

ALL SPRENCHES ARE NOT CREATED EQUAL

I recently attended the 15th Annual Western Plant Growth Regulator (PGR) Society meeting in Sacramento, California. The speakers were very informative and got me thinking of some connections between PGR products and fungicides. For one thing the terminology used to describe applications is the same—spray, sprench and drench. However, the way these terms relate to each other for PGR used is different than the way they are used for fungicides.

For a PGR, the key issue is the total active ingredient applied to the plant. If it is applied as a sprench the amount of material to apply is recommended to be twice that of a spray application. Thus if 1 gallon is used for a spray then 2 gallons should be applied to the same area for a sprench. If the amount of the active ingredient for the spray is 1 oz then the recommendation is 1 oz per 2 gallons for a sprench. That means that although the amount of water (spray solution) may be doubled, the amount of active ingredient delivered to the crop remains constant.

I started thinking how different this is from fungicide use and wondered why. For example, the Heritage label gives directions and use rates of drench, sprench and spray applications. Sprays as high as 2 and 4 oz/100 gal, sprenches of 0.9 and 1.8 oz/100 gal and drenches of 0.45 and 0.9 oz/100 gal are described. Why the difference?

The most likely answer is that a spray of Heritage might be used for *Alternaria* leaf spot, a sprench for *Rhizoctonia* stem rot and a drench for *Pythium* root rot. These are three very different targets for the same active ingredient and the rate needed (concentration) differs considerably. Unfortunately, the choice of specific rates on the label does not always rely solely on testing to identify the most effective rate for each disease. Sometimes environmental concerns (due to leaching) or pricing can influence labeled rates.

In contrast some fungicides can be applied as sprays, sprenches and drenches as a means of delivery only. A good example would be thiophanate methyl like Cleary 3336, Fungo formulations and OHP-6672. When I worked at the University of Florida I did some testing with a well-

thora. The test involved spraying the product on the leaves and rinsing in to the potting medium where the action against the pathogens occurred. Unfortunately, phytotoxicity was a concern when the product was applied in a concentration that would deliver sufficient control when washed off and into the potting medium.

Sometimes the goal is ease of application. Sprays are by far the easiest to apply and often thought to be the least expensive. This is really a poor way to apply products to roots for control of *Pythium* or *Fusarium*. If you are trying to prevent root rot then a drench is suggested in most cases. One clear exception to the rule is Aliette. This product is systemic and can be applied as a spray and achieve control of root rot. It can also be applied as a drench for root rot control (*Pythium* and *Phytophthora*). It is interesting that over the past 20+ years of testing Aliette I have come to the conclusion that the best rate for disease control is 16 oz/100 gal whether applied as a spray or a drench. This rate is lower than recommended for sprays and higher than recommended for drenches (see label).

Sprences can be substituted for drenches when the product can be later moved throughout the potting medium using water alone. This method is often used to fertilize plants. Since our fertilizer components are water soluble and/or move well with water this is very effective. Trying this with a fungicide that does not move well in water will likely not be very effective. The concentration of the product per 100 gal would need to reflect the reduction in volume needed to sprench vs. drench. For example we use about 40% less volume in our sprenches than we use for a full pot drench. That means the active ingredient would be more than twice as concentrated in a sprench as a drench. The Heritage label reflects this

I think sprenches are best saved for stem or crown diseases. This would apply to *Rhizoctonia* and *Sclerotinia*. A sprench delivers the fungicide to the site of the infection directly. Remember that the spray crew often applies fungicides, insecticides and PGRs. Make sure that you understand the rates to use of each product in sprays, sprenches and drenches and explain it thoroughly. Some growers assign PGR application to one or two individuals the keep confusion to a minimum.

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The Newest Products for *Phytophthora*, *Pythium* and *Peronospora*

During the past year or so quite an effort has been made to research new products that target *Phytophthora*, *Pythium* and *Peronospora* (a downy mildew fungus). There are new phos-acid products that have been registered as fungicides including Vital (Griffin L.L.C.) and Alude (Cleary Chemical). In addition, SePRO has registered Stature DM. There are also some products in the experimental phase - Ranman (ISK BioSciences) and Fenomen (Bayer-Olympic). The table to the right shows a summary of some of the work that has been conducted nationally on some of these new products.

Stature DM (for downy mildew) has EPA registration but has not been marketed yet. A combination of dimethomorph and mancozeb, Stature MZ, was labeled a couple of years ago by SePRO Corporation. This product was not registered in California due to the mancozeb component but we are looking forward to registration of the dimethomorph formulation as Stature DM (for downy mildew). Dimethomorph is excellent for preventing and eradicating downy mildew and also preventing *Phytophthora*. Although, *Pythium* is related to *Peronospora* and *Phytophthora*, Stature does not control it.

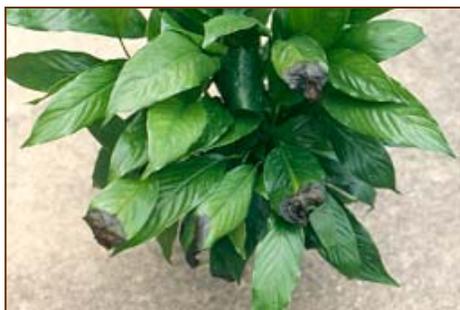
Another new product for this serious group of pathogens is fenomen. This product is in the same general chemical class as Compass O, Cygnus and Heritage but is not a strobilurin. Fenomen (Fenamidone) will likely be marketed to ornamental producers by Olympic Horticultural Products. Field and greenhouse trials with fenomen for downy mildew have been good to excellent. In addition, *Phytophthora* control has usually been excellent although failures have occurred in our trials. The single trial on *Pythium* root rot showed excellent results.

Product	Pathogen	Degree of control
Alude	Downy mildew (<i>Peronospora</i>)	Excellent (based on one trial)
	<i>Phytophthora</i>	Very good
	<i>Pythium</i>	Some
Bio-Phos	Downy mildew (<i>Peronospora</i>)	Excellent (based on one trial)
	<i>Phytophthora</i>	Very good
	<i>Pythium</i>	None (based on one trial)
Fenomen	Downy mildew (<i>Peronospora</i>)	Very good-excellent
	<i>Phytophthora</i>	Very good-excellent
	<i>Pythium</i>	Very good-excellent
Ranman	Downy mildew (<i>Peronospora</i>)	Excellent (based on one trial)
	<i>Phytophthora</i>	Very good
	<i>Pythium</i>	Very good
Stature DM	Downy mildew (<i>Peronospora</i>)	Excellent
	<i>Phytophthora</i>	Excellent
	<i>Pythium</i>	None
Vital	Downy mildew (<i>Peronospora</i>)	Excellent (based on one trial)
	<i>Phytophthora</i>	Very good
	<i>Pythium</i>	None (based on one trial)

Ranman is another experimental product with activity against *Peronospora*, *Phytophthora* and *Pythium*. We have worked on this product for two years with very good to excellent results on *Pythium* root rot and *Phytophthora* aerial blight and root rot. Most recently we tried Ranman for prevention of downy mildew on stock (*Matthiola*). It was 100% effective at preventing disease at all rates tested. Additional trials on downy mildew control are planned for Ranman this season on other crops.

I am looking forward to having some new products to recommend for control of this group of plant pathogens. The need for new rotational partners grows with each season as resistance to mefenoxam spreads. Until the past two years I would not have thought controlling *Pythium* root rot would be so difficult. Terrazole (etridiazole) has been effective in most of our trials (geranium, Lisianthus and snapdragon with *Pythium* resistant to mefenoxam). For sensitive isolates, Subdue Maxx remains an excellent choice.

Phytophthora leaf spot on Spathiphyllum



Pythium root rot and blight on Pansy



Peronospora (downy mildew) on Scabiosa



SAFETY OF SOME PHOS-ACIDS ON PANSY

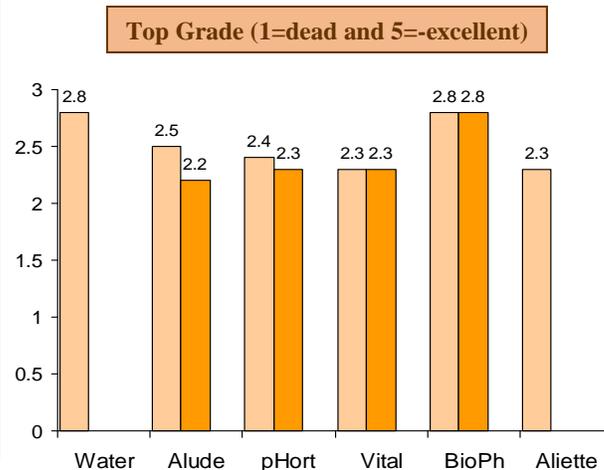
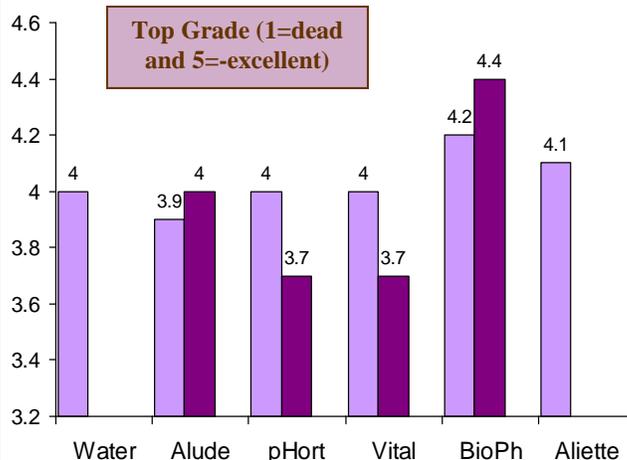
Use of phosphorous acid products like Alude, Bio-Phos, Nutriphyte, pHortress and Vital is gaining ground in many portions of the ornamental industry. Grower experience is increasing but still minimal with respect to crop safety. Phytotoxicity on small bedding plants can be devastating. Since Pythium root rot often appears as stunting, yellowing of lower leaves and slow growth due to root damage, it is easy to confuse this disease with phytotoxicity caused by using too high a rate of the phos-acid fungicides and fertilizers.

We started a trial in November to evaluate low and high rates of four phos-acid products on 'Crown Blue' pansies. Plants were established in 3.5 inch pots containing Sunshine No. 1 and top-dressed with Osmocote Plus 15-9-12. A water-treated control and Aliette (16 oz/100 gal) were included for comparison. Rates were as follows: Alude (32 and 64 oz), pHortress (48 and 64 oz), Vital (48 and 64 oz) and Bio-Phos (48 and 64 oz). All products were applied as drenches (one pint per square foot surface area) five times on a 14-day interval.

Plant height, top grade and root grade were all recorded during the trial and at the end. The two graphs to the right show the final data for top grade (purple-top) and root grade (orange-bottom). Both were rated on the following scale: 1 (dead), 2 (poor), 3 (good), 4 (very good) and 5 (excellent).

Top grade was very good for all products used at the lower rate but decreased slightly when either pHortress or Vital was used at the higher rate (64 oz/100 gal). Best overall top grades were found on plants treated with either rate of Bio-Phos. Root grade was also best on Bio-Phos treatments (same as the water treatment). All other treatments showed a lower root grade than the water treated plants. It is important to realize that top growth does always reflect root growth.

Higher rates of some phos-acid products may cause phytotoxicity on some young plants. These products should be treated the same as any new fungicide by testing rates on a small number of sensitive plants before wide scale use in your operation.



Sudden Oak Death/Ramorum Blight Update

In a recent Disease Note, Parke et al. reported on some new hosts of the sudden oak death pathogen *Phytophthora ramorum*. This disease is also reported as Ramorum Blight in European forests and landscapes. The authors examined plants in woody ornamental nurseries in both Oregon and Washington last summer. They isolated the pathogen from *Viburnum bodnantense*, *V. plectatum* var. *tomentosum*, *Pieris japonica*, *Camellia sasanqua*, *C. japonica*, and *Rhododendron*.

The isolates they recovered were related to others originally from both North America and others from Europe. Further testing proved that the pathogens could cause the disease on these new hosts. Limiting further spread of this devastating disease throughout North American nurseries and landscapes is the focus of a major USDA effort. See the original report for specifics on this work (Plant Dis. 88:64). If you would like more information on this disease, please contact us via e-mail (MTAUKUM@aol.com).

Plant Oils and Extracts for Phytophthora Aerial Blight on Vinca

Phytophthora aerial blight on vinca and other bedding plants is caused by *Phytophthora nicotianae* (= *P. parasitica*). The disease is sometimes reduced through use of fungicides like Aliette, Subdue Maxx and Terrazole during production but can cause serious problems in the landscape if it is introduced. Bowers and Locke recently reported work they performed on use of plant oils and extracts for control of this disease.



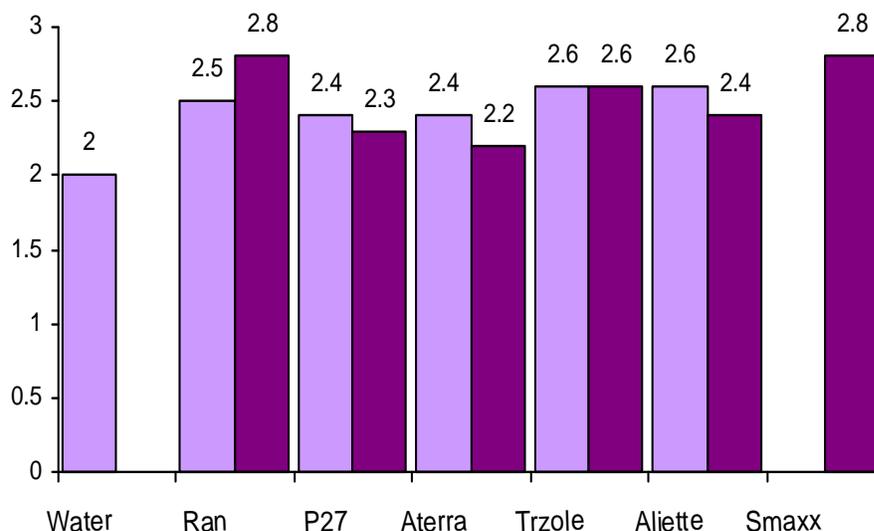
Clove oil, pepper extract-mustard oil (Champon's Insect Control), cassia extract and synthetic cinnamon oil (Cinnamite) reduced populations of the *Phytophthora* in the potting media. Neem oil (Triact 90EC) and metalaxyl (Subdue 2E) failed to reduce populations of the pathogen in the same trial. In a greenhouse trial, the pepper extract-mustard oil, a cassia extract and the cinnamon oil controlled aerial blight on vinca. Some of these products remain on the market for other uses while others have been discontinued. For a full description of the work please see Plant Disease 88:11-16 (2004).

PYTHIUM ROOT ROT CONTROL ON ASIATIC LILY

Asiatic lilies are an important cut flower crop. They are also gaining importance as a seasonal pot crop. Under both production systems, the most common disease problem is *Pythium* root rot. We obtained some bulbs from a cut flower producer in San Diego and started a pot trial for control of *Pythium* root rot. The bulbs were already infected with *Pythium* spp. so we started the trial by planting them in 6 inch pots containing Sunshine No. 1. They were top-dressed with Osmocote Plus 15-9-12 and grown in a greenhouse with minimum temperatures of 55 F. They were drenched monthly with a variety of fungicides (see caption under the graph for details). We evaluated the plants after three months. Root development was rated on the following scale: 1(none), 2 (poor), 3 (good), 4 (very good) and 5 (excellent).

Best roots were found on plants treated with Ranman (3 oz/100 gal) or Subdue Maxx (1 oz/100 gal). Poorest roots were found on the water-treated plants or the 1% rate of Agri-terra (graph—right). The 1% rate of Agri-terra may have been too high for the lily roots in this test resulting in root damage and increased severity of *Pythium* root rot. Terrazole 35W and Aliette 80WDG showed intermediate results in root growth. There was no significant difference between the rates of Aliette and Terrazole we tested.

Plant height and top grade were not affected by the treatments included in this trial. Additional testing may be needed during a warmer season when plant growth is faster. In addition, different bulbs may be infected with different types of *Pythium* that could respond differently to the fungicides we have tested. Look for more tests on control of bulb diseases during the next year.



Root grade on Asiatic lily with *Pythium* Root Rot

Treatments included: Ranman (1.5-3 oz/100 gal), Phyton 27 (20-30 oz/100 gal), Agri-terra (0.5-1%), Terrazole (3.5-6 oz/100 gal), Aliette (12.8-16 oz/100 gal) and Subdue Maxx (1 oz/100 gal). The lavender bars are the low rate and the purple bars are the high rate for each product.



Pythium root rot on lily.



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