



PHOSPHOROUS ACIDS AND ALIETTE 80WDG

A year ago I reported some views on the use of phosphorous acid alternatives to the fungicide Aliette 80WDG. Since then, I have continued to trial these products for Pythiaceus fungi as well as the downy mildews on some ornamentals. Until this year, Aliette was the sole product with these characteristics that was labeled as a fungicide in the US. Although Australia has worked for 20 years on these alternatives, the US has lagged behind.

In 2003, we have seen registrations of a number of these products with labels very similar to Aliette including: Alude (Cleary—originally Agri-fos), Magellan (Riverdale) and Vital (Griffin). Many more of these products are labeled as fertilizers or growth promoters and therefore not subject to the usual pesticide regulations (no REI). We added some field and greenhouse work with one such product, pHortress (Western Farm Service) for downy mildew control on ornamentals.

These alternative products contain ingredients such as potassium salts of phosphorous acid (phosphates) and phosphonic acid (phosphonates). Over the past few years, we did some testing on a few of these including Nutri-Phite PK, Bio-Phos, Agri-Fos and Vital. In general, we have found them to be effective but occasionally phytotoxic on the small bedding plants we often use for our trials.

One of the selling points of the newer products is their pH. They are all more basic than Aliette and as such do not increase availability of copper that leads to copper toxicity. They are, however, capable of causing phytotoxicity in their own right. We have seen certain prod-

ucts safe at 0.5-1% and severely phytotoxic at 2%. Care should always be taken to check the safety of each new product before wide-scale use. The table below summarizes the pH of four products when diluted in neutral pH water. Aliette was tested at 8, 16 and 32 oz/100 gal. These laboratory tests indicate the magnitude of the pH difference between Aliette and some phos-acid alternatives.

The labels of the phos-acids list bacterial disease control as does the Aliette label. Over the 7 years I worked on Aliette at the University of Florida, I had inconsistent results for bacterial disease control. Our tests showed that in about 50% of the cases of Pseudomonas or Xanthomonas leaf spots, Aliette gave control equivalent to copper products like Kocide. In another 25% of the trials we had no control with Aliette and in the final 25% of the trials we actually made these bacterial diseases worse with Aliette than nothing at all. Nevertheless, the Aliette label was written to include bacterial disease control.

When we were investigating the reaction we did find that in some cases, low pH of the Aliette spray was responsible for the efficacy. We could use vinegar (a Florida grower discovered this) and get control of some Xanthomonas leaf spots. When we changed the pH of the Aliette to 6.5 or 7 we did not always lose its benefit. Thus the reaction is not solely due to pH. This is important since the alternatives all have a higher pH than Aliette. Our next goal is testing the phos-acids for bacterial diseases.

See the next page for trial results

Spray solution pH in neutral water (pH=7)				
Product	Availability	64 oz/100 gal	1 gal/100 gal	2 gal/100 gal
Aliette 80WDG	Bayer	4.6 (8 oz)	4.5 (16 oz)	4.3 (32 oz)
Alude	Cleary	6.7	6.8	6.9
Bio-Phos	Ag Biochem	8.3	8.4	8.4
pHortress	Western Farm Service	6.5	6.5	6.5
Vital	Griffin	7.7	7.8	7.8

CHASE RESEARCH GARDENS, INC.

8031 MT. AUKUM RD., SUITE F, MT. AUKUM, CA 95656-0529

PHONE/FAX (530)620-1624, MTAUKUM@DIRECTCON.NET



PHOSPHOROUS ACID ALTERNATIVES (CONTINUED)

We have been testing phos-acids over the past few years but really expanded our efforts in downy mildew this year. The tables below summarize our trials of both downy mildew (bottom, left) and Pythium and Phytophthora (bottom, right).

Our downy mildew trials were both preventative and curative when the opportunity presented itself. The Limonium (statice 'Misty Blue') trial was performed in the field in San Diego County and the others were performed in our greenhouses. We have found that the phos-acid alternatives applied as foliar sprays are as effective as Aliette but the effective rate was always higher than that of Aliette. For instance, 64 oz/100 gal of pHortress was equal to 24-32 oz of Aliette in three trials. Bio-phos and Nutri-grow PK were applied at 128 oz/100 gal to equal a 24 oz rate of Aliette.

Alude (agri-fos) was as effective as Aliette but we needed twice as much product to achieve the same result. Finally, Vital used at 64 was equal to 32 oz of Aliette and better when applied at 96 oz/100 gal. Be careful when using these alternatives since our experience indicates slight burning on some crops when they are used at effective rates for downy mildew control on ornamentals. All of the results reported in the table below gave very good-to-excellent control of downy mildew on these ornamentals.

The results for our Pythium and Phytophthora trials are reported compared to the inoculated controls. Aliette was used at 12.8 to 16 oz/100 gal as a drench. The

phos-acids we used were also applied as soil drenches. Results were variable depending upon the disease and crop tested.

We tried most of the products against Phytophthora aerial blight on vinca. Each worked at rates of 64 or 128 oz/100 gal when applied every 2-4 weeks (as did Aliette) when applied at 16 oz/100 gal—above the labeled rate of 12.8 oz/100 gal). The exception was Bio-phos applied at 128 or 256 oz gave no control. I believe this was a case of phytotoxicity primarily since the same product gave very good control of Phytophthora root rot on Spathiphyllum.



The vinca on the left was treated with Nutri-Grow PK (256 oz/100 gal)

Similar results were found with most Pythium root rot trials. Effective rates for Alude, Nutri-Grow PK or Vital appear to be 96-128 oz/100 gal compared to 16 oz of Aliette. The single trial on calla lily with Pythium shows a failure for Alude which was due to Erwinia bulb rot. While these products list suppression of some bacterial diseases, they do not include Erwinia soft rot such as occurred on these calla lilies.

Our trials have indicated that the phos-acid alternatives can be as effective as Aliette for downy mildew, Pythium and Phytophthora when used at rates from 64 to 128 oz/100 gal. Remember that they are not drop-in replacements since the effective

rates are always at least twice, and often as much as four times, as high as Aliette rates. Their safety must be verified under each grower's conditions before widespread use. The advent of fungicide labels on some of these products (Alude and Vital) will allow legal substitution for Aliette. This is an excellent opportunity to compare pricing and safety to an industry standard.

Downy Mildew Control with Aliette and phos-acids

Crop	Aliette (oz/100)	Phos-acid	Result (oz/100 gal)
Limonium	32	pHortress	Equal at 64 oz
Snapdragon	24	pHortress	Equal at 64 oz
		Vital	Equal at 64 oz ,
Pansy	32	Bio-phos	Same at 128 oz
		Nutri-phyte PK	Same at 128 oz
Blue Salvia	32	Alude	Same at 64 oz
		pHortress	Same at 64 oz

Phos acids for Pythium and Phytophthora

Product	Pathogen	Plant	Rate - degree
Alude	<i>Phytophthora</i>	Vinca	64 oz
Alude	<i>Pythium</i>	Snapdragon	64 oz some
Alude	<i>Pythium</i> sp.	Calla lily	64 oz none
Bio-Phos	<i>Phytophthora</i>	Spathiphyllum	128 oz
Bio-Phos	<i>Phytophthora</i>	Vinca	128 or 256 oz
Nutri-Grow PK	<i>Phytophthora</i>	Vinca	64 oz
Nutri-Grow PK	<i>Pythium irregulare</i>	Lisianthus	128 oz very good
Vital	<i>Phytophthora</i>	Vinca	96 oz
Vital	<i>Pythium irregulare</i>	Snapdragon	96 oz none

BLACK ROOT ROT UPDATE

Black root rot (BRR) on pansy and other bedding plants is gaining ground once again. The disease is caused by *Thielaviopsis basicola* and is most troublesome on pansy but occurs on salvia, petunia and vinca as well.

Cultural control has been investigated over the past 15 years. The pathogen is a relatively common resident of peat bogs and appears to enter ornamental production occasionally through infested potting media. It has long been held that keeping the potting medium pH below 8 and above 4.5 minimizes disease—an overall suggestion of 5.5-6 seems to be best for pansy production without BRR. Although it is felt that maintaining pH in this range is sufficient to control BRR on pansy, some growers continue to suffer losses periodically.

Any type of stress contributes to BRR severity. Production of cool season crops (like pansy) in the late summer is a recipe for plant stress and leads to outbreaks of BRR some seasons.

Reusing plug trays has become an economic necessity in some operations making the potential for contamination with BRR a serious concern. Cleaning trays and benches can best be accomplished with 10% sodium hypochlorite (bleach) in combination with a detergent and

scrubbing. Zero-Tol was effective when sprayed onto plug trays at 2.5 oz/gal and Greenshield was effective when used as a 10 minute dip at 1 tbs/gal.

Fungicide control trials continue to be reported every few years. Many have been conducted by Marge Daughtrey (Long Island Horticultural Research Center) and Mary Hausbeck (Michigan State University). The table below summarizes some of their results as well as ours (Chase Research Gardens) over the past few years. Mixed results have been seen with a few active ingredients such as fludioxinil (Medallion), azoxystrobin (Heritage) and triflumizole (Terraguard). The only product that works consistently from researcher to researcher and one year to the next is thiophanate methyl (3336) used on a 14 day interval as a 1 oz/100 gal drench. A similar compound, benomyl was found to be as effective in the 1990's before Dupont withdrew its ornamental label.

Since all of the trials were run with 3336, we are starting a trial comparing different rates and brands of thiophanate methyl fungicides. Results will be available in a future issue of Chase News. On a final note, we recently completed a trial with combinations of products and found that while those with thiophanate methyl included were effective on pansy, nothing controlled BRR on vinca. They all died miserably.

Treatment	Rate/100 gal	Interval	Result
3336	16 oz	14 days	Excellent
Banrot	8 oz	14 days	Poor to none
Compass O	2, 8 oz	14 days	Poor to none
Heritage	0.9, 1.8 oz	21 days	Poor to none
Heritage	2, 4 oz	14 days	Poor to good
Medallion	2 oz	21 days	None to excellent
Phyton 27	20-35 oz	14 days	None to good
RootShield G	1.25 lb/cubic yard	once	Poor to none
RootShield (replaced with PlantShield HC)	8 oz	once	Poor to none
Terraguard	4-8 oz	14 days	Some to excellent



Symptoms of black root rot (BRR) on pansy (A) and vinca (B) are similar with plant death the final result. The roots of the pansy (C) shows signs of infection with the pathogen (*Thielaviopsis basicola*). The characteristic blackened roots on infected plants gives this disease its common name (BRR). A close-up of the black spores if the fungus are seen on the roots (D).

