

CHASE NEWS

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CHASE HORTICULTURAL RESEARCH, INC.

Partnerships in Our Research Trials

Chase Horticultural Research has been performing applied research trials for the past 10 years, completing an average of 100 trials annually. As the research director, I am in charge of deciding what work to do. Many times, we find partners in manufacturers of fungicides, wetting agents, plants and potting media. Companies come to us throughout the year with protocols in hand or we help develop them. About 50% of our trials in a given year are performed for one or more specific clients.

The rest of the work is performed to solve problems. Put more bluntly, only 50% are funded by an official contract. Sometimes, this work is on experimental or numbered compounds and it is performed under a confidentiality agreement. You never hear about some of these trials. At other times, we do work on numbered compounds that I write about in Chase News or present at grower meetings in a talk. I do this to keep growers up to date on developments in their industry. If I only wrote about labeled products and their labeled uses, I would minimize our potential for helping solve grower problems. I also have no doubt that sometimes these reports give rise to other trials that result in label expansion which benefits all of us.

Who supports contract work?

We work with a wide variety of companies. I have attempted to remember all of them off the top of my head in the table to the right. I apologize to anyone I forgot to include. As you can tell, these are not all BIG companies. They are not all chemical companies either and you probably have not heard of some of those on the list. We do not choose partners based on size, or amount of funding. We sometimes work with a company on a single treatment in a single trial. And in case you are wondering everyone pays the same amount for a piece of work. We do offer volume discounts for \$20,000 or \$30,000 in a calendar year.

The other 50%

I choose the rest of the work we do based on grower questions during talks, e-mail and site visits. Sometimes I do trials on many similar ingredients such as comparing coppers, strobilurins or sterol inhibitors. These types of trials are of interest to growers but rarely interest a chemical company. These trials are sometimes the ones that generate the most complaints since the manufacturers do not dictate how their products are tested or what they are compared to. For the next few issues, I will listing the source of funding for our trials, including the plant materials that are donated by so many growers.

AgraQuest	Jackson and Perkins
Aquatrols Corp.	JH Biotech
Agrium (Western Farm Service)	LABServices
Arysta (Arvesta)	Mellano and Company
BASF Corporation	Natural Industries Inc.
Bayer	OHP (Olympic)
BioWorks	Phyton Corp. (Source Technology Biologicals)
Cal Agri Products	Precision Laboratories, Inc.
CH20 Inc.	Prokoz Inc.
Chemtura (UniRoyal)	Rohm and Haas
Cleary Chemical	Roots (Novozymes)
Dramm & Echter	SePRO Corporation
EcoSMART Technologies Inc.	Syngenta Professional Products
FMC Corporation	Tessenderlo Kerley Inc.
Garden Rose Council	Valent U.S.A. Corp.
Gowan Company	Valent BioSciences
ISK BioSciences	Whitmire Micro-Gen

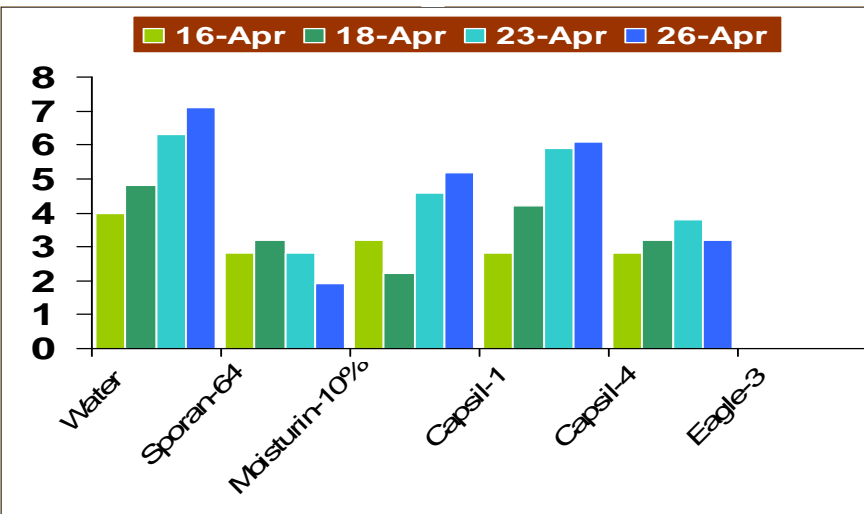
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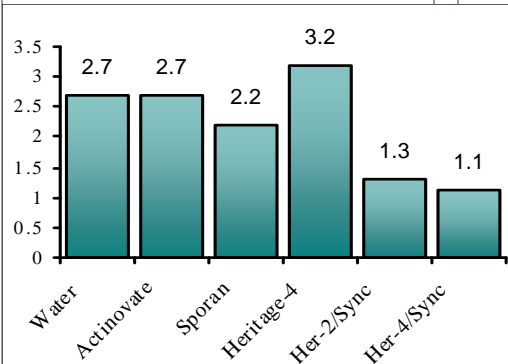
Wetting Agents Help Fight Disease

We have recently performed a couple of trials to help determine the benefits of using a wetting agent either alone or with a fungicide for control of rust and powdery mildew. We also included Sporan which is a combination of essential oils from EcoSmart and Moisturin (an anti-transpirant) from GSI Horticultural. The first trial was performed using hypericum rust (*Uromyces triquetrus*) as the test system and the second trial employed gerber daisy powdery mildew.

Healthy hypericum were treated with Actinovate (6 oz/100 gal), Sporan (64 oz), Heritage alone (4 oz) and Heritage at 2 or 4 oz combined with 16 oz/100 gal of the wetting agent, Sync. Plants were sprayed on 15 and 22 February and 1 and 8 March. They were inoculated on 20 February and rust was recorded on 13 March. Disease severity was rated on



Prevention of Gerber Daisy Powdery Mildew Rates are given in oz/100 gal. The number of leaves per plant with active powdery mildew is given on four dates.



Prevention of Hypericum Rust

Rates are given in the text. Disease was rated from 1 (none) to 5 (severe rust, leaf drop).

the following scale: 1 (no rust pustules), 2 (slight), 3 (moderate), 4 (severe) and 5 (leaf drop due to rust infection).

The only significant control of rust in this trial was seen when both Heritage and Sync were applied. Heritage alone was not effective (we have seen this before with this rust). The 4 oz rate of Heritage combined with the 16 oz rate of Sync provided nearly perfect control while the 4 oz rate of Heritage alone gave no control of hypericum rust.

The powdery mildew trial on gerber daisy was started before infection occurred with plants sprayed on 4-3, 4-17 and 4-23. We recorded the number of leaves with powdery mildew on 4-16, 4-18, 4-23 and 4-27.

As the graph (above) shows, the water control rapidly became 100% infected with all leaves showing active sporulation by the end of the trial. Sporan did give some suppression that improved with each application. The 1 oz rate of Capsil alone did not provide any control, while the 4 oz rate did slow powdery mildew development down somewhat. Moisturin (applied at 10% v/v) also slowed disease development. The spray interval was initially 14 days and was apparently too long for the severity of disease present for all products except Eagle. This fungicide (Systhane) provided complete prevention when used at 3 oz/100 gal. There were no signs of any growth regulator response to Systhane and all other products were as safe as the water control.



Powdery mildew on Gerber Daisy

These two trials do show that some diseases can be controlled with non-traditional products such as wetting agents, oils and anti-transpirants. In the case of rust, we have found that adding a wetting agent can be the difference between excellent control and no control even with one of the most effective rust fungicides—Heritage. In this case, we also saw that including one helps in prevention as well as eradication. Indeed unless you are a magician, sometimes prevention turns into eradication overnight. Changing weather conditions drive most diseases and they are certainly not in our control and often not predictable. Be sure to check all labels for legal uses on your crops, in your growing conditions, in your state.

Thanks to our Supporting Partners

Coast Nurseries, EcoSmart, GSI Horticultural, Mellano & Company, Natural Industries, Precision Industries, Raker and Sons

Downy Mildew—Tips From Another Industry

I often read articles on crops other than ornamentals since a lot of the fungicides used in vegetables are eventually registered for ornamental use. In February, a review article on downy mildew on lima beans was published (*Plant Disease* 91(2):128-135). Downy mildew on lima beans is caused by *Phytophthora phaseoli*. The authors related the history of the disease in the Mid-Atlantic region as well as a description of a forecasting system to time fungicide sprays. They also presented an overview of the efficacy of a number of important active ingredients that were tested in the field. I present here a brief summary of this table to the right.

The most consistent product in their trials was mefenoxam mixed with copper hydroxide (Ridomil Gold Copper). We do not have an equivalent in ornamentals. Phosphorus acid salts were just as successful. A few examples of these in ornamentals include Aliette, Alude, Vital,

Active ingredient	No. successful trials/ total trials
Mefenoxam and copper hydroxide	8/8
Phosphorus acid salts	6/6
Copper hydroxide	7/8
Basic copper sulfate	1/1
Azoxystrobin	4/6
Pyraclostrobin	3/5
Dimethomorph	1/2

Nutriphyte, Magellan and Fosphite (K-phite). Copper products were also very effective. The strobilurins, azoxystrobin (Heritage in ornamentals) and pyraclostrobin (Insignia in ornamentals) and dimethomorph (Stature DM in ornamentals) were somewhat less frequently tested, but were very effective. The cost of application clearly affected use as mefenoxam, copper and phos acid salts can be less expensive than the newer strobilurins or dimethomorph. These results are substantially similar when compared to the same ai (where possible) to those we have seen on ornamentals. Remember that mefenoxam is not currently labeled for use as a foliar spray for downy mildew although it is labeled for Ramorum Blight. Remember to always follow the label—it is the LAW!!!

Anthracnose on Euonymus—Which One is it?

One of the most important diseases in woody ornamentals especially is called anthracnose. One would assume that anthracnose on Euonymus on the East Coast, in the plains states and the West Coast would all be caused by the same pathogen. But one would then be wrong. Nearly all of the research that has been reported on euonymus anthracnose has been performed with *Colletotrichum gloeosporioides*. This is the same fungus that I worked on at the University of Florida. This is not the fungus that has been causing the disease in California. In this case the fungus is *Phoma* (=Phyllosticta). While we find *Colletotrichum* on other woody ornamentals I have not seen it on Euonymus.

In recent years, a group of researchers at Oklahoma State University have been working on anthracnose on *Euonymus fortunei* 'Emerald Gaiety', 'Canadale Gold' and 'Emerald 'n Gold'. Products included in the trial were Phyton 27 (5-8 oz/100 gal), Protect (24 oz/100 gal) and ZeroTol (14 oz/100 gal). Their work showed highest levels of disease in 'Emerald 'n Gold' and lowest levels in 'Canadale Gold'. The fungicides were applied weekly but were not effective. Our experience with Phyton 27 has been very good on many diseases but the rates chosen would have been at least 15 oz/100 gal. The rate of Protect applied was consistent with labeled use rates. Research has shown that the use rate of ZeroTol should be 0.5 to 1% compared to the 0.1% used in this trial. So perhaps the use rates compromised the efficacy of these products. For a full report see: Boyer, Cole and Conway. 2007. *J. Environ. Hort.* 25(1):21-26.

Anthracnose Fungicides

A research article was published last fall by Koike et al. including chemical control of *Phoma* basal rot on lettuce. (*Plant Disease* 90:1268-1275). *Phoma* and *Phyllosticta* are very similar and sometimes used interchangeably. The research reported by Koike et al. was a summary of two field trials (2002 and 2003). The table below shows a summary of their results.

The best control was achieved with a combination of pyraclostrobin and boscalid (under development for ornamentals by BASF). Cyprodinil and fludioxinil provided very good to excellent control (under development by Syngenta as Palladium). The three strobilurins alone provided good to very good control. Azoxystrobin is labeled as Heritage, trifloxystrobin is labeled as Compass or Compass O and pyraclostrobin is labeled as Insignia for ornamentals. Iprodione (labeled as Chipco 26019/Chipco 26GT) provided good to very good control. We will report on a trial on euonymus with *Phoma/Phyllosticta* in a couple of months.

Active ingredient	Control
Pyraclostrobin and boscalid	Excellent
Cyprodinil and fludioxinil	Very good to excellent
Azoxystrobin	Very good
Trifloxystrobin	Good to very good
Pyraclostrobin	Good to very good
Iprodione	Good to very good

Euonymus Anthracnose –*Phyllosticta/Phoma*

I have been hearing about difficulties in controlling anthracnose on woody ornamentals over the past few years. It appears that disease does not become severe until late in the production cycle—often in the second year. Many anthracnose diseases start as leaf spot diseases during propagation. The symptoms then appear to disappear (they are not noticed) until the disease progresses to the stage where it causes dieback and sometimes kills the plant outright.

We started a trial on *Phyllosticta/Phoma* anthracnose on February 2, 2007. One of the local nurseries gave us some beautiful rooted cuttings of *Euonymus fortunei* ‘Emerald ‘n Gold’. As we transplanted them we found a very low level of anthracnose symptoms in most cuttings. We sprayed the plants with the fungicides and rates listed in the table to the right. We had one treatment that was applied as a drench at the rate of 50 ml/4 inch pot (Lynx drench). The applications were made 6 times on a 14-day interval. To promote disease development, plants were placed on a bench in a greenhouse where they were misted for 30 sec/30 minutes for 12 hr/day.



In as short a time as one month, we saw significant stunting of the cuttings sprayed with Concert and Banner MAXX. Concert is a combination of propiconazole (the same active ingredient as in Banner MAXX) and chlorothalonil (the same active ingredient as in Daconil). Apparently this *Euonymus* cultivar is sensitive to the rate of propiconazole. By the end of the trial, top grade was best for plants receiving water (control), Heritage, Medallion, Lynx (spray and drench) and Clevis. The only treatments that were significantly lower in top grade than the water sprayed controls were Concert and Banner MAXX.

The only treatment that provided statistically significant reduction in *Euonymus* anthracnose was Eagle. Insignia, Medallion and Lynx each provided some reduction in anthracnose. Concert and Compass O did not provide any discernable control in this trial. Disease pressure was relatively low in this trial. Small differences during propagation can become large differences later in production.

We are planning to do another trial on this disease and will include the formulation of pyraclostrobin and boscalid (BASF) as well as cyprodinil and fludioxinil

Effect of fungicide sprays on growth and *Phyllosticta/Phoma* anthracnose severity on *Euonymus*

Treatment	Rate/100 gal	Top grade	No. leaves with spots
Water	—	3.9 cde	3.8 bc
Concert	16 oz	3.2 ab	3.7 bc
Heritage	4 oz	3.8 cde	2.4 abc
Compass O	4 oz	3.6 bcde	3.4 abc
Insignia	10 oz	3.5 abcd	1.9 ab
Medallion	4 oz	4.0 de	2.0 ab
Banner MAXX	6 oz	3.2 a	2.1 abc
Eagle (Systhane)	4 oz	3.4 abc	0.8 a
Lynx	8 oz	4.0 de	1.6 ab
Lynx drench	2 oz	4.1 e	3.0 abc
Armada	6 oz	3.4 abc	2.6 abc
Terraguard	8 oz	3.5 abcde	4.7 c
Clevis	16 oz	3.8 cde	2.4 abc



(Palladium-Syngenta) that did so well on *Phoma* on lettuce (see previous page). This trial did show very good activity with pyraclostrobin alone (Insignia) and fludioxinil alone (Medallion). We will certainly include Eagle in the next trial and perhaps increase the rate of 6 oz/100 gal (highest labeled rate). If you have any other ideas of fungicides to include I would be glad to hear them.

Thanks to our Supporting Partners

Bayer and Prokoz