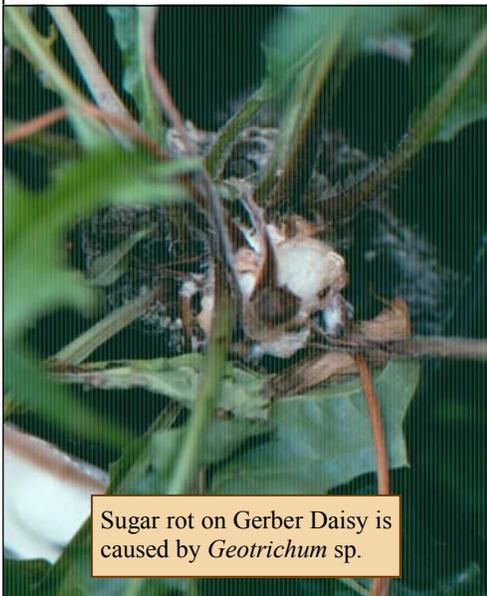
Hurricane will not control mefenoxam resistant *Pythium* spp. any better than Sub-

due MAXX alone and you might consider adding Heritage if resistance is a concern. Our trials with Heritage on *Pythium* root rot on geranium and pansy have shown very good control when used at labeled rates as drenches. Rotating Hurricane with a combination of a phosphonate for *Pythium* and *Phytophthora* and thiophanate methyl for *Rhizoctonia* and *Fusarium* is recommended. I think rotating Hurricane and Heritage would be an effective strategy. I will be testing a tank mix of the two this next year since simplicity is often the best approach.

Sugar Rot on Gerber Daisy

One of the most unusual diseases of an ornamental plant is caused by a yeast. *Geotrichum* spp. are known to cause diseases, mainly of fruit and vegetables. Sour rot on tomato and citrus fruit got its name from the vinegar odor associated with the disease. The fungus is considered a weak pathogen and needs wounds in the flesh of the fruit as well as the help of fruit flies that carry its spores from one site to another. The optimal temperature for tomato sour rot is 86 F and the disease has a long history in the tomato processing factories in California. It's also involved in fruit rot of muskmelon, watermelon and peach and can occur in the field before harvesting.

Sugar rot on cut Gerber daisies gets its name from the white masses of crystalline growth (see below) that form in the center of affected plants. Fruit flies are once again involved in this *Geotrichum* disease. I have not seen the disease on containerized Gerber daisies making the role of wounding (flower harvest) a probable necessity for infection to occur.



Sugar rot on Gerber Daisy is caused by *Geotrichum* sp.

A couple of years ago, we performed some lab tests to investigate the potential of a variety of fungi-

cides and bactericides for control of *Geotrichum* spp. we recovered from Gerber daisies. Each product was added to molten culture medium and allowed to solidify. The plates were inoculated and we measured the growth of the *Geotrichum* isolate.

The best products for stopping growth of the yeast were Banner MAXX (4-8 oz/100 gal), Phyton 27 (50 oz/100 gal), Kocide TNO (1-2 lbs/100 gal), Pipron (8 oz/100 gal) and Protect

T & O (1-2 lbs/10 gal). The table above shows all of the other products we tested as well.

Remember that Banner MAXX is not labeled for greenhouse use and can cause significant stunting (PGR) on Gerber daisies. In addition, Kocide and Protect may leave unsightly residues at their higher use rates. Both Pipron and Phyton 27 would be excellent on both sugar rot and powdery mildew on Gerber daisies making them a good choice.

Treatment	Rate/100 gal	Reaction	Chemical class
Camelot	48 oz	Good	Copper
Chipco 26019	16 oz	Slight	Dicarboximide
Daconil Ultrex	1.4 lb	Good	Substituted benzene
Eagle 40 WSP	4 oz	Very good	Sterol inhibitor
Fungo WSB	20 oz	None	Benzimidazole
Heritage	4 oz	Slight	Strobilurin
Kocide TNO	1.5-2 lb	Excellent	Copper
Medallion	4 oz	Slight	Phenylpyrrole
Phyton 27	25-50oz	Very good to excellent	Copper
Pipron	4-8 oz	Very good to excellent	Piperalin
Protect T&O	1-2 lb	Excellent	Dithiocarbamate
Terraclor 75W	8 oz	None	Aromatic hydrocarbon
Terraguard	8 oz	Some	Sterol inhibitor

Products in Review— Clevis (Manhandle)

We started working on a product for Rohm and Haas in 1998 called RH-0611 or Manhandle for several years. The product is a pre-mix of myclobutanil (like Eagle and Systhane) and mancozeb (like Dithane and Fore). We had some very good results with it on quite a variety of diseases as one might expect from a combination of these two active ingredients.

A couple of months ago I heard that a new company was going to bring the product to the ornamental market. The company is called Prokoz and the product is called Clevis.

In preparation for testing Clevis I returned to our trials

summarized them (Table to the right). Clevis was tested at either 1 or 2 lbs per 100 gal against leaf spots, Botrytis, downy mildew, powdery mildew and rust. Very good to excellent results were seen on most diseases we tested. The only exception is Botrytis control where we sometimes saw very good control but more often saw a lesser degree of control.

One of the most interesting results we saw was the very high degree of downy mildew control. When Clevis is used the results appear to be better than one would expect from adding the two active ingredients. Hopefully, additional research will be performed to clarify the situation.

The combination of these active ingredients (ai) is an excellent solution to fungicide resistance. The actives target pathogens with unrelated mode of actions and there is little chance of resistance developing.

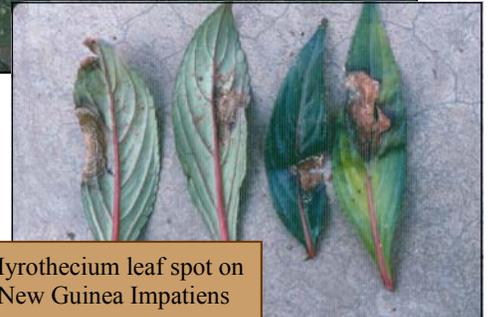
Disease	Plant	Rate/100 gal	Result
Alternaria leaf spot	Impatiens	16 oz	Very good to excellent
Alternaria leaf spot	Pittosporum	16 oz	Very good to excellent
Anthracnose	Cordyline	16 oz	Very good to excellent
Botrytis blight	Geranium	16 and 48 oz	Poor
Botrytis blight	Exacum	16 and 32 oz	Very good to excellent (32 oz)
Botrytis blight	Poinsettia	16 oz	Some
Downy mildew	Alyssum	16 and 32 oz	Very good to excellent
Downy mildew	Stock	16 and 32 oz	Excellent
Downy mildew	Snapdragon	16 and 32 oz	Very good
Myrothecium leaf spot	New Guinea Impatiens	16 and 32 oz	Some
Powdery mildew	Rose	16 and 3 oz	Excellent
Rust (Puccinia)	Geranium	18 oz	Excellent
Rust (Uromyces)	Hypericum	16 and 32 oz	Very good to excellent
Rust (Puccinia)	Snapdragon	16 and 32 oz	Very good to excellent



Alternaria leaf spot on Pittosporum (above) and Cordyline anthracnose



Hypericum rust (right) and Geranium rust (below)



Myrothecium leaf spot on New Guinea Impatiens

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