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CHASE RESEARCH GARDENS, INC.

CHASE NEWS

Introducing Fenstar

Sometime soon we will be seeing the launch of a new fungicide for ornamentals called Fenstar. We started working with this fungicide in 1999 for control of Pythium root rot, Phytophthora aerial blight and downy mildew on some ornamentals. Over the past 8 years, Rhone Poulenc-Aventis-Bayer and finally OHP have continued to trial this new fungicide on these serious ornamental diseases.

Fenstar (AKA Fenomen) has reduced risk status as many of the other imidazolinone fungicides. The strobilurin fungicides including Heritage, Compass O, Cygnus and most recently Insignia are closely related products. While they have shown very good to excellent control of downy mildew they are not my first choice for a Phytophthora or Pythium product. That is one big difference with Fenstar compared to the strobilurins.

Fenstar has low toxicity for bees, birds and earthworms but is moderately to highly toxic to fish. Its half life in soils is less than two weeks and it has a low leaching potential. When applied to the soil, the product is upwardly systemic and locally systemic (translaminar activity) when applied to leaves.

Original testing targeted rates of 14 to 42 oz/100 gal but since then much lower rates have been found very effective in some cases. Most trials compared Fenstar to Aliette and/or Subdue MAXX as two of the most commonly used fungicides for Pythium and Phytophthora diseases. Our first trial on Phytophthora aerial blight showed 100% prevention with all three rates of Fenstar when sprayed on a weekly interval. The second year, we tried the same rates but applied the product on a 14-day spray schedule. This time we saw slight symptoms develop, especially at the 14 and 28 oz rates. The higher rate was necessary to extend the interval of treatment from 7 to 14 days.

We also tried out a Pythium root rot on geraniums. The best treatment was Fenstar applied monthly at 14 oz/100 gal.

We also started trials for downy mildew control in 1999 and continued for the next four years. The first two trials used the same rates as those employed for Phytophthora and Pythium control but by 2002 the rates for downy mildew control had dropped dramatically from 14-42 oz/100 gal to 5-7 oz/100 gal. The first snapdragon trial was applied on a 14-day interval with 100% prevention at all rates tested. The Alyssum trial also showed 100% prevention when applied on a 7-10 day interval. This was interesting but not especially exciting until our 2002 pansy downy mildew trial. This time, the protocol called for drench, sprench and spray application of much lower rates (5 to 7 oz/100 gal). Imagine my utter shock and enthusiasm when we saw that even a 5 oz drench gave 100% prevention of this downy mildew.

In 2003, we tested Fenstar at 7 oz/100 gal as a spray for downy mildew prevention in a snapdragon trial in our greenhouses and a field trial on Limonium cut flowers with Buzz Uber and Mellano and Company in southern California. In this case, disease was already present and active when we started the trial. Buzz sprayed the plants on a weekly interval four times. Best plant growth was found when they were sprayed with Subdue MAXX and Dithane T/O (1 oz and 16 oz/00 gal, respectively) or Fenstar with or without Dithane T/O (7 oz and 16 oz/100 gal, respectively).

We are currently testing Fenstar as a tank mix partner with various other fungicides in a Phytophthora root rot trial on myrtle and plan to do additional work on azaleas with Pythium root rot.

Remember to rotate Fenstar with other fungicides (not strobilurins) to maintain its efficacy on ornamental diseases.

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Controlling Seed-borne Diseases with a Drench

In March, we reported on a fungicide trial for control of Cercospora leaf spot on the cut flower crop, *Molucella* (Bells of Ireland). When we checked two lots of seed we found a very high recovery of *Cercospora apii*. The fungicide trial we preformed on infected plugs demonstrated that while several products could prevent disease, once infection occurred, only thiophanate methyl (3336) was able to stop the disease.

With all of the contaminated *Molucella* seed burning a hole in my pocket so to speak, we decided to try a drench treatment right after planting the seed. We planted 15 seeds per 3.5 inch pot followed immediately by a fungicide or water drench. The fungicides and rates we chose are listed in the table to the right. We chose products that had performed well in preventing Cercospora leaf spot in the March trial. We recorded final germination 3 weeks after sowing the seed and saw the first signs of Cercospora leaf spot about 2 weeks afterward.

It was immediately obvious that all of the fungicides improved seedling emergence although the 8 oz rate of 3336 was not quite as effective as the other products tested. Initially, Heritage delayed emergence but by the final germination count the seedlings were equal in size to the others.

Only 3336 prevented disease development 100%. The two strobilurins, Heritage and Insignia were statistically equal to 3336 but a few spots did develop on these treatments. Unfortunately, Medallion and Phyton 27 failed to reduce development of Cercospora leaf spot when used as a drench at sowing.

Since the leaf spot took five weeks to become obvious, if we had not applied an effective fungicide drench at seeding, we would have been fighting the disease with very few choices since many of the best fungicides must be used preventatively on this disease. Knowing when to treat is as important as knowing what to treat with.

Fungicide	Rate/ 100 gal	No. seedlings/ pot	No. spots/pot
Water	——	5.5 a	2.8 b
3336	8 oz	7.2 ab	0 a
3336	16 oz	8.8 b	0 a
Medallion	2 oz	8.9 b	3.3 b
Phyton 27	25 oz	8.8 b	4.4 b
Heritage	0.9 oz	9.7 b	0.4 a
Insignia	4 oz	8.1 b	0.9 a

Numbers in the same column followed by different letters are statistically different.

What if you do not grow *Molucella*? This work may be able to be applied to other seed-borne diseases like *Alternaria, Xanthomonas* and *Pseudomonas*. In the upcoming months I will be looking for other opportunities to test the idea of a strategic drench for control of seed-borne pathogens. This appears to be an effective way to control some seed-borne diseases.

Eradicating Hypericum Rust

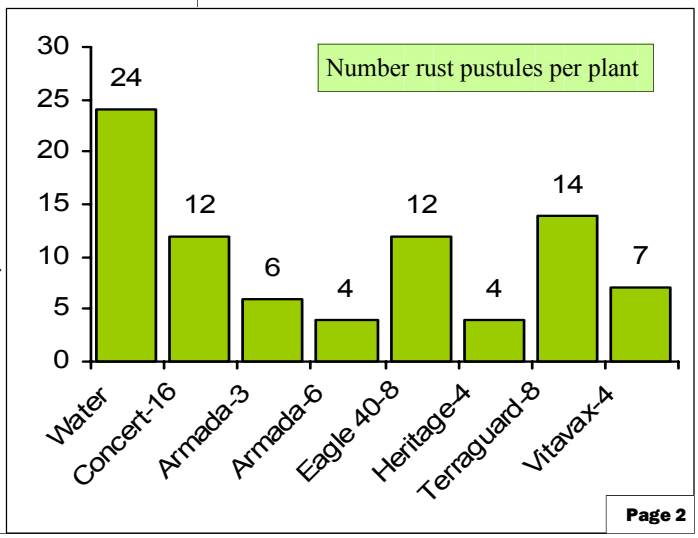
Last fall, we attempted to infect some Hypericum with rust (*Uromyces triquetrus*) and failed utterly. We spent months spraying with fungicides and re-inoculating before we gave up. In January, we acquired some new Hypericum cuttings that had a very low level of rust already and started the trial again. This time we succeeded since we finally found a susceptible cultivar.

We sprayed fungicides three times on a weekly interval. Products and rates (in oz/100 gal) are given in the graph. We rated number of rust pustules, plant height and chemical residue on leaves. Since Hypericum are grown as a cut foliage/flower, the effect of fungicides on plant growth is critical.

We found that several products caused significant reduction in plant height. These included Armada (a combination of triadimefon and trifloxystrobin under development by Bayer and OHP), Terraguard and Vitavax (both form Chemtura). Sterol inhibitors like triadimefon (Strike) and triflumizole (Terraguard) are well-known for PGR effects on some crops. This might be a desirable or undesirable response depending on harvesting schedules.

None of the fungicides caused residue at levels that would affect marketability but several were significant including Concert (a combination of chlorothalonil and propiconazole under development from Syngenta), the higher rate of Armada and Eagle 40WSP.

Finally, we rated rust pustules. The best control of Hypericum rust was achieved with both rates of Armada, Heritage and Vitavax. Older growers will remember using Plantvax (a close relative of Vitavax) for rust control. Concert, Eagle and Terraguard were statistically the same as all other fungicides in this trial. We are doing two more trials on this rust now and will report their results soon. With rust diseases on the rise, new fungicides are welcome!



Botrytis Eradication on New Guinea Impatiens

Occasionally (rather more often than we like) we have to do a trial more than once to obtain an acceptable level of disease for proper evaluation. Some of the worst offenders in the disease realm are *Pythium* and *Botrytis*. One would think this situation could not occur with two such prevalent diseases but we often grow better plants than disease.

After a couple of dismal failures we obtained some New Guinea Impatiens cuttings complete with grower generated Botrytis. We applied fungicides three times on a weekly interval and rated severity of Botrytis weekly. Treatments included an experimental product at different rates (4, 8 or 16 oz/100 gal) and intervals (14 and 21 days). We also tested another experimental combination 26/36 (Iprodione and thiophanate methyl—under development by Cleary Chemical) at 34 oz/100 gal. Phyton 27 was compared to New Dimension (Phyton Corp.) each at 15 oz/100 gal and Zerotol was compared to STBX-013 (a similar product under development at Phyton Corp.).

All of the rates Exp. A were very effective at eradicating active Botrytis whether used every 14 days or every 21 days in this trial. In contrast, none of the other products gave any significant control and some of them actually increased severity of Botrytis on these New Guinea Impatiens.

Treatment	Rate per 100 gal	No. leaves with Botrytis
Water	—	1.1 ab
Exp. A (14 or 21 days)	4-16 oz	0.1 a
26/36	34 oz	1.8 bc
Phyton 27	15 oz	1.2 ab
New Dimension	15 oz	1.0 ab
Zerotol	1% once then 0.33%	2.4 c
STBX-013	0.2% once then 0.1%	1.9 bc

Numbers followed by different letters are statistically different according to Duncan's New Multiple Range Test.

The most significant increase was seen with use of Zerotol which was applied once at 1% then twice more at 0.33%. The experimental peroxide type product, STBX-013 was applied once at 0.2% and then twice at 0.1% with much the same result. Don't let anyone tell you that spraying an ineffective product won't hurt. We have seen time and again that if you cause damage to a plant, Botrytis will take over and cause worse problems than if you have sprayed nothing at all.

Ranunculus flower bud mummified by *Botrytis* (left)

Effect of Fungicides *in vitro* on Growth of *Botrytis cinerea*

In the past year, we have tested the effect of fungicides for *Botrytis* on growth of a variety of isolates *in vitro*. Petri dishes with culture media amended with various fungicides are inoculated with an isolate of Botrytis and the growth measured after 4-7 days. We tested most of the best Botrytis fungicides against eight isolates of *B. cinerea* from ornamentals. The fungicides, rates used and average percent growth reduction are given in the table below. We collected these eight isolates over the past three years from California growers (azalea, chrysanthemum, crossandra, lily, salvia, kalanchoe and vinca).

Product	Rate/ 100 gal	Percent reduction
Chipco 26019	16 oz	82
Daconil Ultrex	1.4 lb	52
Decree	16-24 oz	63
Heritage	4 oz	22
Insignia	16 oz	62
Medallion	4 oz	97

Medallion was the most effective at controlling nearly all growth on the medium but it actually resulted in death of the pieces of Botrytis that were placed on the plates. This was not true of the other fungicides tested even when they provided 100% growth control. Chipco 26019 provided the next best control. The two strobilurins were less effective than Medallion and Chipco 26019. Heritage was least effective of those products with the 1 lb rate of Insignia equal to Decree and Daconil Ultrex. Our results show that it is unlikely any of the Botrytis isolates tested were resistant to these six fungicides.

Botrytis Fungicides

Chipco 26019, Chipco 26GT and Sextant (Iprodione)

Decree (Fenhexamid)

Daconil Ultrex, Daconil Weatherstik (chlorothalonil)

Medallion (fludioxinil)

Phytophthora ramorum and Other *Phytophhora* spp. on Woody Ornamentals

Linderman, Davis and Marlow reported in the most recent issue of HortTechnology on their work with different species of *Phytophthora ramorum*. These USDA researchers collected a large number of *Phytophthora* spp. from Oregon woody ornamentals and tested them on plants known to be susceptible to *P. ramorum*, the cause of Ramorum Blight and Sudden Oak Death.

They tested 16 isolates of *P. ramorum* and one each of *P. cactorum, P. cinnamomi, P. citricola, P. ctitrophthoa, P. hevea, P. nicotianae*, and *P. syringae*. The table to the right summarizes responses of a wide range of woody ornamental crops to all eight species of *Phytophthora*.

The researchers also compared the different *Phytophthora* spp. for their ability to cause disease. They were ranked as follows: high (*ramorum*), medium (*citrophthora, cactorum*), low (*citricola, nicotianae, heveae, cinnamomi* and *syringae*). Since only one isolate of each was tested, results could differ with other isolates.

Linderman et al. concluded that there is significant interaction between specific isolates of Phytophthoras and specific woody plants. It is obviously best not to conclude that all Phytophthora diseases in a nursery are caused by *P. ramorum*. Get all suspected isolates tested by reputable labs.

See HortTechnology 16(2):216-224 for the full report.

Response of ornamentals to Phytophthora species

Highly susceptible	Moderately susceptible	Slightly susceptible	Nearly immune
'Nova Zembla' rhododendron	'PJM' rhododendron	'Unique' rhododendron	Japanese spurge
Kinnikinick	Mountain-laurel	California bay	English holly
Cherry Laurel	Laurustinus	Evergreen huckelberry	David viburnum
Lilac	Japanese pieris	English laurel	European cranberrybush viburnum
Bodnant viburnum	Portuguese laurel	Fraser photinia	
Spreading cotoneaster		Koreanspice viburnum	
		European carpinus	
		Salal	

Downy Mildew on Coleus

I have been hearing (and seeing) more and more about Coleus downy mildew in the past three months. It appears to be present on both cutting propagated and seed propagated *Coleus* spp. Margery Daughtrey (Cornell University) has been working on this relatively new downy mildew as well as other researchers in the southern US and in Switzerland. The pathogen was originally identified as *Peronospora lamii* which has been found on *Salvia* spp. for a number of years.

The Swiss researchers (Belhahri, Pawlowski and Lefort) reported on a new downy mildew on basil. Since basil is in the mint family these researchers used genetic PCR testing to compare the basil downy mildew with *P. lamii*. The test showed that the basil pathogen is not *P. lamii* but a new species. Margery was able to have her strain of downy mildew from Coleus tested and it is probably not *P. lamii* but is related to the basil downy mildew. The most important aspect of this information is that the Coleus strain may infect basil and not salvias.

See Mycol. Res. 109 (11): 1276-1287 for a full report.

Alternaria Leaf Spot on Pittosporum

We have begun testing a product called Clevis that I reviewed a few months ago. This product is a combination of myclobutanil and mancozeb and was called Manhandle at one point in its development.

The first trial we have completed was for prevention of Alternaria leaf spot on pittosporum. In our early work, we found very good control of this disease with Clevis. In the current trial we included rates of 16 and 32 oz with or without an adjuvant called Sync. We compared these treatments to Medallion at 2 oz/100gal. The fungicides were applied four times on a weekly interval.

All of the fungicides provided excellent prevention of Alternaria leaf spot in this trial. Clevis alone at 16 or 32 oz/100 gal and Medallion (2 oz) were 100% effective. The potential for benefits from the addition of Sync could not be determined since the fungicide alone was 100% effective.

We are doing a test now on eradication of Hypericum rust to determine benefits of Sync. It is especially important to include a wetting agent when attempting eradication of a rust disease since this is the only way that the fungicide can penetrate the pustule.

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