Volume 4, Issue 4

April, 2005

CHASE RESEARCH GARDENS, INC.

CHASE NEWS

The Many Faces of Rose Downy Mildew

I thought I knew what rose downy mildew looked like until the past two months. I have seen angular, tan spots in the past with a very small amount of white crystalline sporulation on leaf undersides. The name of the pathogen is *Peronospora sparsa* and was obviously chosen due to the low number of spores the original researchers found. In the past two months however, I have seen a lot of PURPLE sporulation on leaf undersides and a weird array of other symptoms.

We also found collapsing buds and cankers on newly emerging rose canes (top, right). They wee sometimes infected with Botrytis too making the exact cause somewhat confusing to determine. Visiting nurseries, growing fields and retail box stores merely reinforced the observation that a lot of cane rot and bud death was due to the downy mildew fungus this year.

Typical blotching with angular spots occurred on some cultivars and a lot of leaf drop on others. We have even heard what is the most common misdiagnosis of rose downy mildew-PHYTOTOXICITY. Downy mildew on rose often looks like phytotoxicity since it can appear as purpling, distortion and severe leaf drop almost over night. The photo in the middle to the right shows very common purpling and some tan dead spots.

Finally, we have seen an ever-changing series of leaf spots from tiny speckles that are tan to actually pink spots that might not even extend through to the underside of the leaf. Different species of roses respond differently to downy mildew making diagnosis very difficult. Don't fall into the trap of thinking you know what you are looking at. Get a lab diagnosis whenever possible or buy stock in fungicide companies!

Bud blight and cane rot

Purple blotching

Pink or tan speckles

Inside this issue:

Shot-hole—What's in a Name? by Marianne Waindle	2
Cleaning Before Disinfesting	2
Research Highlights—Steaming for Pathogen/Pest Control, Rust Fungi and Fungicides, Caladium Resistance to Pythium Root Rot	3
Hydrangea Diseases are on the Rise	4

Shothole—What's in a Name? by Marianne Waindle

Often plant pathologists give a common name to symptoms that generally reflect the physical attributes of a disease or plant disorder. Shothole disease of stone fruit trees is caused by *Wilsonomyces carpophilus* (see picture below). The disease was formerly known as Coryneum blight and is caused by a fungus that over-winters in infected stems and buds. When the right environment occurs in the spring the spores form and get busy infecting new leaves as they emerge.

Fungal shothole

There is another shothole disease commonly found on *Prunus* spp. (especially *P. laurocerasus*—English laurel, 'Otto Luyken' or 'Zabeliana'). This is bacterial leaf spot and can be caused by *Pseudomonas syringae* and *Xanthomonas* spp. This symptom, at first glance, looks like the fungal shothole disease but fungicides will not control it since it is caused by bacteria.

Bacterial shothole

Sometimes, the margin of bacterial shothole is yellow or water-soaked but not always. Only a laboratory can accurately identify the cause of a shothole outbreak.

Management of shothole can be attained with copper based products since they are broad-spectrum and can help control both bacterial and fungal shothole diseases. Use a fixed copper during the dormant season. Start copper applications at leaf drop in the fall and continue at 4-6 week intervals until bud swell in the spring. At that time you can switch to a strobilurin fungicide like Heritage or Compass O for fungal shot-hole. As leaves mature, switch to a product like Daconil WeatherStik in rainy parts of the country.

Bacterial shothole should be controlled throughout the growing season with copper products like Kocide, Camelot and Phyton 27 alternated with the biological control product Rhapsody. Although no tests have been completed on this specific disease, trials on other bacterial leaf spots have been very good with Rhapsody used at 1.5%. Be sure to get an accurate diagnosis in order to choose the best control strategies.

Cleaning Before Disinfesting

There are quite a few products being used to disinfest greenhouse surfaces like benches, floors and trays including bleach (sodium hypochlorite), peroxides (like ZeroTol), quaternary ammoniums (like GreenShield and Physan) and chlorine dioxide. We just finished two small trials testing the efficacy of P.A.C. and Micro-Bloc Ultra used in a new program launched by Floralife.

We tested the efficacy of using P.A.C. a _____cleaning agent, prior to applying a disinfestant. The disinfestants were Micro-Bloc Ultra ( ), GreenShield and ZeroTol. We tested efficacy on 4 ml polyethylene film, wood and concrete block with *Thielaviopsis basicola* (the cause of black root rot) and *Fusarium oxysporum* fsp. *cyclamenis* (the cause of Fusarium wilt on cyclamen). .

Surfaces were dirty when we started with obvious algae growth. The P.A.C. was applied to each surface as a spray (40 ml/liter) and rinsed after 5 min. This was followed by one of the disinfestants Micro-.Bloc Ultra (8 ml/liter), GreenShield (1 tbsp./gal), and Zerotol (1%). The pathogen was recovered after 24 hours. The entire test was performed in a greenhouse. This month I will report on Fusarium and next month Thielaviopsis.

The results are shown in the table below. The % kill for the Fusarium was affected by the type of surface. Plastic was the easiest surface to clean and wood the most difficult. PAC alone was somewhat effective. Micro-Bloc Ultra was very effective on all three surfaces when the PAC was used first with at least 93% kill. GreenShield was also very effective but was better without the PAC cleaning treatment. ZeroTol was least effective in this test with mixed results on the different surfaces.

Further testing on other pathogens will be presented as it becomes available.

Treatment	Wood (% Fusarium kill)	Plastic (% Fusarium kill)	Concrete (% kill Fusarium)
Water	None alone 35% with PAC	None alone None with PAC	None alone 100% with PAC
Micro-Bloc Ultra	None alone	100% alone	69% alone
GreenShield	75% used alone None with PAC	100% alone 100% with PAC	96% alone 80% with PAC
ZeroTol	None alone None with PAC	None alone 100% with PAC	81% alone 68% with PAC

Research Highlights

STEAMING FOR PATHOGEN/PEST CONTROL— Baker and Roistacher published information on the specific temperature and exposure times needed to kill fungi, nematodes, weeds and bacteria in the 1950's and 1960's. It might seem like a stretch to go back 50 years for research but sometimes that is exactly what we need to do. With the reduction in use of methyl bromide, steaming has once again become an important alternative. Researchers have generally agreed to 140 F for 30 minutes to achieve pasteurization with aerated steam. This is recommended since soil sterilization results in a biological vacuum that soil-borne pathogens are often first to invade. The high temperatures needed also release chemicals that are toxic to seeds especially. The table below summarizes the key treatments temperature and duration to achieve control of particular pathogens. Nematodes are easier to eliminate with steam than fungi and fungi are easier than insects and mites or weeds. It would be a good idea to know your target so you could minimize temperature and exposure times and therefore keep fuel costs from being excessive.

Target Pest	Temperature	Duration (minutes)
Bacteria (most)	140 F	10
Viruses (most)	160 F	30
Weeds (except *Malva, Medicago* and *Lotus*)	158-176 F	15
Insects and mites	140-160F	30
Nematodes—*Ditylenchus*	127 F	11
Foliar nematodes	120 F	15
Globodera (potato cyst)	118 F	15
Lesion nematodes (*Pratylenchus*)	120 F	10
Root knot nematode	118 F	10
Botrytis	131 F	15
Fusarium oxysporum (in gladiolus cormels)	135 F	30
Pythium ultimum	115 F	20-40
Rhizoctonia	125 F	30
Sclerotinia	122 F	5
Sclerotium rolfsii (in iris and caladium bulbs)	122 F	30

RUST FUNGI AND FUNGICIDES—Mueller, Jeffers and Buck reported their finding on efficacy of some fungicides on six common rust fungi. The table (below, left) shows some of their results on geranium rust. In other studies, they found that Compass O, Heritage, Phyton 27, Daconil Ultrex and Dithane T/O killed spores of *Puccinia* spp. from daylily, iris, spearmint, wood sorrel and geranium. Cleary 3336, Chipco 26109, Decree, Strike, Terraguard, Banner MAXX were considered to be more fungistatic than the first five which were considered fungitoxic.

Fungicide	% Control
Iprodione (Chipco 26019)	0
Triadimefon (Strike)	56%
Myclobutanil (Eagle)	45%
Propiconazole (Banner MAXX)	83%
Copper sulfate pentahydrate (Phyton 27)	Almost 100%
Chlorothalonil (Daconil Ultrex)	Almost 100%
Azoxystrobin (Heritage)	Almost 100%
Mancozeb (Dithane T/O)	Almost 100%

Be sure to rotate between chemical classes like strobilurins (Heritage or Compass O) and, sterol inhibitors (Eagle, banner MAXX and Strike) for best results. You can find a full report in *Plant Disease* 89(3):255-261.

CALADIUM RESISTANCE TO PYTHIUM ROOT ROT—University of Florida researchers, Deng and Harbaugh, recently completed some trials on Caladium cultivars that evaluated their resistance to Pythium root rot. The table (right) shows the summary of that work. For a complete description of their work see *Ornamental Outlook* March 2005 pages 2-22. It might be a good idea to check the cultivars you are growing out since very susceptible cultivars might benefit from preventive fungicide drenches for Pythium control. Best products for Pythium prevention include Subdue MAXX, Truban or Terrazole, Aliette and PlantShield. For a broader spectrum treatment you can use Banrot or Heritage or a combination of a thiophanate methyl with one of the products listed for Pythium. Be sure to read fungicide labels carefully and follow their rules.

Very Susceptible Cultivars
Fannie Munson
Florida Cardinal
Gingerland
Gray Ghost
Red Flash
Red Frill
Rosalie
Rosebud
Aaron
White Queen
White Wing
Susceptible
Carolyn Whorton
Lance Whorton
Miss Muffet
Pink Beauty
Pink Gem
Moderately Resistant Cultivars
Apple Blossom
Candidum
Candidum Jr.
Florida Blizzard
Frieda Hemple
White Christmas

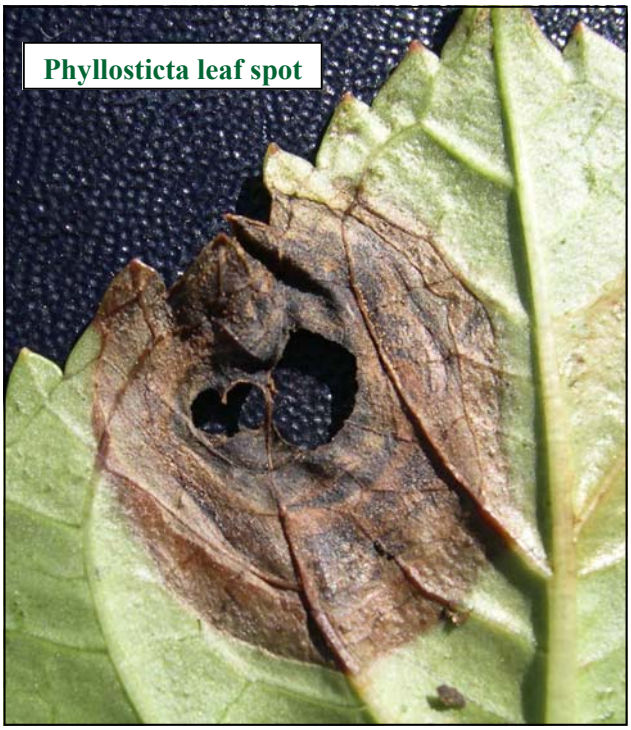
Be sure to visit our website to check out the latest additions of articles in the ***Complimentary*** area.

www.chaseresearchgardens.com

Hydrangea Diseases are on the Rise

Botrytis blight

Close-up of Phyllosticta leaf spot



Phyllosticta leaf spot

Xanthomonas leaf spot

We have been touring quite a few nurseries and homeowner outlets over the last two months. Everywhere we see Hydrangeas we also see leaf spots and blights. We are commonly finding Botrytis (top, left) and Phyllosticta leaf spot. Sometimes the symptoms are different. The tiny spots (directly above) are most typical for Phyllosticta leaf spot but we also see a very big spot with the center missing.

I thought we would surely find something else in this case (upper right) but it was Phyllosticta as well. Our trial with a Phyllosticta leaf spot on Vinca minor showed best control with Spectro (a combination of chlorothalonil and thiophanate methyl). The August 2004 *Chase News* has a summary of fungicide trials on similar diseases.

We did have one surprise and that involved a greenhouse operation producing potted hydrangeas. The spots were somewhat angular in shape and water-soaked (bottom, right). We isolated a high recovery of a *Xanthomonas* sp. Since this was a new disease in my experience we decided to make sure it was real. The bacteria were inoculated into healthy Hydrangeas and they did make new spots. Our control trials with similar bacterial leaf spots have shown copper and Rhapsody to perform the best. Be sure to obtain an accurate diagnosis before starting a control program since there is no single product that will work on good control of all these diseases.

Chase Research Gardens
Education for Horticulture