

Chase News



Chase Diagnostic Lab to Close— March 1st, 2011

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I hate to give up on anything but the unfortunate truth is that we have decided to close our diagnostic lab. There are many opportunities that we would like to pursue that will not be possible unless we close the diagnostic lab. The final date for accepting any samples will be the end of February 2011. Until that time, things will continue as they have in the past with our one-week turn-around time and custom control strategies. If any of you have purchased a prepaid package it can be used for lab diagnoses until the end of February. We will no longer be offering the prepaid packages so only those of you who already purchased one should be concerned. If you do have any diagnoses left on your prepaid package that are less than two years old, we will provide them as digital diagnoses after March 1, 2011.

We will be expanding our product testing and contract research services which we feel will impact a broader audience and allow me to concentrate on writing new books, doing more consulting and giving better talks. The newest book planned is one with Marge Daughtrey and Ray Cloyd on diseases and pests of bedding plants. We are planning to include plug production, six-pack and larger production and a section on landscape problems and their control.

Please feel free to contact me or Mike with your concerns, suggestions and thoughts. We are sorry to discontinue this service since we have enjoyed getting to know each of you and the unique situations you face in producing ornamentals.

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RECENT LAB SIGHTINGS

We have been seeing some bacterial diseases all across the US. One of the most critical is *Xanthomonas* leaf spot on poinsettia (right, top). This has been appearing in many locations. We are also seeing *Pseudomonas* leaf spot on Mandevilla (right, below) and *Xanthomonas* leaf spot on zinnia (below).

One of the keys to recognizing



many bacterial leaf spots is the shape of the spots is often angular or bordered by the leaf veins. This is clearly in the zinnia with *Xanthomonas* leaf spot. The spots are also often water-soaked or wet looking and might start on the leaf edges where the bacteria invade by entering natural openings called hydathodes.

Weather across much of the country has been very unstable giving rise to many more diseases. The reason for this is often the fact that growers cannot apply the right amount of water when the temperatures are so unpredictable. Thus, leaves are wet when they might normally dry and the bacteria spread and infect much more readily.

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Woody Ornamental Research Reports

Euonymus Anthracnose Control—There have been a series of studies performed in Oklahoma and Arkansas on anthracnose (*Colletotrichum gloeosporioides*) on several Euonymus cultivars. One I missed from 2005 covered work performed by Cole, Cole and Conway on the effect of a surfactant on efficacy of fungicides to control this disease on three cultivars of *Euonymus fortunei*. The fungicides tested were mancozeb, copper hydroxide, trifloxystrobin, chlorothalonil, azoxystrobin and myclobutanil. Field trials showed no effect of Hyper-Active surfactant and further indicated best control with mancozeb or chlorothalonil. However, the spray intervals differed and were based on the longest labeled interval for each product. Thus a 28 day interval was used for Eagle and Heritage and a 7 day interval used for Kocide and Dithane RainShield. The results might be more an expression of the spray interval than the activity of the fungicide. Clearly, chlorothalonil remains a very efficient and effective choice, providing about 50% disease control even though it was applied every 14 days. You can view the complete report in J. of Applied Horticulture 7(1)16-19.

Effect of fungicides on Euonymus anthracnose

Treatment	Rate/ 100 gal (interval)	Percent defoliation
Water	7 days	95
Heritage (azoxystrobin)	28 days	98
Echo 720 (chlorothalonil)	14 days	48
Kocide (cupric hydroxide)	7 days	73
RainShield NT (mancozeb)	7 days	46
Eagle (myclobutanil)	28 days	97
Compass (trifloxystrobin)	14 days	61

Rhizoctonia Web Blight on Azalea—Web blight is a serious concern on many ornamentals in the southern US from Florida through North Carolina and west to Texas. Copes and Sherm (USDA -Poplarville, MS and University of Georgia) reported on extensive studies performed in 2006, 2007 and 2008. Their studies involved analyzing the effect of weather conditions on severity of web blight on azalea. Temperatures ranging from a low of 68 F and a high of 95 F favored high disease development. The number of hours in this temperature range was also critical with 17 hours the turning point. There was an interaction between the number of hours at the optimal temperatures and the number of hours of leaf wetness. Even when the number of hours of the optimal temperature regime was reached, disease might still be low if the number of hours of leaf wetness was less than 14. The interaction between temperature and wetness in development of foliar diseases has been established for this common disease. Clearly, if the plants cannot be cooled with shade and cannot be spaced to allow more rapid drying or irrigated by drip to keep leaves drier, Rhizoctonia web blight will happen based on the weather alone. It is important to consider environmental modification whenever possible to limit our reliance on fungicide use and protecting plants year-round from a seasonal disease is wasteful of our resources. The full scientific article may be viewed in Plant Disease 94:891-897.



Rhizoctonia web blight (above on rosemary cuttings from southern California) is rare on woody ornamentals outside the southern US. Even in climates where summer rainfall is almost non-existent, growers can overrule nature with excessive moisture and create disease. If we can change conditions to promote disease, surely we can change them to prevent it.

Botryosphaeria and Phomopsis Cankers on Walnuts—Michailides and Hasey (both University of California scientists) reported on preventative steps for walnut cankers recently. They report that effective chemical controls are not known currently for these cankers but give guidelines for preventing infection in orchards:

1. Avoid wounding since the fungi enter this way. Remove infected branches routinely and avoid stressing the trees.
2. Late rains during the spring aggravate these diseases as they spread spores easily to the rapidly growing trees. Sunburn during the growing season also causes wounding that allows these fungi to enter the trees.
3. Prune trees during the dry parts of summer to avoid new infections.

The fact that so little is known of walnut cankers should make ornamental growers somewhat less irritated with the limited understanding we have for many of our crops. Finding a fungicide to control canker development will still be based on timing sprays, finding out if adjuvants should be employed and other factors. Some diseases (in fact all) should be controlled through all avenues possible since even the most effective fungicides cannot work if cultural controls are not understood and practiced.

For further information see http://cesutter.ucdavis.edu/Orchard_Crops/Botryosphaeria_Blight_-_Phomopsis_Cankers.htm.

Fusarium and Nectria cankers

We will be trying some fungicides on canker prevention this fall and through next spring. In one case, we will be working with fruit tree production in the ground and in the other with ornamentals in containers. Timing and adjuvants will be part of each study. Nectria on *Ilex* is shown to the left.



Disarm O for Ornamental Disease Control

We have been working on Disarm O (OHP) for the past few years. Disarm O is the latest in the strobilurin (MOA group 11) line of fungicides registered for ornamentals. It is a new active ingredient—fluoxyastrobin. I decided it was a good time to summarize our trial results with Disarm O for ornamental diseases.

Our trials have shown very good to excellent control of many serious diseases on ornamentals including leaf spots caused by *Alternaria*, *Cercospora* and *Colletotrichum* (anthracnose). It also provided very good to excellent control of *Myrothecium* which can cause both petiole and stem rots and leaf spots. We did not see significant control of Botrytis blight on geraniums, Fusarium cladophyll rot on Zygocactus or powdery mildew on gerbera.

We just finished another trial on Disarm O—this time we evaluated Disarm O with two other strobilurins (Heritage and Pageant) for control of Rhizoctonia stem rot on Impatiens.

Effect of fungicides on severity of Rhizoctonia stem rot on Impatiens. Disease was rated from 1 (healthy) to 5 (dead). Numbers in the same column followed by the same letter are not statistically different.

	Rate/100 gal.	Disease severity 8-21-10	Disease severity 8-27-10
Water Noninoculated	----	1.0 a	1.0 a
Water Inoculated	----	3.4 c	4.3 d
Heritage	2 oz	1.0 a	1.0 a
Pageant	12 oz	1.0 a	1.0 a
Disarm O	0.6 oz	1.0 a	1.0 a
Disarm O	2 oz	1.0 a	1.0 a
Veranda O	4 oz	1.0 a	1.2 a
Veranda O	8 oz	1.0 a	1.0 a

Pathogen	Plant	Rate/100 gal	Interval	Result
<i>Alternaria</i>	impatiens	2,4 oz	1 week	excellent
<i>Botrytis</i>	geranium	2,4 oz	1 week	none
<i>Cercospora</i>	pansy	4 oz	1 week	very good to excellent
<i>Colletotrichum</i>	cyclamen	2,4 oz	1 week	very good to excellent
<i>Colletotrichum</i>	cyclamen	4 oz	1 week	excellent
<i>Cylindrocladium</i>	myrtle	4 oz	1 week	excellent
<i>Fusarium</i>	zygocactus	4 oz	1 week	poor
<i>Myrothecium</i>	pansy	4 oz	2 weeks	very good to excellent
<i>Myrothecium</i>	salvia	4 oz	2 weeks	very good to excellent
Powdery mildew	gerbera	4 oz	once	none
<i>Pythium</i>	geranium	2,4 oz	2 weeks	excellent
<i>Pythium</i>	poinsettia	2,4 oz	2 weeks	very good to excellent
<i>Pythium</i>	pansy	2,4 oz	2 weeks	good
<i>Pythium</i>	celosia	0.6 oz	once	none
<i>Pythium</i>	celosia	0.6 oz	2 weeks	none
<i>Rhizoctonia</i>	celosia	2,4 oz	1 week	very good
<i>Rhizoctonia</i>	impatiens	2, 4 oz	2 weeks	excellent
<i>Rhizoctonia</i>	poinsettia	2,4 oz	1 week	excellent
<i>Stagonospora</i>	agapanthus	4 oz	2 weeks	some
<i>Thielaviopsis</i>	pansy	0.15,0.6 oz	2 weeks	none



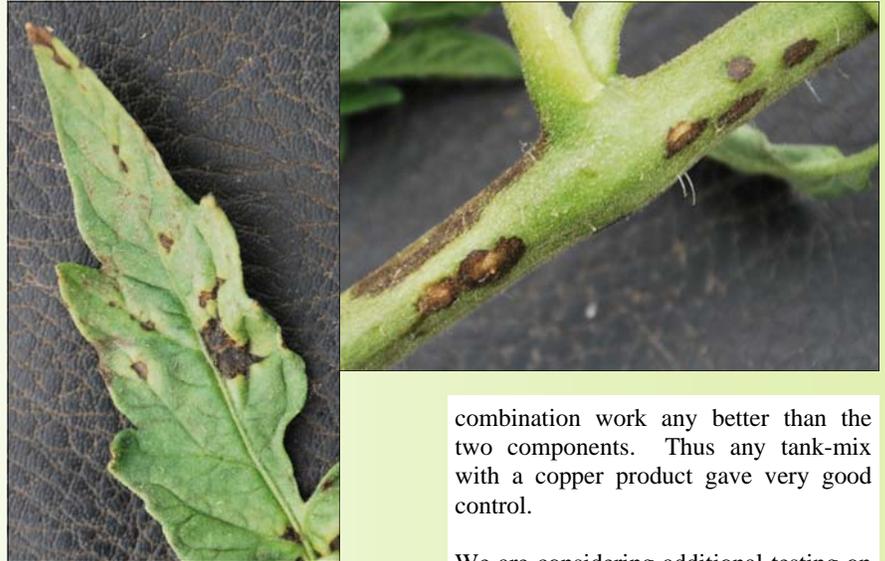
The fungicides were applied as sprenches once before inoculation and then again two weeks later. The table above shows how very effective these products are for Rhizoctonia stem rot with no disease developing during the trial period. They were also very safe. Only the Veranda O showed any signs of Rhizoctonia stem rot and then it was very slight and only at the 4 oz rate.

In all three trials we have preformed on *Rhizoctonia* from damping-off on celosia to stem rot on impatiens and cutting rot on poinsettia results have been very good to excellent with Disarm O. Black root rot on pansy was not controlled by Disarm O and our experience with other strobilurins shows similar results. In contrast, we saw very good to excellent control of *Pythium* root rot when used at 2-4 oz (early trials) but none when the product was used at the label rates (0.15 -0.6 oz/100 gal).

Our trials indicate very good to excellent control of many common diseases on ornamentals. Be sure to rotate with a different mode of action group to minimize chances of resistance development.

BACTERIAL SPECK CONTROL ON TOMATO

I'll bet you are wondering why I am including a page on bacterial speck on tomato. Actually last spring we received quite a few samples of leaf spot on tomatoes from ornamental growers who were branching out into container vegetables for the box stores especially. Each of the samples proved to have bacterial speck which is caused by *Pseudomonas syringae* pv. *tomato*. We saw leaf spots and even some stem spotting. When the opportunity arose to perform a trial on bacterial speck I agreed to do so.



We performed our trial in July when the temperatures were higher than ideal for speck but we always use intermittent mist when we perform foliar trials and all of the leaf wetness promoted promoted speck despite the heat. Bactericides were applied as a foliar spray to the point of drip on a weekly interval for a total of three applications. The plants were inoculated 4 days after the first bactericide application. The treatments were as follows:

- A. Noninoculated control
- B. Inoculated control
- C. Phyton 27 (50 oz/100 gal)
- D. Nordox (64 oz/100 gal)
- E. Kocide 2000 (32 oz/100 gal)
- F. Agri-Mycin (16 oz/100 gal)
- G. ZeroTol (50 oz/100 gal)
- H.

We included three different cultivars (different colors of the bars-graph below). The numbers above a particular bar are the average number of spots per flat. You can see that the optimal prevention was achieved with Nordox (copper oxide) on

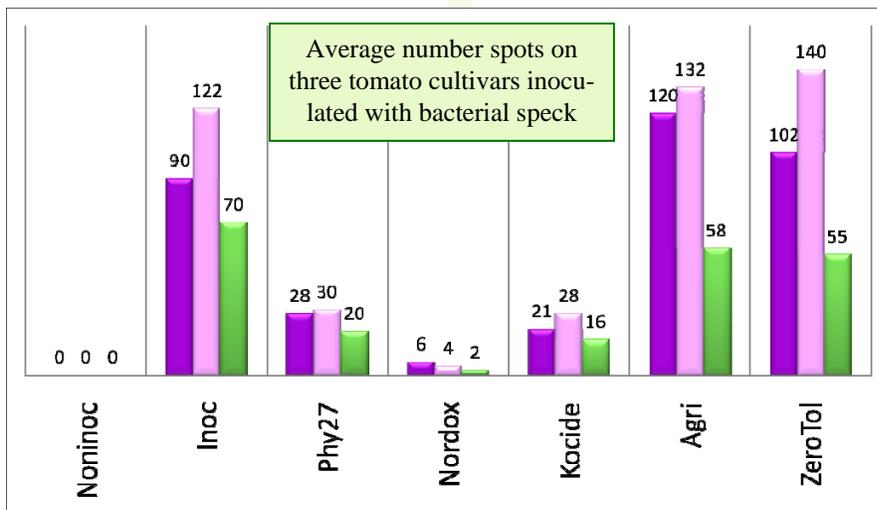
all three cultivars. The next best products were Phyton 27 (copper pentahydrate) and Kocide 2000 (cupric hydroxide) which are each contain copper. These results showed no appreciable control with either Agri-Mycin or ZeroTol. Unfortunately Nordox is not a good choice for ornamentals in most cases due to a very distinctive red residue (below, right).

One of the more interesting results was the very good control with all three copper bactericides since the *Pseudomonas* we used was slight to moderately Cu-resistant (Univ. of California testing). It shows that resistance to copper is not the same as immunity. We also tested quite a few products in combinations but in no case did the

combination work any better than the two components. Thus any tank-mix with a copper product gave very good control.

We are considering additional testing on this disease (speck on tomato) and also on other bacterial pathogens on ornamentals. Over the next 2 months we will do some trials on poinsettia for *Xanthomonas* leaf spot prevention, on oak-leaf hydrangea for *Xanthomonas* eradication and also perhaps another one on *Pseudomonas* leaf spot on Mandevilla. We will be testing some currently unregistered products and hope to include others such as Cease and KleenGrow which have shown good prevention of a variety of bacterial diseases.

Efficacy of Nordox on tomato in preventing bacterial speck—note red residue.

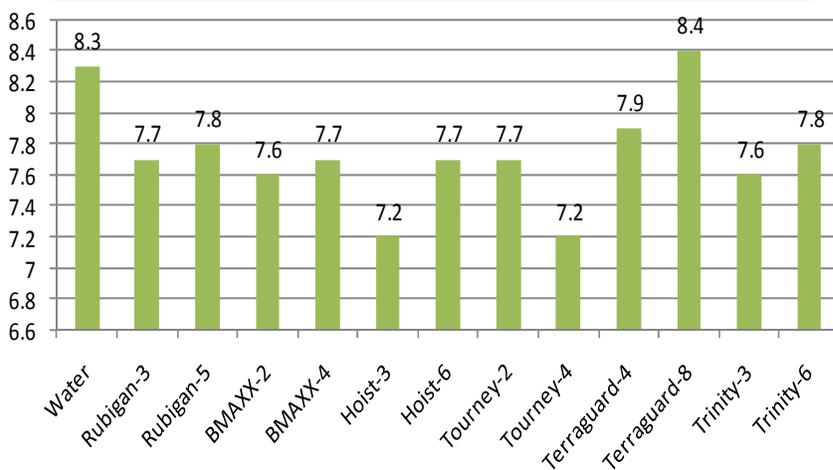


Using Leftover Plants

DMI Fungicides Affect Height of *Dianthus*—We sometimes have extra plants and since we don't want to throw them away, we often do trials just to see what happens. In late June we started a trial on *Dianthus* 'Neon Pink' plants in 4 inch pots. They were full grown and I decided to see if any of the DMI (sterol inhibitor) fungicides would have any effect on their continued growth and appearance. The fungicides were included at the low and high labeled rates for each. They were sprayed twice on a 14 day interval and we recorded the higher, top grade and number of flowers a couple of times during the trial. All plants had very good top grade and the number of flowers was not affected by treatment. However, 2-3 weeks after the second fungicide application, plant height was affected somewhat by treatment. The graph below shows the final height data with exact fungicides and rates used.

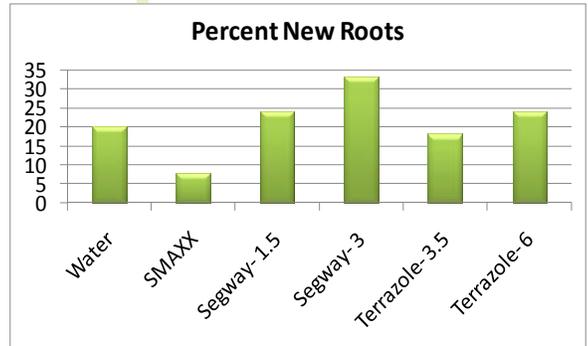
All of the fungicides resulted in slight stunting (numbers are in cm). Only Hoist at 3 oz/100 gal and Tourney at 4 oz/100 gal) were visibly shorter than the water sprayed controls. It was interesting to see that the least stunting occurred with Terraguard. Some of these products are not labeled for greenhouse use but might be applied to some herbaceous perennials like *Dianthus*. Be sure to read labels carefully and rotate to avoid PGR affects.

PGR Effects of DMI Fungicides on *Dianthus* (height in cm)



Curing Pythium Root Rot on Geraniums—In another trial using left-over plants we decided to evaluate whether or not some of the best preventative fungicides for *Pythium* would be able to "cure" some geraniums with advanced *Pythium* root rot. We did not identify the *Pythium* sp. involved in this test. The geraniums were originally rooted cuttings in Fafard Mix 2B. The weather was so variable last spring and early summer that over-watering occurred and root rot ensued. We picked the best looking plants (based on tops only) and treated them with Subdue MAXX (1 oz/100 gal), Segway (1.5 or 3 oz/100 gal) or Terrazole CA (3.5 or 6 oz/100 gal). Plants were drenched at the rate of about 2 oz/4 inch pot three times on a 14 day interval (23 June and 1 and 15 July). We did not see any real differences in the height or top grades. At the end of the trial, we rated the percentage of healthy new roots that were visible on the potting medium surface when we removed the pot. The graph to the right above shows this data. We clearly had the best results with Segway (especially at the 3 oz/100 gal rate). Neither Subdue MAXX or Terrazole at the rates tested were effective.

Curative Effects of Some Fungicides for Pythium Root Rot on Geranium



We have seen resistance to Subdue MAXX in some *P. irregulare* populations especially which may be why it failed here. In all of our trials with Terrazole we find that the only rate that can effectively control *Pythium* root rot when it has already become established is 10 oz/100 gal (not a legal rate in California). The rates of Segway used are those on the label and they did provide some "curative" control of these badly infected geraniums.



The roots above show no new healthy growth while those below show some new healthy (white) growth.



DOWNY MILDEW FUNGICIDES

Downy mildews continue to plague ornamental growers across the US. Due to their importance, IR-4 has designated them as target diseases for their control studies. These trials were conducted on Lamium, Coleus, rose, snapdragon and Viburnum. In a recent summary by IR-4, some of the newest fungicides were found to be very effective. The table below is a general summary of the IR-4 trials.

I did not include numbered compounds since they are not currently available to ornamental growers. Be sure to take note of the MOA groupings (numbers after the active ingredient). Downy mildew fungi are known to develop resistance to some fungicides when these fungicides are used exclusively. The best way to avoid resistance development is to use all IPM methods available and to either tank-mix or rotate between different MOA groups. Two recent registrations take this directly into consideration by requiring tank-mixing for downy mildew control. Adorn actually requires tank-mixing for any use and Subdue MAXX requires it when downy mildew is the target.

Downy mildew IR-4 Trial Summary

Fungicide (active ingredient and	Summary of IR-4 Results
Adorn 4SC (fluopicolide-43)	Good to excellent control on Coleus and Lamium. Under high disease pressure it failed on Coleus.
Disarm O (fluoxastrobin-11)	Fair to good control on Lamium and good on Coleus, rose, snapdragon and Viburnum.
FenStop (fenamidone-11)	Good control on Coleus.
Heritage 50WG (azoxystrobin-11)	Good to excellent control on Coleus, Lamium, rose and snapdragon.
Insignia 20WG (pyraclostrobin-11)	Good control on Lamium and rose.
Pageant (pyraclostrobin and	Good control on Lamium.
Regalia SC (giant knot weed extract-na)	Good control on Lamium and snapdragon, good control on viburnum (1%) and no control on Coleus.
Stature SC (dimethomorph-40)	Good to excellent control on Lamium, Coleus and Viburnum.
Subdue MAXX (mefenoxam-4)	Good to excellent control on coleus and lamium.

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One of the most recently found downy mildew diseases is found on coleus. Dr. Mary Hausbeck and her lab at Michigan State University are very active in this area. I include below a summary of one trial they reported on their website for Coleus downy mildew. I included the rates tested and overall results in the table below. You can see some additional products in this trial including Subdue MAXX



Fungicide	Rate/100 gal	Result
FenStop	7 oz	Very good to excellent
Adorn 4FL	2 oz	Very good
Adorn 4L drench	1 – 2 oz	Some
Stature DM 50WP	6.4 - 12.8 oz	Very good to excellent
Pentathlon LF	25.6 oz	Very good to excellent
Segway 400SC	6 oz	Good
Insignia 20WG	8 oz	Very good to excellent
Subdue MAXX drench	1 oz	Very good to excellent
Heritage 50WG	1 oz	excellent

used as a drench which provided very good to excellent control and Adorn used as a drench which provided some control. Many other products were very good to excellent including FenStop, Stature DM, Pentathlon and Insignia. In this trial, Heritage provided excellent control.

In another trial on Coleus, Dr. Hausbeck found 100% prevention with FenStop (14 oz/100 gal), Stature SC (6.12 oz) and Subdue MAXX (1 oz). Adorn (2 oz drench) and Disarm O (4 oz) each gave 60% control while Heritage (4 oz) only gave 40% prevention. The fact that results are somewhat variable



even on the same disease is common in disease management. This is another benefit of rotation in addition to resistance management.

Read fungicide labels carefully. The new fungicides have specific requirements you must follow.