CHASE NEWS

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SAF Pest Management Conference—2009

We attended the Society of American Florist's annual Pest Management Conference in San Jose, CA last weekend. The weather and location were both great! I especially enjoyed seeing many friends from all over the country in both the production and allied industries. Since I am partial to disease work, I am going to highlight some of those talks this month.

Dr. Dave Norman (Associate Professor of Plant Pathology, University of Florida Mid-Florida Research and Education Center) spoke on controlling bacterial diseases. Dave has worked in this area since his days at University of Hawaii. He reported on a series of trials on bactericide efficacy for Erwinia blight on orchids and Xanthomonas leaf spot on Geranium. The results are shown in the table to the right as he presented them in the SAF Proceedings. Best results were seen with copper products such as Phyton 27 and carbamates such as Protect DF. Antibiotics (Firewall = streptomycin sulfate, Flameout=oxytetracycline and Kasumin=kasugamycin) were somewhat variable according to Dave. Biologicals (Cease, Companion, Taegro and Actinovate) were sometimes effective to a limited degree (eg. Cease on both bacterial diseases). Remember to check labels for all products as not all of them reported in research trials are labeled for ornamentals in every state.

Dr. Deborah Mathews is Asst. Coop. Extension Specialist/Plant Pathologist at the University of California at Riverside. She specializes in virus diseases and gave the audience an overview of viruses and viroids on ornamentals. She covered prevention, transmission and testing methods. Knowing what viruses your plants are susceptible to and what the symptoms look like is half the battle in developing a management program according to Deb. Deb finished with some web sources for information on emerging viruses as well as sites with host range lists. Some of those she suggested: http://image.fs.uidaho.edu/vide/famindex.htm (host list for some viruses) and http://www.dpvweb.net (descriptions of plant viruses).

Next month I will summarize a few highlights of the entomology sessions.

Efficacy Rating of Bactericides applied to *Erwinia* on Phalaenopsis Orchids and *Xanthomonas* on Zonal Geranium.

Bactericide	Erwinia/	Xanthomonas/
Kocide 3000	95	74
Camelot	45	78
Phyton 27	78	82
Junction	52	98
Protect DF	99	100
Cuprofix	69	96
Cuprofix MZ	87	91
K-Phite	12	0
Vital	0	22
Firewall	9	80
Flameout	46	0
Kasumin	48	44
Cease	33	30
Companion	7	24
Taegro	48	---
Actinovate	0	0

David J. Norman. 2009. Managing the Unmanageable:Treating Bacterial Diseases of Flowering Potted Crops. Proceedings of the 25th Annual SAF Pest Management Conference. Pages 77-83.

CONTENTS

DOGWOOD DISEASES ARE AFFECTED BY NITROGEN RATE AND HERITAGE APPLICATION-The impact of nitrogen rate on several diseases of flowering dogwood was researched by Hagan et al. from Auburn University. The ability of Heritage 50w (azoxystrobin from Syngenta Professional Products) to control these foliar diseases was tested as well. Trials were run for three consecutive years. Powdery mildew and Cercospora leaf spot were affected more by nitrogen rate than spot anthracnose. Generally, powdery mildew increased as nitrogen rate increased while Cercospora leaf spot decreased as nitrogen rate increased. Heritage (4 oz/100 gal) controlled all three diseases when used on a 14 day interval. It slowed development of Cercospora leaf spot enough to significantly enhance leaf retention and fall color. Overall, the fungicide application was more important than nitrogen fertility on these three diseases of dogwood. For a full report see: Hagan et al., Dec. 2008, J. Environ. Hort. 26(4):197-203.

NECTRIA CANKER AND CORAL SPOT are caused by *Nectria* spp.. The diseases occur in temperate regions worldwide and affects more than 60 species of trees and shrubs in North America alone. Some of the most commonly affected include apple, elm, locust, maple, oak, and walnut.


Nectria cutting rot on boxwood

Nectria is an opportunistic fungus that infects twigs, branches, and trunks through wounds in the bark and at the base of dead branches. Pruning wounds, cracks, leaf scars, sunscald lesions, and senescent branches can each be sites for entry of the fungus. In addition to killing twigs and larger limbs, the cankers can weaken the main trunks leading to breakage. Severely infected plants can show a mass of tiny shoots at the base when the main trunks are killed. The fungus over winters as bright red or orange fruiting bodies called perithecia on the canker surface and spores are spread to susceptible tissue by rain and wind. Spores ooze from sporodochia during warm, rainy periods in late spring and summer and are splashed to new infection sites. The spores infect at wound sites and rapidly invade the xylem. This causes twigs above the cankers to wilt and die. The orange pustules form on leaves and wood. It is especially important to realize that in woody ornamental production, this pathogen can start in propagation. If you fail to prevent Nectria during this phase it will continue to be a problem during the entire production cycle.

Healthy, vigorous trees resist infection and can readily compartmentalize and restrict spread of the fungus through affected wood. Be sure to adequately space the trees so fungicide treatments have a chance. Since drought stress increases canker development avoid it throughout the year. Avoid wounding trees to minimize new infections with *Nectria.* This can be minimized through fungicide application immediately before and after pruning or taking cuttings. If you are diligent about fungicide timing (do not wait even a day if possible), you may not need to sterilize the cutting tools. Trim out and remove dead branches since the spores of *Nectria* form in dead wood and persist for months.


Nectria canker on maple twigs

Most of the information on fungicides for control of Nectria canker has been developed on apples. Apparently fungicides in the sterol inhibitor group (like Eagle=Systhane) reduced numbers of new cankers by 65% to 76% when used from spring through the summer. Autumn applications of copper at leaf fall further reduced numbers of new cankers. This work was done more than 15 years ago when the strobilurins and fludioxinil were not available. At this point, I would still suggest that Medallion (fludioxinil), strobilurins (like Heritage and Insignia and Pageant) would be a good choice for this disease.

PERENNIAL PLANTS PAGE

Plant	Diagnosis
Alstroemeria	Alternaria, Pythium, Fusarium
Amaryllis	Stagonospora
Anemone	Foliar nematode (2), no pathogen (5), INSV (4)
Anthurium	Colletotrichum (2), Botrytis
Aquilegia	Pythium, Fusarium, insect feeding
Argyranthemum	Downy mildew
Artemesia	Puccinia
Asarum	Fusarium
Aster	Pythium, Fusarium (2), Alternaria, Rhizoctonia
Bergenia	Pythium
Buffalo grass	Pythium (2), Fusarium
Bunny grass	Pythium, Fusarium
Calla	Fusarium (11), Pythium (3), Erwinia, Botrytis (2)
Campanula	Myrothecium, INSV
Carex	Pythium (2), Fusarium (2)
Clematis	Pestalotiopsis
Columbine	Stemphylium
Convolvulus	Fusarium (2), Pythium, Phytophthora (2)
Coreopsis	Botrytis, Pythium, Fusarium, powdery mildew
Delphinium	Xanthomonas, Pythium
Dianthus	Pythium, Fusarium (6), Xanthomonas, Phyllosticta, Phytophthora
Digitalis	Downy mildew
Epidendum orchid	Fusarium
Erodium	Pythium, Fusarium
Erysimum	Xanthomonas
Euphorbia	Phytophthora, Pythium, Fusarium, Cercospora
Farfugium	Alternaria
Gaillardia	Agrobacterium
Geranium	Xanthomonas (2), Pythium, Botrytis
Gerbera	Pythium (2), Pseudomonas, Fusarium (2), powdery mildew, Phytophthora

Last month we summarized the diagnostics results for woody ornamentals in our lab for 2008. This month we are presenting the summary for perennials. If a pathogen or disease is listed once it represents a single sample while the numbers in parentheses show multiple samples and thus a more common problem.

One of the more interesting events is when a plant is sent in with no obvious pathogen problem. Some plants are actually commonly sent in without diseases including anemone, oregano and phlox. In some cases they have symptoms and in other cases, the grower is trying to determine health of liners or plugs.

In contrast, many perennial suffer from root pathogens including *Pythium* and *Fusarium* most commonly. *Fusarium* also commonly causes crown rot and sometimes can be identified as a wilt pathogen. In our diagnostic lab we try to remind growers that not all fungi that are indeed pathogens of the plants we find them in. This includes *Fusarium* that can readily attack damaged roots. The occurrence of mixed infections is common with *Fusarium* and *Pythium*. Which one is the main problem is critical and although it is not obvious at times, we do not recommend broad-spectrum fungicides unless really needed.

We find some viruses in our samples with INSV the most common. Since we can only check for a few viruses and nobody really knows how many of the perennials have new (undescribed) viruses, we cannot be sure we are not missing quite a few in our sampling methods. We did find INSV in anemone, campanula, and lu-

PERENNIAL PLANTS PAGE (CONT)

Plant	Diagnosis
Gypsophilia	Erwinia, Pythium, Fusarium
Hakonechloa	Phytophthora, Fusarium
Hebe	Pythium, Phyllosticta
Helichrysum	Botrytis
Helleborus	Pythium (2)
Hemerocallis	Stemphylium, Phytophthora, Pythium, Fusarium
Heuchera	Pythium (2), Xanthomonas, Fusarium
Hosta	Colletotrichum
Iberis	Downy mildew
Iris	Pythium (2), Fusarium (2)
Lavender	Pythium (3), Xanthomonas (5), Botrytis, Phytophthora, Fusarium (3)
Leucanthemum	Agrobacterium
Liatris	Pythium, Fusarium, Botrytis
Lily	Pythium (2), Phytophthora, Fusarium
Limonium	Powdery mildew (2)
Lobelia	Xanthomonas
Lupine	Pythium, Colletotrichum, Fusarium (2), INSV, Alternaria, Botrytis
Miscanthus	Cercospora, Pythium, Fusarium (2), Helminthosporium
Mum	Fusarium (2), Pythium
Oregano	Phytophthora, Rhizoctonia, no pathogen (2)
Pelargonium	Pythium (2)
Penstemon	Phyllosticta
Pentas	Botrytis
Phlox	Phyllosticta, rust, Pythium (2), Fusarium, Alternaria, Colletotrichum, no pathogen (2)
Ranunculus	Xanthomonas (2), Pythium (2), Fusarium
Rosemary	Pythium (2), Phytophthora (2), Rhizoctonia
Salvia	Pseudomonas, Pythium, Cylindrocladium
Sedum	Powdery mildew, Fusarium (6), Rhizoctonia (1), Pythium (2)
Stokesia	TMV
Tulips	Fusarium (3)

Other pathogens we find at times in ornamentals are crown rot pathogens like *Phytophthora, Myrothecium* and *Rhizoctonia*. Both diseases are more common in the warmer seasons and *Phytophthora*, particularly, can result in rapid death at the end of summer on many crops including lavender and rosemary.

Diseases on grasses have been little researched but with the raise in popularity of perennials many new grasses are being produced and unfortunately, with them their pathogens are being found. Root pathogens have been found but sometimes we also see leaf spots by typical grass pathogens including *Cercospora* and *Helminthosporium*.

Foliar diseases caused by fungi like *Alternaria, Stemphylium, Colletotrichum* tend to be specific to a certain perennial crop like anthracnose (*Colletotrichum* on lupine.

Certain diseases appear relatively common on certain crops. One example is Fusarium crown rot on Dianthus (we are seeing this in lab samples right now), Fusarium bulb or corm rot, Xanthomonas blight on lavender (common all over the country all year round).

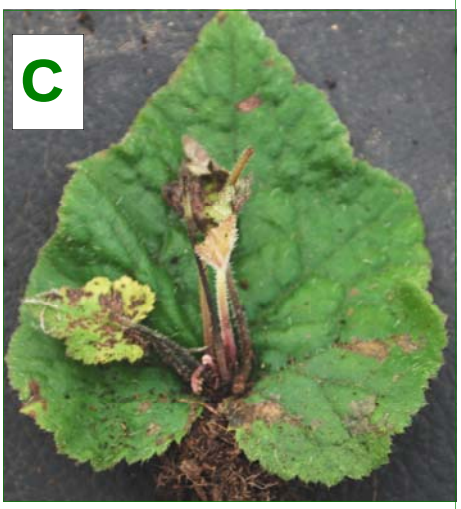
With the relatively long production cycle of many perennials, it is critical to start with healthy plugs or cuttings. If you do nothing else be sure to examine your propagation material carefully and get a sample to a lab early. If you do not find out exactly what is wrong at the beginning, the problem will be with you for the entire crop and with some diseases is can become a resident of your propagation area. If that happens you will be fighting it for years

NEW FROM OUR DIAGNOSTIC LAB

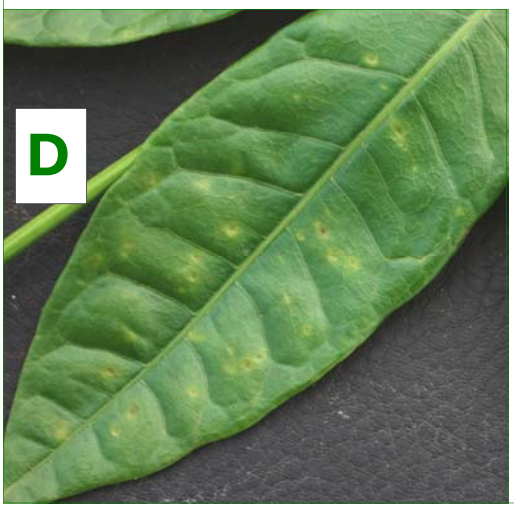
We receive samples from all over the continental US in our diagnostic lab. Sometimes, a trend becomes apparent when many samples of a single plant with a single problem are submitted. This happened in January with Gerbera daisy affected by Fusarium crown rot which continued in February. We also have seen quite a few submissions of Petunia with crown rot although it was rarely caused by a pathogen we could isolate with the exception of some Botrytis and Sclerotinia. We had Sclerotinia on other hosts including Osteospermum, stock (Matthiola) and *Erysimum* (A). At this time of year, formation of the black sclerotia may not have occurred and the problem is confused with many other diseases.

In February, we saw a series of leaf spots from Myrothecium leaf spot on New Guinea Impatiens (B) to Zebra plant. Many growers are not aware of how common this leaf spot is on some crops (especially New Guinea Impatiens). It is also the cause of crown rot on pansies. Spots sometimes have a target appearance (contain concentric rings) as shown in the leaves on the left (B). The fruiting bodies of this fungus form most often on the undersides of leaves and are black lumps with a white fringe. They are usually the size of large pepper grains and can form in rings within the dead portions of the spots.

Other spots that have been appearing are those caused by anthracnose fungi, especially *Colletotrichum*. We even saw a relatively uncommon anthracnose on piggy back plant (*Tolmeia*). The disease was first found in the early 1990's and has surfaces once again (C).



Bacterial diseases are also active right now. We saw a new Pseudomonas leaf spot on Mandevilla last month and more Pseudomonas this month. The *Pachira* (D) shows the first symptoms of a Xanthomonas leaf spot that has been problematic on this tropical plant. In advanced cases, the spots become shot holes with their centers falling out.

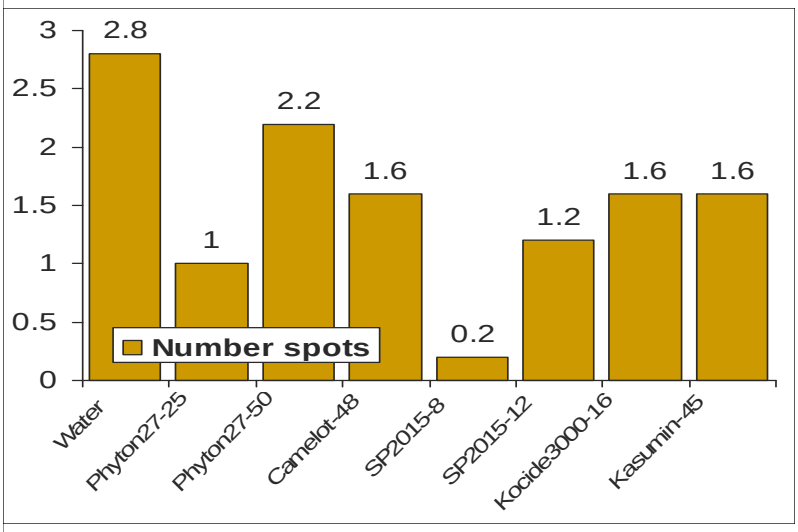


Don't ever forget about root rot pathogens. They are present and cause problems on many ornamentals year-round. We saw Pythium root and petiole rot on pothos in February. This disease was one of my favorites for working on Pythium control while I worked at the University of Florida. The pathogen is *P. splendens* and has been occasionally found to be resistant to Subdue MAXX. If you are having problems controlling a Pythium root rot, be sure to have your particular strain tested by a diagnostic lab. It is costly to apply an ineffective fungicide and easy to prevent.

CYCLAMEN ANTHRACNOSE—We completed another trial on cyclamen anthracnose caused by *Colletotrichum* sp. in February. This time we tested some products that have not been tested before including Pageant (8 oz/100 gal), Chipco 26019 (16 oz), Medallion (4 oz), Cygnus (6.4 oz) and MilStop (2.5 lb). We started treatments on 27 January and applied a total of three times on a weekly interval. The plants were inoculated on 30 January. We rated the severity of immature (new) leaf damage on 16 February. Severity of new leaf damage was rated on the following scale:1 (none, healthy), 2 (slight), 3 (moderate), 4 (severe) and 5 (all new leaves dead). The letters in the table following the numbers are a statistical analysis. If two numbers are followed by the same letter, they are not statistically different. None of these products was exceptional at preventing this anthracnose in this trial. The most effective product was Medallion which was statistically the same as the noninoculated water control. The other products were actually no better than the inoculated control.

Treatment	Rate/ 100 gal.	New leaf damage 2-16-09
Water Noninoculated	-----	1.0 a
Water Inoculated	-----	3.1 c
Pageant	8 oz	2.1 bc
Chipco 26019	16 oz	2.7 bc
Medallion	4 oz	1.7 ab
Cygnus	6.4 oz	2.2 bc
MilStop	2.5 lb	2.7 bc

SEED TREATMENT VS. DRENCHING FOR SEED-BORNE PATHOGENS—Seed-borne disease include some caused by *Xanthomonas, Acidovorax,* Tobacco mosaic virus, *Alternaria* and *Mycocentrospora*. The level of infection is often quite low (less than 1%) but can reach remarkable levels (we saw 100% infection of one lot of Moluccella infected with *Cercospora*) Traditionally, many seed-borne diseases are minimized using a seed treatment. This is common on vegetable seeds like tomatoes and peppers and has been researched extensively in recent years on watermelon seed for control of fruit blotch caused by *Acidovorax.* Treatment for 5-30 minutes with compounds like peroxyacetic acid, sodium hypochlorite (bleach) and hydrogen peroxide have been effective on many of these seeds.



We have tried a different approach since seed treatment can be tedious and difficult to fit into normal production cycles. In essence we are treating the seed by drenching right after planting. A few years ago, we tested the ability of fungicide drenches right after seeding and had excellent results for Moluccella seed contaminated with *Cercospora*. We also saw excellent results for Celosia which we inoculated with *Rhizoctonia*. This winter we are working on zinnia seed contaminated with *Xanthomonas* and have completed a trial. We applied each product listed in the graph at the number of oz/100 gal listed one time right after seeding (3 December 2008). After 2.5 months, we did a final count on the number of spots (*Xanthomonas*) per pot. There were only 10 seeds per 3.5 inch pot so the level disease was low. We did find that one rate of an experimental product (SP2015 from SePRO Corp) did have very low incidence of Xanthomonas. The other products tested each showed some reduction but the 8 oz rate of SP2015 was the best. We are doing tests right now on dusty miller seed contaminated with *Alternaria* and *Stemphylium* at a low level.

Xanthomonas leaf spot on zinnia

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