

CHASE NEWS

Chase Horticultural Research, Inc.

Volume 8—Issue 12 December

NEW FROM CHASE HORTICULTURAL

EDUCATIONAL VIDEOS IN 2010

I get around to quite a few meetings over the course of a year but not everyone can afford to attend a national or regional meeting. I am sometimes asked if we have any presentations of talks that can be accessed or used for training. So we are working on a series of twelve video presentations for download purchase. They cover the most common diseases from powdery mildew to Phytophthora. We also have special topics such as biological controls, quarantine rusts and diagnosis. They run from 10-20 minutes long and are based on updated PowerPoint presentations on these topics. They should be on our web for purchase (\$14.99 to \$29.99) sometime in January, 2010. Please let us know if there are any additional topics you are interested in once you get a chance to see what we are offering.

NEW PROCEDURES FOR DIAGNOSTIC SAMPLES

On another note, we have slightly modified our procedure for sample submission. The state of California has alerted us that all samples must be accompanied by both our state and federal permits. We have posted them on our website for download (three pages total). We have also emailed them to our current diagnostic clients and snail mailed them too. If you do not include them, there is a good chance that the authorities in Sacramento will hold them and/or return them to you. This is a big waste of your money so please do include all three pages. I also have new submission guidelines and a new sample submission form which must accompany every sample. We do listen to your comments and are trying to make this all smoother. We are still honoring the prepaid discount of 10 samples for \$750 (you can buy more than one set). This is a 25% savings and won't last forever.

CHASE BASE UPDATE

We will be adding another set of trials to **Chase Base** in early 2010. These are the most information trials of 2008 and will bring our total to almost 400. Remember you can search by plant, disease (or pathogen) and fungicide. We have an introductory offer of \$99 for one year if you purchase on the web.



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POWDERY MILDEW—I receive a monthly newsletter (ADAS Hardy Ornamental Plant Notes) from England which reports on current diseases, insects, industry news and new registrations for pest control products. I am always interested to see how similar their disease sightings are to ours. The table below

<i>Acer</i>	<i>Hebe</i>	<i>Sorbus</i>
<i>Aquileia</i>	<i>Hydrangea</i>	<i>Spirea</i>
<i>Clematis</i>	<i>Lonicera</i>	<i>Syringa</i>
<i>Crataegus</i>	<i>Photinia</i>	
<i>Euphorbia</i>	<i>Potentilla</i>	
<i>Fragaria</i>	<i>Rosa</i>	

shows the crops affected by powdery mildew during the previous month (I added the *Fragaria* and *Rosa* sightings). The

ADAS newsletter also reported downy mildew and Septoria leaf spot on *Hebe*, Fusarium crown rot on *Dianthus* (we have seen lots of this in 2009), and anthracnose on lupine. It is very often the case that we see the same diseases on the same crops.

The rose trial ('Nearly Wild Pink') was started after we saw powdery mildew start. Treatments were applied weekly for a total of four weeks. The table below shows the number of powdery mildew colonies after two and then four treatments. After two appli-

Treatment	Rate/100 gal.	# PM spots 11-16-09	# PM spots 11-30-09
Water	-----	16.5 b	15.7 b
Pageant	12 oz	6.1 a	3.7 a
Cease	1.5%	9.2 ab	9.4 a
MilStop	2.5 lbs	5.2 a	6.7 a
Cease/MilStop	1%/1.25 lbs	9.3 ab	7.7 a
Capsil	4 oz	15.7 b	18.7 b
Cease/Capsil	1%/4 oz	17.7 b	18.8 b
Banner MAXX	6 oz	7.0 a	5.7 a

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

cations, MilStop alone, Pageant and Banner MAXX provided significant control of powdery mildew. After the fourth application, all products provided control with the exception of Capsil alone and Capsil plus Cease. Although we have seen good preventative control of powdery mildew with Cease, it must

be used at 1.5% to eradicate or stop an active infection on rose. The 1% rate for Cease should be used when control is strictly preventative and simply adding a wetting agent was not sufficient to obtain the same level of control as achieved with the 1.5% rate. The combination of reduced rates of MilStop and Cease was effective indicating that they may be additive or perhaps that the MilStop rate of

1.25 lb/100 gal was high enough in this trial to give good control. None of the treatments damaged these roses during the trial.



BOTRYOSPHERA BLIGHT ON PISTACHIO

In our diagnostic lab we occasionally isolate Botryosphaeria from woody ornamentals. Finding research on fungicide controls has been difficult even when checking non-ornamental crops. Morgan et al. (University of California-Plant Dis. 93:1171-1181) reported on

effectiveness of a warning system for this disease on pistachio. The researchers reported that timing fungicide sprays based on rain events (greater than or equal to 1 mm per hour for 4 hours or more) and temperatures greater than 50F was more effective in limiting losses compared to a calendar-based spray schedule. They found that Heritage worked well when used within 5 days of a rain event (before or after). Rotating a thiofanate methyl (like 3336) and Pageant were also very effective when applied based on rain events.

The take home message for me is that applying the products based on the environment is more effective than applying fungicides based on a calendar. This means for landscape plants susceptible to Botryosphaeria making sure to monitor rainfall and temperature and apply products only then. A similar rule can be used for nursery production in addition to

avoiding overhead irrigation whenever possible. I'll keep looking for fungicide work on this important woody pathogen but until then, we do know that Heritage, thiofanate methyl and Pageant have been effective. Remember that Heritage and Pageant are each strobilurins and should not be rotated.

Plant	Pathogens (diseases)
Alstroemeria	Pythium, Fusarium
Anemone	INSV
Aquilegia	Botrytis, Pythium
Asarum	Phyllosticta, Myrothecium
Astilbe	Phyllosticta
Brunnera	Alternaria, Botrytis
Calla lily	Pythium, Erwinia, Xanthomonas
Campanula	Pythium, downy mildew, Phytophthora, Fusarium
Canna	Xanthomonas
Dahlia	Pseudomonas, Xanthomonas, Fusarium
Delphinium	Phyllosticta, powdery mildew
Dianella	Colletotrichum
Dianthus	Sclerotinia, Fusarium, Phytophthora, Stemphylium, Pythium
Echinacea	Pythium
Erigeron	Phyllosticta
Erysimum	Xanthomonas, Rhizoctonia
Freesia	Fusarium
Gaillardia	smut, Alternaria
Hakonechloa	Pythium
Hellebore	Pythium, Coniothyrium, Pseudomonas
Hemerocallis	Phytophthora, Fusarium, Pythium, rust
Heuchera	Xanthomonas, Phytophthora
Hosta	Drechslera, Pythium
Larkspur	Pythium, Fusarium
Lavender	Pseudomonas, Xanthomonas, Pythium, Botrytis
Lupine	Fusarium
Miscanthus	Bipolaris
Oregano	Pseudomonas, Botrytis
Papavar	Cladosporium
Penstemon	Phyllosticta, INSV, rust
Peony	Xanthomonas, Botrytis, Pythium
Perovskia	crown gall
Phlox	Phytophthora, Pythium, downy mildew, Fusarium
Ranunculus	INSV
Rosemary	Phytophthora, Botrytis, Xanthomonas
Rudbeckia	Erwinia, Alternaria
Salvia	Pseudomonas, Pythium, Botrytis, Alternaria, downy mildew, Fusarium
Scabiosa	Alternaria
Silene	Alternaria
Tiarella	Colletotrichum
Tulip	Pythium, Fusarium, Rhizoctonia, Penicillium, Botrytis, Phytophthora
Veronica	Botrytis, Colletotrichum, rust

BELL PEPPER ANTHRACNOSE—Wyenandt and Maxwell recently reported on a field trial with bell pepper infected with anthracnose. The authors applied products weekly for a total of 11 sprays. Bell peppers were infected with *Colletotrichum* spp. which resulted in fruit rot and therefore less marketable yield when left untreated. The sprays were combinations alternated over the production cycle. I have decided to list the products as their agricultural names, giving their ornamental equivalents where possible.

LEM17 is an experimental product representing a new MOA for ornamentals. Tanos is the same active ingredient as SP2015 which has been reported in earlier issues of Chase News (2007 and 2008 especially or 2009—bacterial trials). All rotations tested resulted in significant increases in marketable yield of the bell peppers. Best overall control and thus marketable yield was seen with maneb alternated with Quadris (=Heritage). Maneb alternated with Evito (=Disarm O) was also very effective. **The alternation of traditional chemistry such as maneb with strobilurins (Evito or Quadris) appears to be especially effective.** For a complete report see—Wyenandt and Maxwell, Rutgers Agric. Research and Extension Center, Plant Dis. Management Report 3:V024.

Treatment	Marketable yield
Untreated	78 e
LEM17 (low rate) plus Kocide alternated with Tanos and Kocide	122 cd
LEM17 (medium rate) plus Kocide alternated with Tanos and Kocide	126 cd
LEM17 (high rate) plus Kocide alternated with Tanos and Kocide	124 cd
Kocide alternated with Tanos and Kocide	104 de
Cabrio and Kocide alternated with Manzate and Kocide	148 bc
Maneb alternated with Evito	179 ab
Maneb alternated with Quadris	186 a

BOTRYTIS POST-HARVEST ROT ON STRAWBERRY FRUIT-Mertely et al. (University of Florida), tested the ability of several fungicides to reduce Botrytis fruit rot after harvest. The authors tested pre-harvest sprays compared to sprays during the bloom time. The researchers found that sprays applied during the flowering were far more effective in controlling Botrytis fruit rot than those that were applied right before harvesting. Elevate (=Decree) was more effective than Switch (=Palladium—not currently labeled for ornamentals) in one trial. In another trial, Captevate (a combination of Elevate and Captan) was more effective than Pristine (=Pageant). The most important lesson from these trials on strawberries is that spraying during the production phase is more effective than spraying right before harvest. Presumably this would also apply to cut flowers which are sometimes dipped for post-harvest Botrytis control. **It is nearly always true that controlling diseases earlier is far better than later regardless of the type of crop or the type of disease.** For a complete report see: Plant Health Progress—2009-0921-01-RS.

ALTERNARIA LEAF SPOT ON GINSENG—Hausbeck and Harlan (Michigan State University) performed two trials in 2008 on *Alternaria panax* (also causes leaf spot on schefflera) (Plant Disease Management Reports 3:V068 and V069). Fungicide sprays were made weekly with the number of infected plants per row recorded at the end of the season. The results for some of the products differed between the two trials (Daconil WeatherStik, Dithane and Heritage). The products categorized as some control were judged by the researchers to be unacceptable to the growers. The trials were run at about the same time in separate plantings—three year-old planting vs. four year-old planting. The products that gave very good to excellent control in the younger trial were less effective in the older trial. This might be explained by the differences in density—the older planting was denser and more difficult to get full coverage. It is also likely that the inoculum level in the older trial was higher. **Disease control is not a recipe that can be repeated at will—don't expect miracles even with the best products. Optimal disease control demands your expertise and complete involvement.**

Very good/ excellent control	Some control
Daconil	Daconil
WeatherStik	WeatherStik
Dithane	Dithane
Heritage	Heritage
Palladium	Kocide
Chipco 26GT	LEM17
Pageant	

Many trials have been reported over the past four or five years on efficacy of products for Pythium root rot. I have summarized some of them in past issues of Chase News but this month I thought I would review the trials we have performed over the past four years. We have been testing a variety of fungicides: traditional, biological and some experimental for control of Pythium root rot. We often use geraniums for these trials but over the past four years we have also tested Pythium control on calla lily, gerber daisy, pansy, poinsettia, ranunculus, snapdragon and vinca. The pathogens have been *Pythium irregulare*, *P. aphanidermatum* and in some cases the crops were naturally infected (ranunculus). The other trials were run as preventatives with products applied once before we inoculated them. Nearly all of our trials evaluated the growth of roots and tops and did not result in any plant losses.

I summarized the trials in the table below. Each entry is for a separate trial.

One of the most important things to note is that even the best products do not work the same all of the time. The isolate of *P. irregulare* that we use is resistant to Subdue MAXX and one would expect that this fungicide would not work on geraniums. However, our results show everything

from none to very good control on geraniums. On other crops, Subdue MAXX has given good to excellent control. Other industry standards such as Terrazole have given more consistent results of very good to excellent prevention of Pythium root rot. Terrazole has been safe in our trials over the past 20 years with the notable exception of the vinca trial in which the damage was dramatic.

PlantShield HC also gave very good to excellent control of Pythium on geraniums but did not affect Pythium root rot on snapdragons.

Of the newer products, we have tested Heritage and

Insignia and Disarm O most in the past few years. These three strobilurins have given very good to excellent control on some crops (geranium and poinsettia) but no control on pansy (except Disarm O), ranunculus or vinca.

Of the newest registered products, we worked on Segway (cyazofamid) more in years past, but have included Adorn (fluopicolide) and FenStop (fenamidone) a few times recently. Sometimes Adorn and FenStop give very good control while at other times they have failed. Segway, in contrast worked more consistently on Pythium root rot in our trials (data not shown).

Cristi Palmer (IR-4 Project leader) prepared a summary of some recent IR-4 trials (ornamentals and vegetables) on Pythium root rot. These trials show very good to excellent control with Terrazole, Segway and Subdue MAXX. FenStop and Adorn provided some to good control overall. Heritage and Insignia

Fungicide	Rate/ 100 gal	Geranium	Gerber daisy	Pansy	Poinsettia	Ranunculus	Snapdragon	Vinca
Adorn	1, 2, 4 oz	E, G					N	
Disarm O	2, 4 oz	VG		VG	VG			
FenStop	7, 14 oz					VG		
Heritage	0.45, 0.9 oz	G, VGE		N	VGE, VG	N		
Insignia	8-12 oz	E, G, VG, VGE	E	N	VGE	N		N
Plant-Shield HC	4 oz	E, VGE					N	
Subdue MAXX	0.5-1.0 oz	P, S, N, VG, S, VG	P	VG	VG, E	E		G
Terrazole	6, 10 oz	VG, S, E, VG	VGE		E	E	E	phyto

usually provided good control. Mandipropamid (new active ingredient from Syngenta) was not effective on Pythium root rot. There are a number of experimental products which have worked very well in our Pythium root rot trials.

So there will continue to be a large number of fungicides in different MOA groups which can be used for treatment of Pythium root rot. **In most cases, prevention works better than eradication. But—not all plants are prone to Pythium and using any fungicide when not needed can result in damage to the crop and add costs. Use fungicides only when needed.**

This month we are summarizing our work on the biological control products containing *Trichoderma harzianum*—T-22. We have been working on PlantShield and RootShield for the past 13 years. Some of the trials were performed on soil-borne pathogens like *Pythium* while others were performed on foliar pathogens like powdery mildew. The PlantShield HC label indicates activity against a number of soil-borne pathogens (see table to the right) as well as *Botrytis* and mildews. Foliar uses of PlantShield HC are not legal in California. The label also prohibits tank mixing with benomyl (no longer legal for use on ornamentals in the US), imazilil (Fungaflor TR), propiconazole (Banner MAXX), triflumizole (Terraguard) and tebuconazole (no legal uses on production ornamentals). There is a one hour REI for foliar applications and a 0 hour REI for drench applications. Vegetables, ornamentals, herbs and spices are all listed as well as hydroponic uses.

Disease target	Plants tested	Results	Labeled for this use
Botrytis blight	poinsettia	Some	Suppressive
Crown gall (<i>Agrobacterium</i>)	aster, solidago	None	No
Cylindrocladium cutting rot	azalea, myrtle	None-good	Preventative
Fusarium stem rot and wilt	caladium, cyclamen, lisianthus	None-some	Preventative
Phytophthora stem rot	poinsettia, vinca	None-good	No
Powdery mildew	gerbera, hydrangea	None	Suppressive
	calla, geranium, pansy, snapdragon, oxalis, lily, lisianthus	None-excellent	Preventative
Rhizoctonia stem rot and damping-off	celosia, impatiens, poinsettia	None-very good	Preventative
Rust	snapdragon	None-excellent	No
Thielaviopsis (black root rot)	pansy, vinca	None	Preventative



Pythium and Fusarium root rot on lisianthus (above), Pythium root rot on geranium (bottom, right), and Cylindrocladium cutting rot on azalea (below).



Take note that even when PlantShield works very well the results can be variable. This is due to the fact that this is a living organism and creating conditions that are appropriate for best effect is not as easy as using a chemical fungicide which is far less affected by temperature, pH, potting medium nature and host plant. We have found over the years that certain plants respond very well to PlantShield including poinsettias and geraniums. The broad crop labeling makes this one of the only choices for some crops (herbs).

So are you a good enough grower to use biological controls? If you are using insect biocontrols already you are a great candidate for pathogen biocontrols. Keep good records of your conditions and how the product works for you. This is the best way to learn and grow into a successful biocontrol user. If I can get very good to excellent results in some of our trials, which are all inoculated, then you can too.

