# Chase News

Chase Horticultural Research, Inc.
Education for Horticulture

Volume 9—Issue 3

March 2010


## SAF PEST MANAGEMENT CONFERENCE PLANT PATHOLOGY HIGHLIGHTS

The SAF Pest Management Conference was held in late February in Orlando, FL. The first talk of the conference was by Dr. David Norman, Associate Professor of Plant Pathology at the University of Florida Mid-Florida Research and Education Center. Dave spoke on his research on controlling bacterial diseases with alternative products. He presented results of three tests on **Xanthomonas leaf spot on geranium** in the proceedings (see table below).

The trials included experimental and registered products compared to a copper hydroxide standard—CuPro TNO. The range of control is something I see quite often with bactericides. CuPro TNO gave moderate to very good control. The products that gave the best control included Citrex (abscorbic acid), Vitalonil (a combination of chlorothalonil and potassium phosphate) and Regalia SC (an extract of giant knotweed). KeyPlex formulations (micronutrients), Actigard (a systemic acquired resistance product—acibenzolar-S-methyl) and Tricon (sodium tetraborate decahydrate) also show promise.

| Treatment | % control |
|---|---|
| **SP2015 (Tanos)** | 0 |
| **Taegro** | 17 |
| **Cease** | 24 |
| **Citrex** | 31-92 |
| **CuPro TNO** | 52-89 |
| **KeyPlex 350 DP or 1000 DP** | 60-65 |
| **Actigard** | 64 |
| **Tricon** | 65 |
| **Vitalonil** | 77 |
| **Regalia SC** | 87 |

Dr. Norman is continuing with this research by combining an alternative product with standard products. He has seen a number of these combinations exhibit a positive synergism in controlling bacterial diseases.

Dr. Mary Hausbeck (Professor of Plant Pathology) presented work she has been doing with Leah Granke at Michigan State University. Their work focused on the biology of pathogens in water (especially *Pythium* and *Phytophthora*) ant the ability of **algaecides** to kill some fungi was tested. The majority of products contained copper but a few others were tested including bleach and sodium carbonate peroxyhydrate (SCP—GreenClean, Pak 27 and GreenClean Pro).

All of the products caused zoospores of *Phytophthora capsici* to stop swimming within 3 minutes of exposure compared to zoospores that were untreated which continued to swim for 4-6 hours. Exposure for 30 minutes gave much better results than 5-10 minutes. Several copper based algaecides and one of the SCP products were as effective as bleach and all products were better than nothing. More work is planned.

Margery Daughtrey (Senior Extension Specialist) at Cornell University's Long Island Horticultural Research and Education Center discussed controlling some difficult diseases. She included **Verbena powdery mildew** which also attacks cucurbits like zucchini. The American Floral Endowment supported work by Margery and Mary Hausbeck to test cultivars of verbena for powdery mildew resistance. The table above shows some of their results. Some of the most resistance cultivars tested were found in the Superbena and Lanai series although all of the colors in these lines were not equally resistant.

| Very high resistance |
|---|
| Superbena (Burgundy, Coral Red, Dark Blue, Large Lilac Blue, Pink Shades, Purple), Aztec Violet, Lanai (Blue 08, Deep Purple, Purple Star, Red 07) |
| **High resistance** |
| Aztec (Coral, Pearl, Red Velvet) |
| **Moderate resistance** |
| Superbena (Tukana Raspberry), Aztec (Dark Red), Babylon (Purple), Lanai (Deep Pink, Lavender Star, Royal Purple with eye) |
| **Very susceptible** |
| Babylon (Neon Rose and White) |

(continued on page 6).

## CONTENTS

# WOODY ORNAMENTAL FOCUS

**Killing moss and algae with ZeroTol or Xeroton-3-**We have been testing some popular peroxide-like products for efficacy and safety in various growing situations. This month we report on a couple of simple trials performed with Xeroton (X3 from Phyton Corp.) and ZeroTol (BioSafe Systems).

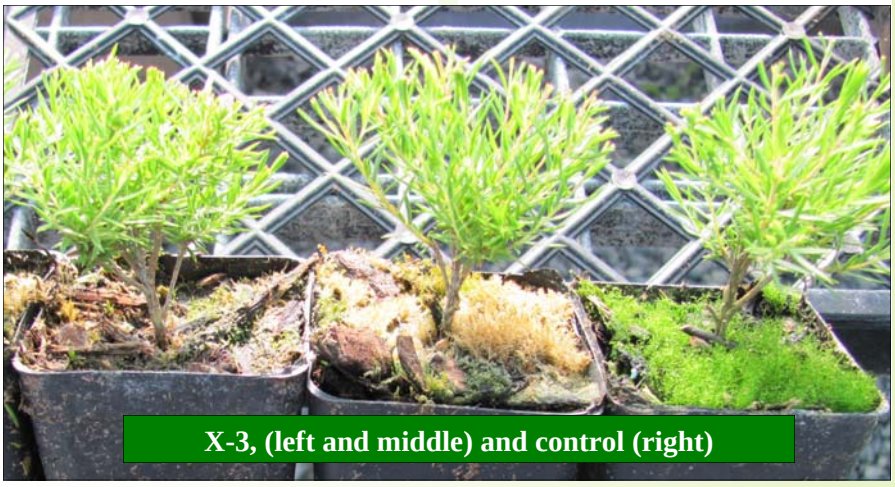
We took each product and made a 1% solution and tested their ability to eradicate moss and algae on an especially bad area of sidewalk in one of our greenhouses. We simply poured some of each on an area and checked after 1-7 days. The pictures to the right show the results in killing moss after 48 hours. We were very pleased with the results given by X3 which performed better than ZeroTol in this test.

We often see moss and/or liverwort growth during propagation of some of the slower growing woody ornamentals. It is as important to make sure the product is safe on the crop as well as being effective. We collected several types of plants including two species of *Daphne*, Azalea (with liverworts), *Pittosporum* and *Coleonema* to see if X3 could safely kill both moss and liverworts.

The image below shows the response for the *Coleonema*. No damage was seen on *Daphne*, *Pittosporum tenuifolium* or *Coleonema*. Only the azalea showed damage from the 0.25% X3 spray. We did find that spraying the potting medium surface to reach the moss or liverworts was impeded by the woody cutting making control less than perfect. If the cutting is over-growing the moss (as one would hope) it will be hard to kill the moss by spraying over the top. When contact was made, both moss and liverwort showed rapid decline within 2-3 days of treatment. Be sure to check labels and do a small trial on your plants BEFORE using either product over the top of plant material. This treatment was not safe on azalea in our little test and other plants may be sensitive to this rate of X3 as well.

X-3 (left), control (middle) and ZeroTol (right)

**Leaf spot resistance in landscape roses—**Dr. Austin Hagan (Auburn University) is one of the few plant pathologist researchers who routinely test disease resistance and control in landscape ornamentals. In 2008, he performed tests in Alabama on about 30 landscape roses for their resistance to black spot (*Diplocarpon rosae*) and Cercospora leaf spot (*C. rosae*). Roses were naturally infected and rainfall was average or above average during the six-month trial period. There was a higher level of resistance to Cercospora in the roses chosen for the study than resistance to black spot. However, there was very little black spot on the Knock Out series (their primary claim to fame) and the Drift series. Since different diseases occur in different parts of the US it is important to check results from your area specifically. For instance, black spot occurs all over the US where roses get summer rainfall or are overhead irrigated. Cercospora, downy mildew, and rust are not as widely reported.



X-3, (left and middle) and control (right)

| Resistance of shrub roses to black spot and Cercospora leaf spot |
|---|
| **High resistance to black spot and Cercospora leaf spot** |
| Knock Out, Blushing Knock Out, Pink Knock Out, Rainbow Knock Out, Double Knock Out, Home Run |
| **High resistance to black spot and moderate resistance to Cercospora leaf spot** |
| Coral Drift, Ivory Drift, Peach Drift, Pink Drift, Red Drift, Lovely Fairy |
| **Moderate resistance to black spot and high resistance to Cercospora leaf spot** |
| Baby Love, Easy Going |
| **Low resistance to black spot and high resistance to Cercospora leaf** |
| Johann Strass, Eureka, White Meidiland, Lady Elsie May, Julia Child, About Face, Belinda's Dream, Hot Cocoa, Gourmet Popcorn, Rabble Rouser, Bebop, Bonanza, Heart N Soul, Pretty Lady |

# DIAGNOSTICS REPORT

We recently received a sample of Liriope in our lab with leaf spots. The spots had diffuse margins which I have come to associate with *Cercospora* in-

**Cercospora leaf spot on Liriope**

fections and it did indeed turn out to be Cercospora leaf spot. Many of the spots were found on the leaf tips making us wonder about cold damage. A web search indicated that anthracnose (caused by *Colletotrichum*) appears to be more commonly found throughout the Southern States. Cercospora leaf spot on Liriope was reported in Florida in the early 1990's and is reported to be caused by *Cercospora liriopes*. Our trials on other Cercospora leaf spots indicate that thiophanate methyl is an excellent eradicant. It can be alternated with chlorothalonil (like Daconil), a strobilurin (like Pageant) or Medallion.

We also got a sample of Kalanchoe which turned out to have INSV (Impatiens Necrotic Spot Virus). When I first looked at the sample I was thinking a fungal leaf spot—but we used one of the Agdia test strips for ornamental

**INSV on Kalanchoe**

**INSV on Lobelia**

viruses and had a positive for INSV. Some of the spots were more typical with ringspots that were not water-soaked. The week before we had a sample of Lobelia which tested positive for INSV as well.

I was out scouting for some new plants and found spots on a geranium in a big box store. While I have seen quite a lot of Xanthomonas leaf spot on zonal geranium in greenhouses, I admit to never seeing such a thing in a big box store in California. I always just assumed that

*Try the Agdia test strips for a quick and easy answer to some ornamental diseases.*

the growers eliminated this classic disease before shipping geraniums out. So I tested the spots when I got back to the lab and was thrilled to see it was positive—once again using the Agdia test

**Corynespora leaf spot on verbena**

We saw another relatively new leaf spot last week. This time we found *Corynespora* on Verbena. I used to work on Corynespora on foliage plants including lipstick vine, Zebra plant, ficus and African violet. I am more used to seeing this leaf spot under warmer conditions but this sample actually came from Minnesota. Our trials indicated that the products that worked well on *Alternaria* and *Helminthosporium* also worked well on the closely related *Corynespora*. That includes strobilurins (like Compass O, Cygnus, Heritage, Insignia and Pageant), chlorothalonil (like Daconil) and fludioxinil (Medallion).

**Xanthomonas leaf spot on verbena**

The last sample I want to mention this month is another Verbena leaf spot. In this case we found *Xanthomonas*. The spots were very water-soaked which can be typical for a bacterial leaf spot. They were also found on margins in some cases. This sample originated in Florida but I have seen the disease in California at times.

The best control strategy for Xanthomonas and Pseudomonas leaf spots is to eliminate overhead irrigation or exposure to rainfall if possible. Our most effective bactericides have been copper alternated with the biological control agent—Cease. Our trials have shown best effect with Cease when used at 1.5% if the infection is advanced although 1% can be very effective in a preventative situation.

# What Can X-3 do for You in a Mist System?

Prevention of disease during mist propagation is very important and sometimes accomplished with fungicide sprays and other times by introducing a general preventative product like copper, chlorine dioxide or peroxide. We started trials in January to evaluate the ability of Xeroton (X3 from Phyton Corp.) and ZeroTol (from BioSafe Systems) to prevent Botrytis blight on geranium, Xanthomonas leaf spot on geranium and rust on Hypericum.

The mist system ran for 60 seconds every hour for 12 hours per day. In most cases we compared X3 (2.6 oz/100 gal) to ZeroTol (12.8 oz/100 gal) to water alone and even a set of plants without mist of any kind. These rates were chosen from the labels.

Botrytis occurred naturally and was especially bad on any geraniums in mist regardless of treatment. These plants were large and the Botrytis mainly developed under the canopy where the mist did not readily penetrate. So if the mist does not reach the entire leaf surface, Botrytis could not be controlled.

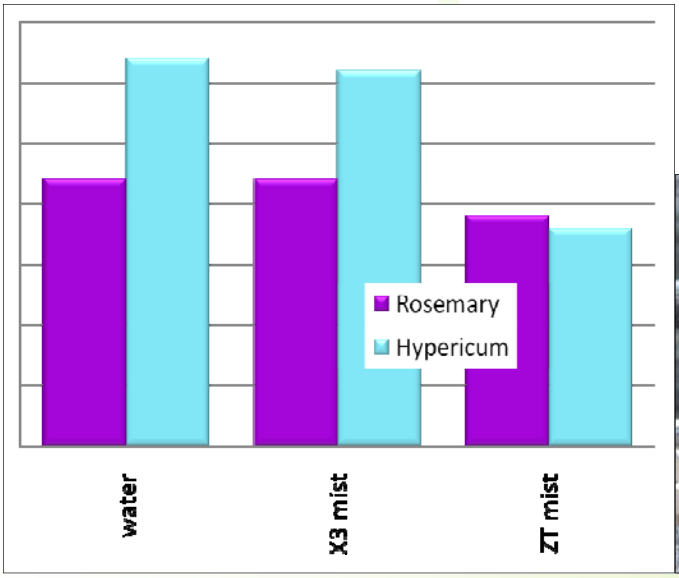
In contrast, un-rooted hypericum cuttings were stuck in Oasis cubes and set onto the mist system treatments. The pictures to the right show that even though the rust (*Uromyces triquetrus*) occurred underneath the leaves both X3 and ZeroTol (best treatment) did significantly limit pustule development. These cuttings were naturally infected with a very small amount of rust at test initiation.

Finally, we inoculated geraniums after they had been in the mist for four weeks with *Xanthomonas campestris* pv. *pelargonii*. In this case, we did include some plants in the bench area without any mist. The initial development of Xanthomonas was significantly higher in all three mist treatments than in the non-mist area showing once again the need for water to create severe bacterial disease. There was no effect of X3 or ZeroTol at the initial evaluation of Xanthomonas blight.

After one month, we evaluated the presence of new spots on upper leaves of the geraniums and found that both X3 (average 22 spots) and ZeroTol (average 12 spots) had significantly less spots than the water mist only (average 54 spots). So apparently these products can be very effective if they reach the leaf tissue and if disease pressure is not overwhelming as it was with the initial Xanthomonas inoculation.

We evaluated the ability of the hypericum (and some rosemary) cuttings to develop roots in thee trial. The graph below shows that ZeroTol did significantly reduce rooting on both the rosemary (purple bars) and the hypericum (blue bars) cuttings. The picture to the right, below shows a set of hypericum cuttings with very good roots on the water mist (yellow) and X3 mist (red) and much less roots on the cuttings in the ZeroTol mist (orange). The burning found on the leaves of both rosemary and hypericum in the ZeroTol mist may have been due to direct toxicity but could also reflect the poor rooting of the cuttings.

Water (top), X-3 (middle) and ZeroTol (bottom)




# RESEARCH REVIEW

**Cold storage of bedding plant plugs replaces PGR treatment—** Researchers from the UK, Denmark and Australia reported on the effect of cold storage of bedding plant plugs as a means of crop scheduling. The goal was to reduce use of plant growth regulators to hold plugs until needed. Crops included Alyssum, Antirrhinum, Begonia, Geranium, Impatiens, Lobelia, Marigold, Petunia, Salvia and Verbena. They were held at 4 or 8 C for up to four weeks and then planted and grown normally. Plug death during storage at 8 C was especially a problem. With one week storage losses in the grow out phase were less than 3%. Only Impatiens showed a significant negative response to cold storage for up to 4 weeks. Most damage increased as storage time increased with those held at 8 C somewhat less likely to survive than those held at 4 C.
For a complete report see: Acta Hort. 847, ISHS 2009.

**Fungicide control of "fire" on Iris—**This disease is caused by *Mycosphaerella macrospora* and occurs more often during bulb production or cut flower production. I recently found a report by Chastagner and Kaufman at Washington State University in Puyallup, WA. Their trials were conducted in 2003 but these products remain integral in many areas of the ornamental industry.

The products were applied under field conditions on a 14 day interval using two different cultivars of *Iris x hollandica*. Disease was rated on a severity scale and the higher the number the more severe the disease. The most effective products in both cultivars were Heritage and Insignia—two strobilurin fungicides. Chipco 26GT (iprodione) was also very effective while Medallion was significantly effective but not as good as the strobilurins or Chipco 26GT.

**Severity of Fire on Bulbous Iris cultivars**

| Treatment | Rate/ 100 gal | Apollo | Saturnus |
|---|---|---|---|
| **Control** | ----- | 9.0 a | 9.3 a |
| **Phyton 27** | 15 oz | 9.0 a | 9.0 a |
| **Phyton 27** | 25 oz | 8.0 a | 9.0 a |
| **Decree** | 16 oz | 8.6 a | 7.7 a |
| **Palladium*** | 6 oz | 8.3 a | 8.7 a |
| **Medallion** | 4 oz | 5.6 b | 5.0 b |
| **Daconil Ultrex** | 1.4 lb | 7.6 a | 4.7 b |
| **Chipco 26GT** | 32 oz | 1.6 c | 3.7 bc |
| **Heritage** | 4 oz | 1.6 c | 1.3 c |
| **Insignia** | 4 oz | 1.0 c | 1.0 c |

Numbers in the same column followed by the same letter are not significantly different.
* Palladium is not currently labeled for ornamentals.

Since we do not always find trials on our specific crops in ornamentals, we sometimes have to extrapolate from other crops. If you are growing an ornamental that has a Mycosphaerella leaf spot you should consider trying the products that worked well here on bulbous iris. Some other hosts of *Mycosphaerella* species include black walnut, caneberries, strawberry and tress (like ash).
For a complete report see: Acta Hort. 673, ISHS 2005.

**Lighting reduces rose powdery mildew—** Researchers from Norway reported on studies conducted on the effect of different day lengths on production of powdery mildew spores on roses. Exposure to 18 hours of light resulted in the highest production of spores with a sharp reduction at 20 or more hours of light. Release of spores and disease severity were also highest with a day length of 18 hours. The table above shows some of their data on spores production and resulting severity of powdery mildew.

**Effect of Light on Powdery mildew on Rose**

| Number hours light | Disease severity | Spore formation |
|---|---|---|
| 0 | 2 | 1 |
| 12 | 48 | 45 |
| 18 | 70 | 100 |
| 24 | 23 | 39 |

Other research has shown that roses grown under 24 hours light have increased flower production but also reduced post harvest longevity. Additional studies from these researchers demonstrated that using 20 or 22 hours light was as effective in reducing spore production and disease severity. They also report that very low light intensity is needed to achieve the suppression of rose powdery mildew, making it more grower-friendly. As part of a fungicide reduction effort, growers in Norway are using increased day length to manage powdery mildew on roses.

For a complete report see: Plant Disease 94:339-344 (2010)

# SAF PEST MANAGEMENT CONFERENCE (cont. from page 1)

Only a few of the cultivars tested were very susceptible including 'Babylon Neon Rose' and 'Babylon White'.

Margery also reported on a 2006 trial with fungicides for control of Verbena powdery mildew. Optimal control was seen with Compass O (2 oz/100 gal), Actinovate (6 oz with Capsil) alternated with Compass O or Rhapsody (=Cease) plus 2% Capsil alternated with Compass O. Actinovate plus Capsil or Rhapsody plus Capsil gave significant control but to a much lower degree.

Margery also reviewed **INSV** (Impatiens Necrotic Spot Virus). Two other Tospoviruses include TSWV (Tomato Spotted Wilt Virus) which occurs more commonly on outdoor crops and IYSV (Iris Yellow Spot Virus)

which can be found on iris and lisianthus but is most common on onions. The tospoviruses are vectored by thrips including Western flower thrips and onion thrips. (See page 3 for an update on INSV from our lab)

**Downy mildew on basil (right) and downy mildew on coleus (left) — courtesy of Daughtrey.**

**Coleus downy mildew** was first found in New York and Louisiana greenhouse in 2005 (image to the right). The disease is now known to occur throughout the US and was originally thought to be caused by *Peronospora lamii*. Although the DNA of coleus downy mildew and that of basil downy mildew are very similar the two diseases appear to be distinct. Basil downy mildew was first seen in Florida in the fall of 2007 and in Massachusetts and California in late 2008. Basil downy mildew has been shown to be seed-borne. Daughtrey and Tobiasz also showed that only *Agastache* of the Lamiaceae members was infected by the Coleus downy mildew.

Cultivar testing for Coleus has shown that almost all are susceptible to the downy mildew even if they do not develop obvious symptoms. Marge reports that coleus downy mildew control with Stature SC at the highest labeled rate and FenStop are extremely effective protectants. Subdue MAXX drenches or mancozeb sprays (with a spreader sticker) are also beneficial. In contrast to other downy mildews, the strobilurins (Compass O and Heritage) or Aliette have not been very effective in preventing Coleus downy mildew.

I am sure that anyone who would like to purchase a copy of the proceedings from this year's meeting can do so from SAF headquarters. Next month I will give some highlights of the entomology sessions and water treatment options for pathogen control.

**Contact Us:**
**www.chasehorticulturalresearch.com or archase@chaseresearch.net.**

## Join us at one of these upcoming seminars

| Meeting | Dates | Location | Topics of Ann's Talks |
|---|---|---|---|
| 2010 OFA Short Course | July 10-13 | Columbus, OH | Cost effective Control for Foliar Diseases<br>Making the Right Choices with Downy Mildew Management including Economic Considerations |
| FarWest Show and Seminars | August 26-28 | Portland, OR | Disease Basics<br>Simplifying Disease Control |
| 2010 OFA Disease, Insect and Growth Management Conference | September 28, 29 | St. Louis, MO | Abiotic Problems<br>Effective Disease Management |