

CHASE NEWS

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Does Drenching Work for Foliar Diseases?

I am not sure why but it seems like many growers want to apply products as a drench for foliar diseases. The most effective way to use a product is almost always by applying it to the area of the plant where the disease occurs. Nevertheless, the development of systemic fungicides has led us to try fungicides as drenches for foliar diseases like rust and downy mildew. Two recently reported trials are important clues to understanding the ability of systemic fungicides.

In 2011, Scooco, Buck and Jeffers reported on use of three fungicides for rust on geranium caused by *Puccinia pelargonii-zonalis*. Products were applied as drenches at three rates. Folicur (tebuconazole) was 100% effective at all three rates when inoculated a week after treatment. When inoculated three weeks after fungicide treatment, only the highest rate was highly effective. Eagle 20EW (myclobutanil) was tested similarly but in this case only the highest rate

tested was highly effective one week after treatment. None of the rates of Eagle 20EW was highly effective when plants were inoculated 3 weeks after fungicide treatment. This indicates that

tebuconazole lasted longer in the plant than myclobutanil) in this test. The final product tested was Heritage 50WG (azoxystrobin) which was 100% effective at all rates tested at 1 week after treatment but only effective after 3 weeks when used at the highest rate.

The second trial was performed by Warfield in 2011 on downy mildew on impatiens. In this test, she compared a spray of Subdue MAXX with a drench (at the same rate). The product was 100% effective as a spray but not effective when used as a drench.

“how effective a fungicide will be as a drench is not simply a matter of whether or not it is systemic.”

These trials indicate that determining how effective a fungicide will be as a drench is not simply a matter of whether or not it is systemic. The factors that play a role are: how long it lasts when used as a drench, the disease you are trying to prevent, the host plant you are growing and

the rate of the product. The label must allow for applications as a drench. That includes making sure that the drench rate is effective for the foliar disease. One example of this is Heritage which can be used as a spray or a drench (depending on the disease target). This product is not labeled for the same rate/100 gallons for sprays and drenches. It is possible that the drench rate will not be sufficient to control the foliar disease or that it will not last as long as a foliar spray. Be sure to check the product label to make sure it can be used for drenching - or just keep spraying for foliar diseases.

Micora Fungicide

Recently, Syngenta Professional Products received labeling on a new fungicide called Micora. This fungicide has the active ingredient mandipropamid and is in the MOA group 40 (as is Stature SC). It has been extensively tested by many researchers working with IR-4 or Syngenta.

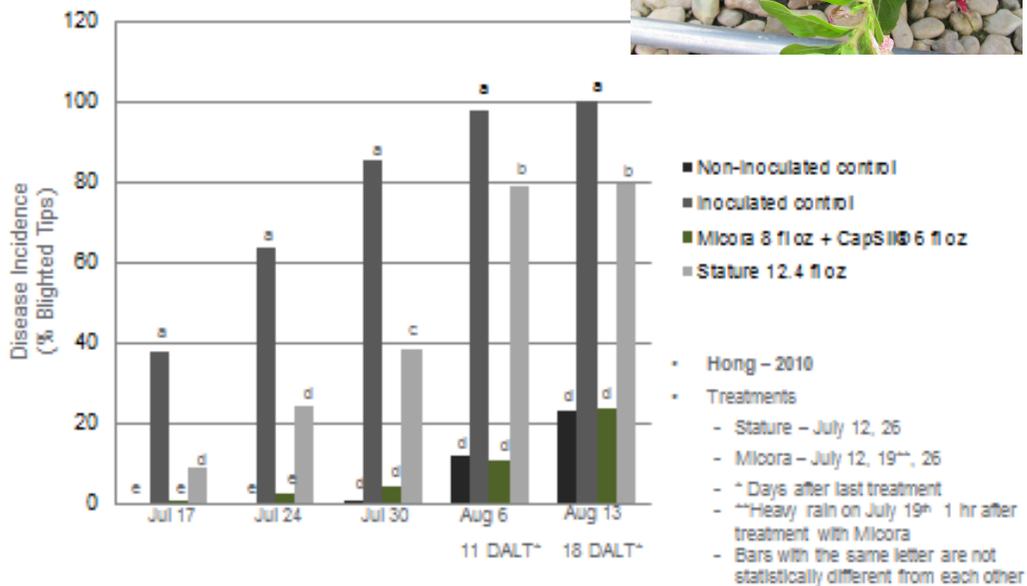
The points of interest made by Syngenta are:

- Unique mode of action for the ornamental market
- Translaminar and contact activity
- Prevents downy mildew and Phytophthora (foliar, stem and root)
- Labeled on certain vegetables (tomatoes, Brassica, eggplant, peppers and leafy vegetables including lettuce)
- 4 hour REI
- Low use rates (4-8 oz/100 gal)
- Good plant safety

Dr. Hong (Virginia Tech) performed a trial on Phytophthora aerial blight on vinca (*P. nicotianae*). He compared Micora to Stature. The graph to the right shows the disease severity data. At all rating dates, severity of Phytophthora was significantly lower with the Micora treatment than the Stature treatment. By the end of the trial, 100% of the inoculated controls were dead and 80% of the plants treated with Stature were dead. Only about 20% of those treated with Micora had died.

Some of the other work performed on Micora for Phytophthora

Effect of fungicides on severity of Phytophthora aerial blight on vinca.



control include: Ramorum blight on camellia (*P. ramorum*), crown rot on pansy (*P. nicotianae*), root rot on Gerber daisy (*P. cryptogea*), root rot on azalea (*P. cinnamomi*) and root rot on snapdragon (*P. nicotianae*).

In 2007, Grunwald et al. (USDA-ARS Corvallis, OR) reported very good to excellent control of Ramorum blight on camellia. The lesion area was reduced most dramatically by Micora (8 oz/100 gal) and Subdue MAXX in this trial.

Hausbeck et al., reported on a trial performed last year on crown rot of pansy. Excellent prevention was reported for Micora, Orvego (under development at BASF), Stature SC and Subdue MAXX. In this trial, Aliette and Heritage were effective to a lesser degree.

Benson and Parker reported on a trial in 2007 performed on Phytophthora root rot on Gerber daisy. The most effective products tested were: FenStop and Micora applied as drenches. Spray applications of phosphonates (Aliette, Alude, Vital, Magellan or Biophos) were not effective at all in this trial.

Phytophthora root rot on azalea was also tested by Benson and Parker (2005). In this trial many products were excellent at preventing root rot including: Alude, Biophos, Vital, Segway, FenStop, Stature and Micora. Subdue MAXX and Insignia were also effective to a lesser degree.

Finally, Hausbeck and Webster reported on root rot control on snapdragon (2006). In this case, 100% control was achieved with FenStop, Micora and Adorn with slightly less effective control seen with Stature DM (6.4 oz/100 gal) and Segway. No control was seen with Truban 30WP (6 oz).

These trials show consistent and high levels of control of a variety of ornamental diseases caused by *Phytophthora* species with Micora. Be sure to follow all label directions and alternate with another MOA group fungicide for Phytophthora. Although development of fungicide resistance in Phytophthora is not as common as in Pythium, it must not be ignored. Prevention is always more effective than eradication and that includes prevention of resistance development.

Fungicides for Botrytis

There are many different fungicides that can be effectively used to manage Botrytis blight on ornamentals. In the past four years we have seen two pre-mix fungicides labeled for ornamentals - Pageant and Palladium. I include below the most effective products from our trials over the past 15 years. Be sure to choose fungicides from different MOA (mode of action) groups to create an effective rotation. Remember that one of the most commonly occurring resistance events is for *Botrytis cinerea*.

FUNGICIDE	MOA	NOTES
Chipco 26019	2	
Daconil Ultrex	M5	can be damaging to open blooms
Decree	17	best at eradicating spores
Medallion	12	
Pageant	7 and 11	two active ingredients for Botrytis
Palladium	9 and 12	two active ingredients for Botrytis

Host Effects Fungicide Efficacy on Botrytis Flower Blight

We are in the habit of deciding what fungicides to use on our plants based on the target pathogen and rarely pay attention to the plant we are treating. Botrytis is one of the most common diseases on ornamental plants and the best products for its control on one plant are usually the best for almost any plant. In a recent set of trials by Buck and Youmans (university of Georgia) this was tested on mums and dianthus.

Plants were treated three times on a weekly interval:

- Non-treated
- Palladium 2 oz/100 gal
- Palladium 4 oz
- Palladium 8 oz
- Medallion 1 oz
- Decree 12 oz
- Heritage 4 oz
- Daconil Ultrex 40 oz

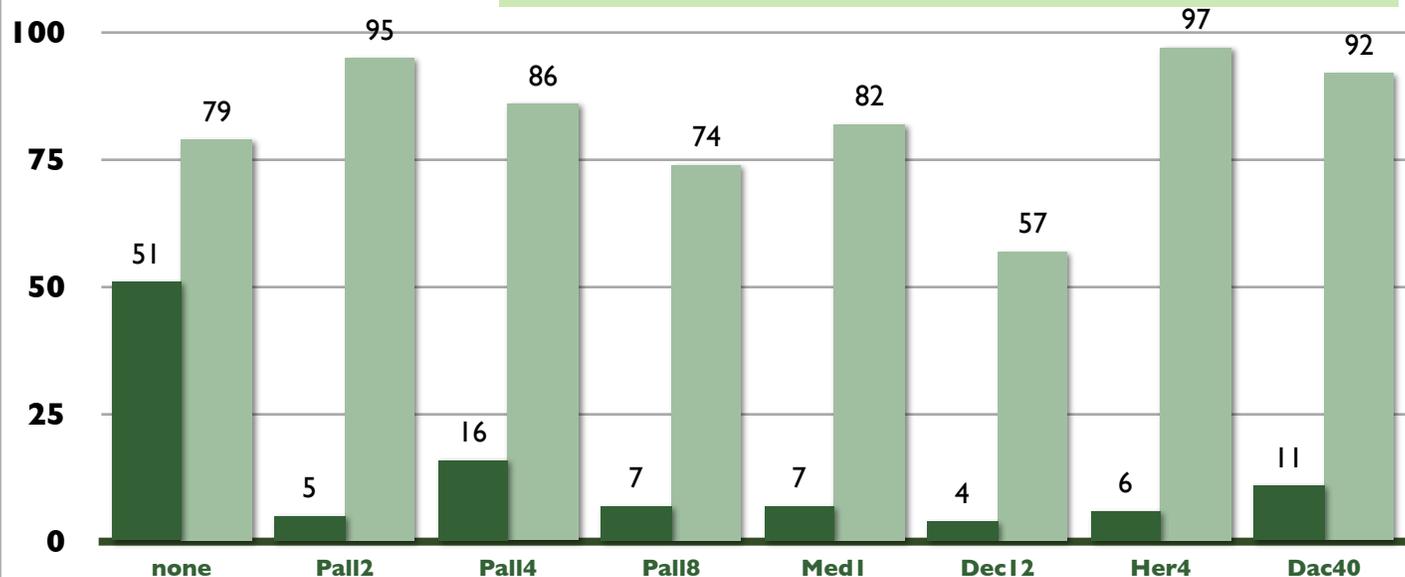
The rate of Medallion chosen was a little low based on our research (2-4 oz/100

gal) and the rate of Daconil Ultrex was well above the labeled rate of 1.4 lb/100 gal. Plants were inoculated after every fungicide application and data were recorded as the percentage of infected flowers 2 weeks after the third and final fungicide application.

All fungicides significantly reduced infection of flowers on mums (dark green) but on the dianthus (light green) only the Decree was significantly better than the non-treated control. The researchers also reported no phytotoxicity with any treatment and only minimal residue. This is a surprise for such a high rate of Daconil Ultrex which can be damaging to open flowers on many plants. I would also have expected significant residue from this rate of Daconil Ultrex applied three times a week apart.

One possibility is that Dianthus are more susceptible to Botrytis blight than mums. Unfortunately, one fungicide fits all is not always true.

Effect of fungicides on percentage infected flowers on mums (dark green) and Dianthus (light green). Data are given as % infected flowers.



Timing is Everything!

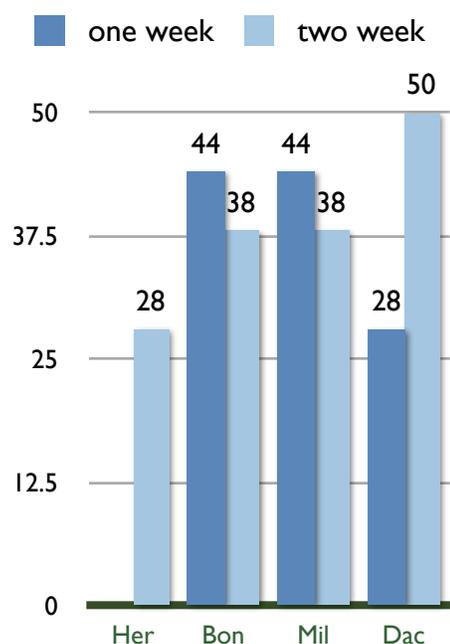
As growers become more challenged by financial concerns, they are trying to spread treatments out to longer intervals or hope that they can treat after symptoms start to save on preventative applications. As a plant pathologist I usually caution against going to far apart in treatments or waiting too long to treat.

I have been reading a lot of trial reports on ornamentals and noticed a theme. Many of the trials tested treatment intervals or treatment at different times after infection occurred. I thought I would illustrate my points with these researchers trials.

The first trial was performed on crape myrtle with *Cercospora* leaf spot in Alabama (Hagan and Akridge, Auburn University). They applied several fungicides on a 1 or 2 week interval for about 2 months.

- Bonide liquid copper (0.8 gal/100 gal)
- MilStop (2.5 lb/100 gal)
- Daconil Ultrex (1.4 lb/100 gal)
- Heritage (4 oz/100 gal) used at 2 wk interval only

The graph below shows the data at the end of the trial.



It was interesting that for Bonide Copper and MilStop the control was about the same for one week as two weeks and only the Daconil Ultrex showed a

significant benefit when used weekly compared to every other week. Heritage, which was only tested on a 2 week interval provided the best control in the trial (same as Daconil used weekly.)

The second trial compared control of rust on switch grass with a 7 or 14 day interval. Hagan and Akridge once again applied products over the summer of 2011. Disease was rated as follows:

- 1=no disease
- 2=very few pustules
- 3=few pustules
- 4=some pustules (less than 10% leaf death)
- 5=some pustules (less than 25% leaf death)
- 6=numerous pustules (less than 50% leaf death)

The treatments were:

- Daconil Ultrex (1.4 lb/100 gal)
- Eagle 40W (8 oz/100 gal)
- Heritage (4 oz/100 gal)

The results showed that Daconil gave some control (rating was 4 compared to 6 for untreated). Eagle had a rating of 2.1 and Heritage had a rating of 3.5. In this trial, Eagle was the most effective fungicide regardless of the interval tested.

All of the products worked better as treatment interval shortened.

TREATMENT	RATING
1 wk	2.1 d
2 wk	3.1 c
3 wk	4.0 b
4 wk	6.0 a

The rating numbers followed by different letters indicate that they are significantly different.

The final trial I am highlighting here was one performed by Warfield (Ball Horticultural Company) on impatiens downy mildew. The trial was run with some of the most effective fungicides for downy mildew with treatments applied either 3 or 6 days post infection.

Treatments were:

- Adorn (1 oz)/Protect (32 oz)/Capsil (6 oz)
- Segway (3.5 oz)/Capsil (6 oz)
- Vital (4 pint)
- Stature SC (6.12 oz)
- FenStop (14 oz)

Data are shown in the table below.

TREATMENT	3 DPI	6 DPI
untreated	4.0 a	NA
Adorn/Protect	1.0 e	1.3 e
Segway	3.2 ab	3.5 ab
Vital	2.3 cd	3.7 ab
Stature	1.9 de	3.3 ab
FenStop	2.3 cd	3.0 bc

These data show that some of the products were less effective in stopping an infection after three days than others. The best appeared to be the Adorn/Protect/Capsil combination which was very effective at 3 or 6 dpi. The Segway was not as effective at eradication whether applied 3 dpi or 6 dpi. Vital, Stature and FenStop were each more effective when used at 3 dpi than when used at 6 dpi.

In this test, Adorn had the best “kick-back” ability. That is to say it was able to stop an infection up to 6 days after the infection started. The other products were less effective the longer the days after infection became.

Sometimes it is best to apply preventatively but it all depends on the disease and the fungicide chosen.

Bacterial Leaf Spots of Hibiscus

In the 1980's I described quite a few new bacterial diseases on tropical crops like hibiscus, dieffenbachia and ficus. In one case, I found three different bacteria causing spots on hibiscus and set out to determine possible differences in the current cultivars in their sensitivity to these three bacteria and also the effect of temperature on them.

That was a long time ago and imagine my surprise when I found out that at least one of the pathogens - *Xanthomonas campestris* pv. *malvacearum* was causing losses in some hibiscus produced in California. I also saw a *Pseudomonas* leaf spot on bougainvillea that I had worked with in Florida forever ago. I thought I would re-view some of the old data since little if anything has been reported on these diseases since I worked on them.

The bacteria on hibiscus had different temperature optima.

- *Pseudomonas syringae* (60-65 F)
- *Pseudomonas cichorii* (80-85 F)
- *X. campestris* pv. *malvacearum* (75-90 F)

Unfortunately, in Florida this meant that at least one bacterial pathogen was active at all times.

Another outgrowth of the old work was the documentation that use of cycocel (CCC) which was common for height management actually reduced susceptibility of the hibiscus cultivars. Since then, many other PGRs have been introduced and

although I sometimes hear that they can reduce disease I have yet to see a documents trial on this effect. For Cycocel treated hibiscus (10 cultivars were included) we found that disease severity was reduced by 34% for *P. cichorii*, 48% for *Xanthomonas* and 58% for *P. syringae*. On the off chance that some of these old cultivars are still in production I include the data on disease severity in the table below.

PSEUDOMONAS LEAF SPOT	XANTHOMONAS LEAF SPOT
White Red Eye	Euterpe
President	Brilliant Red
American Beauty	President
PinkVersicolor	Painted Lady
Butterfly	White Red Eye
Euterpe	Butterfly
Senorita	PinkVersicolor
Brilliant Red	American Beauty
Painted Lady	Senorita
Holiday	

All cultivars were equally susceptible to *P. cichorii* (data not shown). The most



I worked on bacterial leaf spots on Hibiscus at the University of Florida in the 1980's. The image above is from a recent consultation I made to a California nursery where this Xanthomonas leaf spot was causing losses.

resistant cultivars for the other two disease are listed from top to bottom least susceptible to most susceptible. The least susceptible cultivar overall was 'President' and the most susceptible cultivar was 'Senorita'.

If you do not have these cultivars it is important to make observations or disease severity and eliminate the most susceptible cultivars whenever possible. This is one of the most effective (and under-used) means of disease control available



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Final Thoughts from Mike

I went out and bought a new video camera a few weeks ago and I've been experimenting with it. I took some footage at the Spring Trials as a practice run. I found out its not something you just video shoot and watch, there's a little more to it than that. So there will be a steep learning curve on using videos in my future.

As we move on in the year, we will be doing more video production things, this is exciting to me as I can do the shooting (keeping the target on Ann) and then come back and do the editing. I see a great potential and new opportunities for us to supply you with some new products.

On another note, I've attached here our QRCode for the ones who print out their issues, it should take you right to our website. Mike

