

Pythium Control

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This month, I decided to focus on chemical control of *Pythium* on ornamentals. Mary Hausbeck (Professor of Plant Pathology and Michigan State University) reviewed *Pythium* control tips in January. *Pythium* is one of the most common diseases encountered in ornamental plant production. The disease is relatively easy to identify if an adequate sample is tested in a diagnostic lab. I thought I would highlight some of the points that are important (at least to me) in controlling *Pythium*. These include identifying the problem and deciding what to apply. Control of *Pythium* root rot is often thought to be straightforward but our choices are many and varied. I recently reviewed aspects of *Pythium* control including older chemistries like etridiazole, phosphonates, Subdue MAXX resistance and some new chemistries.



Figure 1. *Pythium* root rot on Alstroemeria.

Symptoms of *Pythium* root rot

How many of you recognize that tip burn, wilt, loss of lower leaves and chlorosis (especially of older leaves) are each symptoms of root disorders? I have been surprised lately to see the large number of samples that are sent in with above-ground symptoms when the real problem is root rot. The next time you see something on the leaves that bothers you, take the time to check out the roots. Don't assume that *Pythium* is involved by the fact that the outer core of the root may pull easily away and leave the central core hanging. This may be a sign of root rot in general but it does not mean that *Pythium* and *Pythium* alone is the cause. So...if you do send a sample in for diagnosis, please include part of the root system. That way the lab has a good chance of identifying the entire problem and giving you a complete control strategy.

Common Species of *Pythium*

There are quite a few different species of *Pythium* that are isolated from ornamentals. A study conducted by Margery Daughtrey at Cornell University showed some interesting trends. The most common include *P. irregulare*/*P. crypto-irregulare* (nearly always pathogenic), *P. aphanidermatum* (pathogenic) and *P. ultimum* (pathogenic). Several non-pathogenic *Pythium* species include: *P. rostratum*, *P. angustatum* and *P. spinosum*. Marge also found that poinsettias showed the greatest diversity of *Pythium* spp.: *P. aphanidermatum*, *P. irregulare*, *P. myriotylum*, *P. sylvaticum*, *P. ultimum*, *P. afertile* and *P. rostratum*. Not all labs identify *Pythium* isolates to species making your choice of controls based on this information alone a serious challenge.

Chemical Control - Etridiazole

One of the first fungicides available for *Pythium* control on ornamentals was etridiazole. This active ingredient is found in Terrazole, Truban and Banrot. I worked on these formulations during the time I spent at University of Florida but then I came back to California and found that they were not registered. I did continue to place Terrazole in our *Pythium* trials over the past 12 years. Terrazole was registered for use in California during this time. Overall, Terrazole 35W was very good to excellent when used at least 6 oz/100 gal on less than a 28 day interval. Etridiazole fungicides have been used for more than 30 years with no resistance reported. Trials at Chase Horticultural Research as well as those reported from other researchers show that etridiazole remains a good choice for *Pythium* root rot control.



Figure 2. Leaf spots on penstemon caused by *Pythium*.

Phosphonates

I started working on phosphonates (phos-acid alternatives) in 1980 before Aliette was officially labeled for use on ornamentals. I recently reviewed the trials I did at University of Florida. I found that the use of Aliette 80WDG on tropical foliage plants

for *Pythium* root rot was best at higher than labeled rates. Unfortunately, we also saw that optimal use rate was dependent on the plant. Finally, we saw that while Subdue 2E resulted in the best root systems in the trials, Aliette often resulted in the best top growth.

I then decided to summarize reports on use of any phosphonates for *Pythium* control on an ornamental crop. While very consistent and sometimes excellent control has been proven for *Phytophthora* (poinsettia, spathiphyllum, gerber daisy, calibrachoa, snapdragon, pothos, verbena and vinca more than 80% of the time) the results were far from consistent for *Pythium*. In this case, trials on geranium, snapdragon, lily, pansy, ceanothus (a woody shrub native to the West coast), ranunculus, wax begonia and lisianthus were anywhere from no control (40%) to very good control (75%). The products in some of these trials included: Aliette, Alude, Biophos, Nutri-phyte and Vital.

My overall conclusion is that use of phosphonates is a very good idea when *Phytophthora* is the target but not necessarily a good choice for *Pythium* control.

Subdue MAXX Resistance

One of the most popular fungicides for *Pythium* control remains Subdue MAXX. This fungicide is exceptionally effective most of the time and does have the ability under some circumstances to “cure” a *Pythium* infection. Its efficacy and relatively low cost almost insured that it would be pushed to the MAXX. The exclusive use of Subdue MAXX has led to development of some resistant populations of *Pythium*. This does mean it will not help in many situations. Simply using a higher dose is usually not helpful. Please rotate among the products that work on *Pythium*. The only way to avoid development of resistance and subsequent losses due to *Pythium* diseases is to rotate. If you have been using Subdue MAXX to the exclusion of all other products and it does not seem to be working as well as it used to consider that you may have a resistant strain of *Pythium*. Research has shown that ebb and flood production of ornamentals is an especially easy way to produce resistance. Be sure to ask your diagnostic lab if you suspect resistance.

New Chemistries

Over the past few years, there have been some excellent reports by a variety of researchers concerning use of some closely related products for *Pythium* control. Heritage is a strobilurin fungicide while FenStop (fenamidone – OHP) and cyazofamid (experimental from ISK Biotech) are in related chemical families. They are close enough that rotating between a strobilurin and one of the other two would not be an effective means of preventing resistance development.

These chemicals have each been shown to be effective for *Pythium* control when used at appropriate rates. Right now the only product labeled for this use is FenStop. This fungicide has performed well at rates of 4-14 oz/.100 gal but be sure to check the label for legal use rates. Cyazofamid has performed equally well when tested at rates from 1.5 to 4.5 oz/100 gal. We look forward to seeing this product labeled.

Finally, there has been quite a bit of testing on Heritage use for *Pythium* control. We started testing Heritage for control of *Pythium* in the mid 1990's well before it was labeled for ornamental use. At that time rates were sometimes very high and results were somewhat variable. In the past few years, however the most effective use rate appears to be 0.9 oz/100 gal. One of the most important features of Heritage is the spectrum of

activity. It is the only product discussed above that is effective on *Rhizoctonia*, *Fusarium*, *Cylindrocladium* and *Pythium* and *Phytophthora*. Syngenta is considering adding *Pythium* control to the Heritage label.



Figure 3. *Pythium* root rot on *Buxus*.

Conclusions

My final suggestions are:

1. Be sure about the cause of the problem – get a diagnosis.
2. Rotate different fungicide classes to avoid resistance.
3. Do not assume resistance – get it tested!
4. Follow fungicide labels – they are there to help you.