

Chase News



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New Opportunities as 2010 Closes

I thought I would leave you with this intriguing image of the next trend in poinsettias. Unfortunately, the cause remains a mystery so even if this were salable we could not reproduce it.

This year has been challenging for all of us in one way or another. At Chase Horticultural Research, we have made the decision to close our diagnostic lab. This was solely a decision based on improving our efficiency and concentrating on research, consulting and education. Don't forget we are closing the lab on March 1, 2011. For those of you with prepaid sample packages that have not been used by then please contact me so we can tailor a plan to your needs.

I have already started a new book on bedding plant diseases and insects with Margery Daughtrey—Cornell University and Dr. Raymond Cloyd—Kansas State University. If all goes well it will be published sometime in 2012 and of course we will be selling it at trade shows and in our online store.

We have also completed the updating on Chase's Guide to Ornamental Fungicides-2011. It will be completed sometime in the first quarter of 2011 when you can order one from our online store directly. This independent summary of our research will be provided in both a 8.5 x 11 inch sheet and the familiar wall poster.

After quite a lot of work we have officially launched our new website. It was time for a facelift anyway and with so many changes in our business goals and offerings we just started over. Please let me or Mike (mike@chaseresearch.net) know what you think of the new site.

We look forward to continuing to work with this great industry and starting our 16th year as Chase Horticultural Research. Happy Holidays!



Happy Holiday's from Mike

As we wind down 2010, I hope everyone had a decent business year in spite of the way the economy is. As we head into 2011 and all of us face the economic battle of survival, I hope that 2011 brings some sort of relief. As always Ann & I will be here to help you with your plant disease issues.

We just got done giving our website a huge makeover and are currently working on a new store; hopefully it will be easier for you to maneuver. Please let Ann or me know how you like it, we appreciate your feedback!

2011 will bring some new changes for Ann & me; we plan on building a new house up in northern Arizona in a small city called Cottonwood. I will be spending most of my time there working and overseeing the house project, while Ann will be spending most of her time here. YES...it will be challenging!

Mike

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Viruses and Their Management—Dr. Deborah Mathews

We recently had some questions regarding possible production of virus-free rose clones and also tool disinfection to control virus spread in herbaceous ornamentals. Here are the answers from University of California Riverside Virologist, Dr. Deborah Mathews.

Growing tips of plants contain a region called the apical meristem where new cells are generated and eventually become new leaves, stems and flowers. The cells in this area divide very rapidly but are not fully differentiated into normal cells with proper walls and organelles. This typically reduces the ability of viruses to survive there because they need active, fairly mature cells in order to multiply (=replicate) and move to new cells. Plant tissue culture experts use this fact to try and remove a very small section of the apical meristem, usually 0.2 to 0.6 mm in diameter, and place it on artificial growth media (sort of like jello with nutrients in it), where the new plant will begin to grow and with the right hormones will produce shoots and roots just like the original plant.

This procedure may be coupled with heat therapy of the plants prior to removal of the apical shoot tip to further suppress the virus, as many viruses cannot withstand high temperatures. You usually keep the plants in a hot growth chamber for 4-8 weeks prior to the tissue culturing. The temperature depends partly on how hot the plant can stand it and still survive, you want to be just a couple degrees below what will kill the plant to successfully inhibit the virus, it usually needs to be at least 93-95F and it is better if you can use 98.6-100F or even 104F for some hot climate natives. If you are lucky, many of these new plants will be virus free after these methods, although some virus infected ones almost always come through so you must test for several weeks (or months in the case of woody perennials like citrus or grapes) after the procedure to tell which ones have it and which ones don't.

My laboratory actually does this work with herbaceous ornamental plants, (like verbena) to test the efficiency of virus detection in tissue cultured materials. My research has shown that the testing for viruses needs to be done intensively and for a long enough period of time to ensure all virus positive plants are detected and discarded. The industry typically uses a short turn around time and unknowingly releases some plants that contain virus, because the LEVEL of virus has been so reduced by the tissue culture, they test negative in their hands. That is until a couple of months down the line when the plant growth is again active and the virus levels have had a chance to increase, after they have been sold and are out the door.

The most common rose viruses are *Prunus necrotic spot*, *Apple mosaic* and *Arabidopsis mosaic virus* which all combine to cause what is commonly called Rose Mosaic and can cause various symptoms depending on which 1, 2 or all 3 are in the mix in a given plant. Other viruses that can infect rose are *Tobacco ringspot*, *Tomato ringspot*, *Tobacco streak*, and *Rose spring dwarf-associated virus*. There are other possible viruses in roses that haven't been confirmed yet.

Since I am in the virus business (I actually keep them around on purpose!), I have to be careful about accidentally transmitting viruses between plants. I use a fresh solution of 20% household bleach (1 part bleach with 4 parts water) in a spray bottle, and at least 2 sets of tools. I use the first set and when done cutting I rinse off the plant debris (sap, bark, other material) with water, then spray both sides of the tool with diluted bleach to run-off, making sure to get it in the nooks and crannies of the joints, and let sit while cutting the next plant. The bleach should sit on the surface for at least 2 min, 5 min is better. Before using again, rinse off the bleach solution with water to avoid bleach phytotoxicity on the next plant. This works with clippers where you are making multiple cuts on larger plants, so it takes 2-5 min to trim each plant anyway.

In other cases, where a quick slice or 2 with a knife or other bladed tool is all that is necessary, this method isn't ideal. In that scenario I would have a small container with enough 20% bleach in it to cover the entire cutting surface of the tools, as each tool is finished being used, be sure to either wipe off or rinse with water the plant debris (bleach is quickly inactivated by organic matter), then place the tool business end down into the bleach for a minimum of 2-5 min. Rinse with clean water and reuse after sitting for that amount of time. This way you could have a dozen or so knives all cycling through as you go down a row.

The problem with bleach however is that it is very corrosive to metal and blades don't last long with this repeated treatment. I have seen cheap blades be basically destroyed after one day of such abuse. Bleach also is messy for humans, has fumes and is caustic to the eyes and sometimes skin after long contact. It is also important to dilute just enough of the bleach you will use fresh each day or better, in the morning and again in the afternoon, since bleach loses half of its effectiveness every 2 hrs once exposed to the air and light, especially when diluted. So that is the virologists way of doing things.

There was some work on tool decontamination methods published earlier this year. It focused on *Tobacco mosaic virus* (TMV), one of the most stable viruses we know of, so what works for it SHOULD work for most other viruses. However, since the best chemical in the trial (non-fat dry milk) has not been tested on other viruses at this point in time, I hesitate to tell you that it will inactivate all the viruses you may come across. Milk has long been known to inhibit TMV, there is a possibility that the binding is specific to the TMV group of viruses and is not broad spectrum in its action. The paper however, also shows you how effective many other common disinfecting agents are and those have been shown to have broad spectrum virucide activities, it is just that some are more efficient than others at it. Of those tested, other than the milk and the bleach which were the best, Virkon S (Dupont) was the next most effective. Since handling your plants can spread some viruses during this process, using and changing disposable gloves between each plant is a good idea as well.

Black Root Rot Control on Vinca

We have completed another set of trials on black root rot on vinca (*Catharanthus roseus*). This crop is not as often infected with *Thielaviopsis basicola* as pansy and Calibrachoa might be, but it is very sensitive and makes a good test subject for fungicide evaluations.

We started the first trial on 14 October using 'Cooler Pink' plants potted on 21 September in 3.5 inch pots containing Sunshine No. 1 and top dressed with Osmocote Plus 15-9-12. They were treated on a 14 day interval using a little more than 1 oz/pot as a drench. Treatments included:

- Noninoculated control
- Inoculated control
- Cleary 3336 (16 oz/100 gal)
- Veranda O (8 oz/100 gal)
- Trinity (6 oz/100 gal)
- Trinity (12 oz/100 gal)
- Trinity (6 oz/100 gal) alternated with Pageant (12 oz/100 gal)

Drench dates were October 14 and 28 and November 10 and 29. Plants were inoculated with spores of *Thielaviopsis basicola* on October 21. We rated plants for height and top grade on November 5 and December 1 (table below).

Treatment	Rate/ 100 gal.	Height (cm)	Top grade
Water Noninoculated	-----	8.5 c	3.9 c
Water Inoculated	-----	6.8 ab	3.3 ab
Cleary's 3336	16 oz	7.7 b	3.7 bc
Veranda O	8 oz	7.0 ab	3.4 ab
Trinity	6 oz	6.5 a	3.3 ab
Trinity	12 oz	6.7 ab	3.1 a
Trinity and Pageant alternated	6 oz and 12 oz	6.8 ab	3.4 ab

Numbers in the same column followed by the same letter are not statistically different (Student-Newman-Keuls Method).

Optimal prevention of black root rot in this trial was provided by Cleary 3336. None of the other products gave any control compared to the inoculated controls.

The second trial started on October 26th with the first fungicide application. The 'Cooler Pink' plugs were potted up in early October in 3.5 inch pots containing Fafard Mix 2B and were top-dressed with Osmocote Plus 15-9-12. The treatments included:

- Noninoculated control
- Inoculated control
- OHP 6672 50WP (16 oz/100 gal)
- Veranda O (8 oz/100 gal)

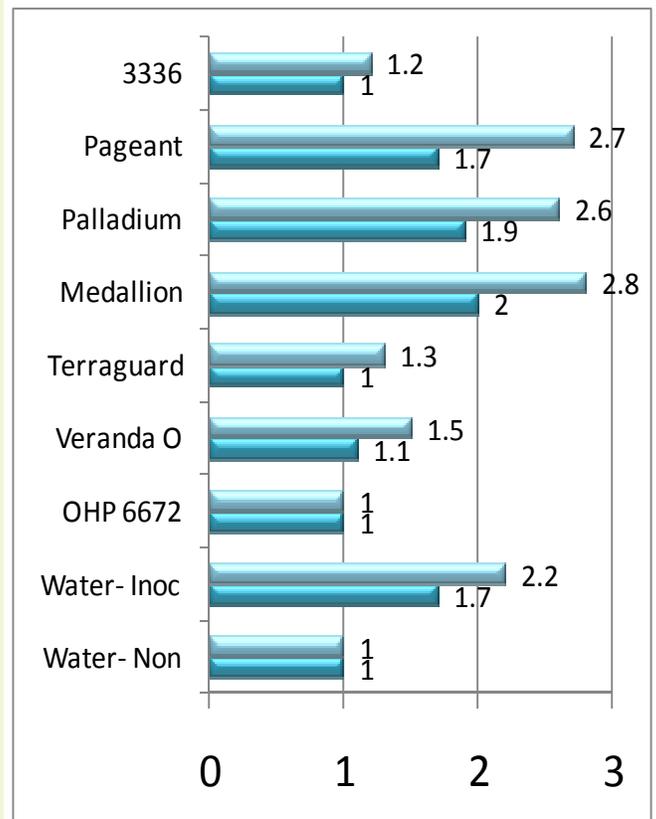
- Terraguard 50WP (4 oz/100 gal)
- Medallion 50WP (4 oz/100 gal)
- Palladium (8 oz/100 gal)
- Pageant (12 oz/100 gal)
- Cleary 3336 50 WP (16 oz/100 gal)

Plants were treated with a drench (using a little over one ounce per pot) three times on a 14 day interval. Dates were October 26, November 9 and November 23. The first application occurred before inoculation on October 29.

We rated them for height and top grade on November 16 and disease severity on November 22 (darker blue bars) and 30 (lighter blue bars). The disease data is shown in the graph below. Disease was rated using the following scale: 1 – no disease, 2 – slight, 3 – moderate, 4 – severe to 5 – plant dead.

Excellent control was achieved with OHP 6672 with slight disease developing when 3336, Terraguard or Veranda O were used. The other products provided no control of black root rot on vinca in this trial.

We will be trialing these products once again and this time compare the two potting media. We have seen vinca more severely affected by black root rot than pansy in the past. It is possible that the potting media and/or the specific crop are influencing the ability of the fungicides to prevent black root rot.



Do These Problems Look Familiar?



This is *Sclerotium rolfsii* on pothos. The clues are the fan-like mycelium (white growth) and the small brownish seed-like sclerotia (arrow). When they are mature (ripe) they are reddish brown and usually round. This disease occurs mainly on more tropical plants or in warmer environments where they are grown. Trials have shown that the best fungicides for control have been Medallion (fludioxinil) and Prostar (flutolanil).



The Oregano shown above had *Rhizoctonia* aerial blight. The most common signs are a mass of brownish spider web-like growth. This only develops when the conditions are warm-hot and pretty wet. We received this in our lab a couple of weeks ago and I was surprised to see *Rhizoctonia* was still active in coastal California. Our trials with *Rhizoctonia solani* have shown that the best fungicides for control have been Medallion (fludioxinil), strobilurins and thiophanate methyl.



These *Zygocactus* (*Schlumbergera*) (left) have *Impatiens Necrotic Spot Virus* (INSV). The only solution is to discard them. This crop is routinely propagated using stem sections (like that shown here) and the virus would easily continue if these plants were used to produce the next crop.



Many plants are showing damage from *Pythium* root rot. These daffodils developed very few roots and those that were forming had brown rotted tips. The best fungicides for *Pythium* root rot in our trials have been Subdue MAXX (mefenoxim—resistance is possible), Segway (cyazofamid) and Terrazole (etridiazole—or Truban).



Downy mildew is really getting going on plants like these delphiniums (left). Turn leaves over and check for the grayish (white or purple too) sporulation. Trials have shown excellent results with Aliette (or other phosphonates), Subdue MAXX (mefenoxam) and Stature (dimethomorph). There are several other products which have worked really well too on downy mildew including FenStop (Fenamidone), Adorn. (fluopicolide) and Segway (cyazofamid). Be sure to rotate between mode of action groups to help avoid development of resistance.

More Rose Powdery Mildew

We struggled all year to perform powdery mildew trials on roses and finally have had a run of luck—probably due to weather changes. This trial was conducted in our Mt. Aukum greenhouses. We started this trial on ‘Nearly Wild Medium Pink’ Rose on August 30th when rooted cuttings were potted up in 4 inch pots containing Fafard Mix 3B. Plants were fertilized with Osmocote Plus 15-9-12 and placed in a shade house to establish in the pots.

We actually started the trial applications on October 20th when we saw just a few powdery mildew colonies. The treatments were applied on different intervals and two were applied as drenches instead of a spray to the point of drip. Several of the treatments were applied with Capsil at the rate of 6 oz/100 gal. Drenches were applied at the rate of almost 2 oz/4 inch pot.

Plants were kept close together between applications to promote high relative humidity and disease development. Treatments continued until 2 December when the final one was applied. We rated number of powdery mildew colonies a couple of times, residue and plant height. Residue was slight with all treatments except for the Concert treatments which were moderate. None of the treatments adversely affected growth or appearance in this trial.

Concert (Syngenta) is registered for landscape use only including home lawns. It is not legal for use in greenhouses. Concert is a combination of propiconazole (Banner MAXX) and chlorothalonil (Daconil). On a 14 day interval provided excellent prevention of powdery mildew development on rose as did Banner MAXX on the same interval. Headway (Syngenta) was also applied on a 14 day interval with excellent results. It is another combination fungicide containing propiconazole (Banner MAXX) and azoxystrobin (Heritage) and is not labeled for ornamentals at this time (turf uses only).



Actigard is also a Syngenta product that contains an SAR (systemic acquired resistance) product called acibenzolar and it not labeled for ornamentals yet. It must be used prior to infection for optimal effect. We had a variety of treatments in this trial including a single Actigard drench that did a very good job of preventing powdery mildew development over the test period. It did not adversely affect the growth or appearance of the roses either. The Actigard sprays (alone or alternated with Heritage) were excellent for prevention although a tiny amount of powdery mildew did develop.

Palladium was registered this year for ornamentals and has shown very good to excellent control of powdery mildew (as well as many other foliar diseases including *Botrytis*, *Cercospora*, *Alternaria* and *Rhizoctonia*). Palladium is a combination of fludioxinil (Medallion) and cyprodinil. In this trial, the lower rate used weekly provided 100% prevention but the higher rate on a 14 day interval was almost as good. The Heritage weekly spray also provided 100% prevention while the Heritage drench showed significant but lesser control of powdery mildew.

These treatments show a very wide range of very effective fungicides available from Syngenta for use under a variety of conditions. Be sure to check labels for current, legal use sites, rates and intervals. These products also represent a variety of mode of actions groups making resistance management more easily accomplished.

Treatment	Rate/ 100 gal	Application timing/method	# powdery mildew colonies 11-3-10	# powdery mildew colonies 12-7-10
Water	----	7 day/spray	2.5 a	9.1 c
Concert	22 oz	14 day/spray	0.0 a	0.0 a
Concert	35 oz	14 day/spray	0.0 a	0.0 a
Banner MAXX	8 oz	14 day spray	0.0 a	0.0 a
Headway	12 oz	14 day spray	0.2 a	0.0 a
Actigard	0.25 oz	One-time drench	1.2 a	3.2 ab
Actigard	0.75 oz	7 day/spray	0.9 a	1.3 ab
Actigard Heritage/Capsil added every other application	0.75 oz 2 oz/6 oz	7 day/spray	0.2 a	0.8 ab
Palladium/Capsil	6 oz/6 oz	14 day/spray	1.4 a	1.2 ab
Palladium/Capsil	4 oz/6 oz	7 day/spray	1.0 a	0.0 a
Heritage/Capsil	4 oz/6 oz	7 day/spray	1.6 a	0.0 a
Heritage	0.9 oz	21 day/drench	0.7 a	5.2 b

Numbers in the same column followed by the same letter are not statistically different using Student-Newman-Keuls Method.

Research Reports

Cercospora leaf spot on pansy—

For the second time recently, we have gotten some unexpected results in controlling *Cercospora* leaf spot on pansy. The trial was run here in Mt. Aukum, CA using ‘Majestic Giant Scarlet’ pansy plugs. We tested a variety of Syngenta fungicides compared to two formulations of thiophanate methyl. The most interesting part was that the Cleary 3336 50WP (16 oz/100 gal) only provided about 40% control and the OHP-6672 50WP (16 oz/100 gal) provided about 20% control. In contrast Palladium (2, 4 or 6 oz/100 gal) and Heritage (4 oz/100 gal) provided 100% prevention at all rates tested. Medallion (2 oz/100 gal) was 95% effective as well. The products were all applied as weekly sprays for as total of three applications. The plants were only inoculated after the first fungicide application.

I am not sure why the thiophanate methyl products performed so poorly in this trial. I reported on another trial last month with OHP-6672 (16 oz/100 gal) where it also failed to give good control of *Cercospora* leaf spot on pansy. I will do some literature searching and see if I can find reports of resistance in any *Cercospora* spp. to thiophanate methyl. In the meantime, I would use other products for control of this disease on pansy.

Slowing down Pythium root rot on poinsettia—

We had some poinsettia cuttings that I was hoping to use for a *Xanthomonas* leaf spot or scab trial only to find them going down to *Pythium* root rot soon after planting. We decided to try and stop the losses using the fungicides that have worked best for *Pythium* root rot in our trials. The treatments are shown below:

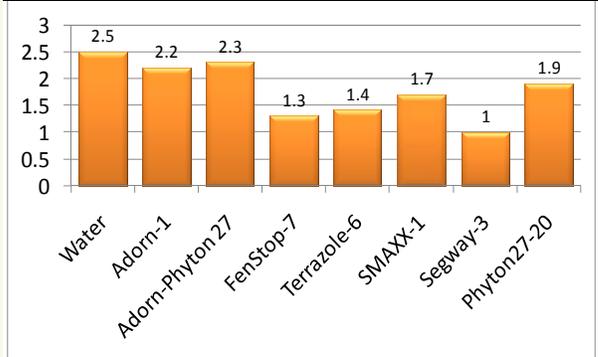
- Water
- Adorn (1 oz/100 gal)
- Adorn (1 oz) and Phyton 27 (20 oz)
- FenStop (7 oz)
- Terrazole 35WP (6 oz)
- Subdue MAXX (1 oz)
- Segway (3 oz)
- Phyton 27 (20 oz)

Fungicides were applied as drenches (a little under 2 oz/4 inch pot) on a 14 day interval—October 5 and 19 and November 2.

We rated the top response periodically and eventually rated root growth and wilting on 29 November. Top response (height or top grade) was never significantly affected by any treatment. Root growth was pretty poor overall and by the end of the test typical wilting seen with *Pythium* root rot was affected by treatment. The only product with 100% prevention of wilting was Segway. FenStop, and Terrazole were also pretty effective.

The fungicides were applied as sprays to drip on a weekly interval starting on 17 November. *Botrytis* sporulation was rated on 29 November and finally we evaluated top grade on 20 December. *Botrytis* control was best with Veranda O (8 oz/100 gal), Medallion (4 oz/100 gal) and Palladium (6 oz/100 gal). We continued the treatments for a total of four applications.

Effect of fungicides on severity of *Pythium* root rot on poinsettia



Disease was rated on the following scale: 1 (none), 2 (slight wilting) and 3 (moderate wilting).

Unfortunately, the roots on even the best plants were very poor and were the best on plants treated with Terrazole or Subdue MAXX. Clearly trying to stop advanced *Pythium* root rot can be very difficult. The type of potting medium as well as environmental conditions also affect the ability to control many diseases. In this case, a poorly draining potting medium and no supplemental heat combined to make the worst case scenario. The lesson for me was that even the best fungicides cannot overcome diseases under some conditions.

Safety of fungicides on Veron-

ica—We picked up some veronica liners about a month ago and decided to see what might help control the low level of *Botrytis* leaf spot that were present. They were transplanted and placed under intermittent mist to promote more disease.

We rated the top grade using the following scale: (1=dead), 2 (poor), 3 (moderate), 4 (very good) and 5 (excellent). It was interesting that doing nothing was better for the final top grade than doing anything at all. The least damaging treatment was OHP6672 and the most damaging was Trinity (triazole from BASF—not currently labeled for ornamentals). Triazole (MOA 3) fungicides are known to cause PGR effects on some ornamentals at

some rates and intervals. Be sure to always follow labeled rates, sites and intervals to avoid unnecessary damage.

Treatment	Rate/100	Top
Water	—	3.6 d
Veranda O	8 oz	3.0 bc
Pageant	12 oz	3.1 bc
Medallion	4 oz	2.8 abc
Palladium	6 oz	3.0 bc
Trinity	4 oz	2.9 abc
Trinity	8 oz	2.4 a
Trinity	12 oz	2.6 abc
Trinity	16 oz	2.5 ab
OHP6672	16 oz	3.2 c

Numbers followed by the same letter are not statistically different using Student-Newman-Keuls Method.

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