

# Downy mildew—Alert



Downy mildews once again have made their presence known in the horticultural industry. We are already seeing the disease on Salvias and Pansies. During the fall-winter of 2002, we experienced a severe outbreak of pansy downy mildew across the United States and all of our work last year centered on this particular downy mildew.

We tested eradication as well as prevention with both currently available and experimental fungicides. The trials were funded in part through a grant from the Washington State Department of Agriculture as well as SePRO Corporation, Cal-Agri Products, Whitmire Micro-Gen, Aventis and Chase Research Gardens.

The best fungicides for prevention were tested for eradication of pansy downy mildew. We sprayed weekly for three applications and checked for control. The best eradicator proved to be Stature DM (dimethomorph from SePRO). This active ingredient is also found in Stature.

In another trial, an experimental product called Agri-50 from Cal Agri Products was

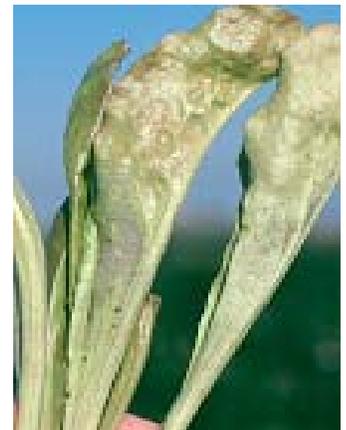
Evaluated. We found very good to excellent control of downy mildew with this product as well as Camelot

A number of new “strobilurins” or related fungicides are in development now. One of these products gave excellent prevention when used as a soil drench for downy mildew on pansy. The standards, Heritage and Compass did not give 100% control but performed very well as usual. Cygnus (another strobilurin from Scotts) was not as good as Compass or Heritage. We are looking forward to testing more new products in the upcoming season.

I have been getting questions for at least three years regarding efficacy of phos-acid products. We included two in a trial last year. Both are labeled as fertilizers and not fungicides but each gave excellent control of downy mildew on pansy. A note of caution, however: one of the products was phytotoxic on pansy while Aliette was completely safe and equally effective. We will be testing a couple of new products (labeled as fungicides) in the next 6 months. They are currently in trials for Pythium and Phytophthora control. Look for an update on them in CHASE NEWS in November.



**Downy mildew** spores are usually white and occurs all over leaves on *Osteospermum*.



**Downy mildew** spores occur mainly on leaf undersides and are purple on *Limonium*.

### Control checklist

1. Inspect all plugs and cuttings for signs of downy mildew infection
2. Keep humidity as low as possible with fans and venting
3. Irrigate when leaves will dry quickly
4. Use preventive fungicides on sensitive crops—before symptoms appear
5. Use a wetting agent with fungicides
6. Rotate fungicide classes (two or three different ones)

### DOWNY MILDEW TRIAL SUMMARY ON PAGE 3

### Inside this issue:

Trial Update (NEW Bactericides)	2
Field Notes—Keith Hunderfund	2
Controlling Downy Mildew—Summary Table	3
From the Tradeshow Floor—Mike Zemke	3
Products in Review—Camelot	4

## Trial Update— NEW Bactericides

Over the past two months we have had the opportunity to work with a biological control product in a new area—bacterial disease control. The product is going to be called Rhapsody and is *Bacillus subtilis* (strain QST 713) from Agraquest. I was skeptical when we started these trials but pleasantly surprised by the results. The Table below summarizes the two trials.

Both trials were conducted with *Pseudomonas* leaf spot. The first was run on Delphiniums (*Ps. delphinii*) and the second with Impatiens (*Ps. syringae*). We found good control (63%) with Camelot at either 16 or 48 oz/100 gal. Phyton 27 provided better control with 15 or 25 oz/100 gal (74-90%). Rhapsody gave 84% control when used at 1% (128 oz/100 gal) but the combination with Phyton 27 was very poor (essentially no control). Agraquest reports testing on vegetables with a similar combination (copper and Serenade) has been good. We also checked out Zerrotol and Ecoclean (two hydrogen peroxide products) and found that Ecoclean was safer and somewhat more effective than ZeroTol.

In the Impatiens trial we saw 62% control with Rhapsody at 2% and Phyton 27 gave 76% control. In this test, we included Actigard (SAR = a systemic acquired resistance product). A SAR acts a little like an immunization by convincing the plant that it should beef up its natural defenses against disease. When used preventatively, Actigard gave excellent control (92-98%) of *Pseudomonas* leaf spot on Impatiens. Syngenta does not currently have plans to market in ornamentals but we are hoping they change their minds.

It is nice to finally have something besides copper to trial on bacterial diseases. We will continue testing Rhapsody and Actigard as well as industry standards Phyton 27 and Camelot over the winter. Our next trial will be *Xanthomonas* blight on Geraniums.



Bacterial leaf spot on Delphiniums can be caused by *Pseudomonas delphinii* or *Xanthomonas* and sometimes both at once.

### Cultural Control of Bacterial Diseases

1. Check new plugs and cuttings for symptoms—discard them when found.
2. Keep leaves as dry as possible—use fans and space plants.
3. Water early and if you spray, skip normal watering.
4. Scout at least once a week and discard infected plants.
5. Keep plants fertilized appropriately—not too much or too little.
6. Use copper bactericides preventatively—no more than once a week.

Product	Rate/100 gal	% Control Delphinium	% Control Impatiens
Actigard	2 or 4 oz	Not tested	92 to 98 (excellent)
Camelot	16 or 48 oz	63 (good)	Not tested
Ecoclean	128 oz (1%)	26 (some)	Not tested
Phyton 27	15 or 25 oz	74 to 90 (very good)	76 (very good)
Rhapsody	64-256 oz (0.5-2%)	84 (very good)	18 to 62 (some to good)
Rhapsody and Phyton 27	64 and 15 oz	5 (none)	Not tested
ZeroTol	128 oz	0 (none)	Not tested

### FIELD NOTES—KEITH HUNDERFUND

Our contract research has been picking up lately. All of our greenhouses are filled nearly to capacity at this time. Since the last newsletter we have started trials on fungicide safety on Salvia, algae control in plug flats, powdery mildew on Gerber daisy, Rhizoctonia stem rot on Impatiens and Poinsettia and Phytophthora aerial blight on vinca. Our research and testing for the Methyl Bromide replacements is still in progress and yielding promising data on disease control for some older products such as Vapam.

We have just placed the order for a new greenhouse so we will be building again soon. This will give us more versatility and testing capacity. If the weather cooperates, the new house should be fully operational in a few months.

Most of us at Chase Research made the trip to Portland in August for the Far West 2002 Show. The show seemed to be well attended and packed with interesting things to see. There were many terrific seminars available that covered most aspects of horticulture and the industry. All in all it was worth the trip!

Keith

## SUMMARY OF TRIALS FOR DOWNY MILDEW CONTROL—THE BEST PRODUCTS/ROTATIONS

Fungicide (REI)	Chemical group Active ingredient	Control grade
<b>Phos-Acid</b>		
Aliette 80WDG (12 hr)	Fosetyl aluminum	A
<b>Cinnamic acid derivative</b>		
Stature (24 hr)	Dimethomorph and mancozeb	A
<b>Strobilurin</b>		
Compass O (12 hr)	Trifloxystrobin	B+
Cygnus (12 hr)	Kresoxim methyl	B
Heritage 50WG (4 hr)	Azoxystrobin	A
<b>EBDC (carbamate)</b>		
Protect T/O (24 hr)	Mancozeb	B
Dithane Rainshield (24 hr)	Mancozeb	B+

There are a number of important considerations when choosing a fungicide program for downy mildew control. It is critical to rotate between at least two of the chemical groups as laid out in the Table. If you do not rotate your chances of developing downy mildew fungi that are resistant to the fungicide are very high.

The Table gives the fungicides that have been the best in our trials in the groups that represent four different chemical types (classes). You can apply them once a week or under high disease pressure use something twice a week. I believe it is important not to exceed twice a week since the benefits of the fungicide begin to disappear with the drawbacks of applying 3 or 4 sprays (lots more water = lots more downy mildew).

If there are already spores forming you might want to use Stature first since it seems to be a little better at eradication than the other products. If you live in California this is not an alternative yet since the product is not registered here. If you use Stature you will have applied two active ingredients and thus could elect not to rotate to another group. However, the residue from the mancozeb portion of this product can be objectionable on some plants, and rotation to another group therefore may be desirable.

Using the B and B+ products when downy mildew conditions are not ideal or when spores have not been detected will allow you to save the A products for more serious times.

Choosing products is not always based on efficacy alone. Two other obvious factors are the cost of the fungicide and the REI. If you are a greenhouse or cut flower grower the 4 hour REI of Heritage may be of critical importance. Since costs vary from distributor to distributor, I will avoid that issue here. Besides - what is affordable to one producer may be too costly to another.

If I had an outbreak I would probably use Stature, Aliette and Heritage. The rates can be critical since using too high a rate can reduce efficacy or increase chances for phytotoxicity. I have had the best results with Aliette at 16 oz/100 gal, Stature at 1.75 lb/100 gal and Heritage at 1 oz/100 gal. Be sure to follow the labels—Stay legal!!!!

## FROM THE TRADE SHOW FLOOR

MIKE ZEMKE

My most recent trip was to the Far West Show in Portland, OR. I think attendance was good and we just signed on for a booth next year. We will be going to the 2002 International Plug Cutting Conference in Orlando starting on Saturday, and will give an update in the next issue. The current project I'm trying to get completed is a new flashcard set - "Bedding Plant Problems" Spanish version. I hope to have this out by the end of the year. Mike



**DOWNY MILDEW SPORULATION ON ALYSSUM**—The symptoms of downy mildew sporulation on alyssum are white, crusty masses, usually on leaf undersides. When conditions are ideal they look as though they were sprinkled with sugar or salt (spores form all over the plants).



### PHYTOTOXICITY ON ALYSSUM

Alyssum and stock (*Matthiola*) are very sensitive to all of the copper products we have trialed on them. The photo above (left) shows the damage from three (weekly) applications of a copper fungicide. The plants on the right were sprayed with water (lots of downy mildew). We also saw this damage with a few other products (oils). It is critical to try new products on all of your crops in a small way before incorporating them into a nursery-wide program.

## BOTRYTIS BLIGHT UPDATE

Disease	Degree of control
Alternaria leaf spot	Fair to good
Bacteria	Fair to good
Botrytis blight	Very good
Cylindrocladium root rot and cutting rot	Fair
Downy mildew	None to very good
Phytophthora aerial blight	None
Powdery mildew	Very good
Pythium root rot	Fair to Good
Rhizoctonia stem rot	None to fair
Rust	None to Good

Over the past four years we have been working with Camelot, first for Griffin L.L.C and then for Whitmire Micro-Gen. Camelot is a combination of fatty and rosin acids of copper salts. It has a good label (except for California) for many ornamentals as well as fruits and field crops.

In 1998, we started out looking at a few bacterial diseases and graduated on to fungal diseases such as Alternaria leaf spot on impatiens, rust on snapdragons and powdery mildew on Gerber daisy. The table above gives the results of these trials.

It is most interesting that although we tend to think of copper products only for their ability to control bacterial diseases such as Erwinia soft rot, Pseudomonas leaf spot and Xanthomonas blight, they actually do a better job controlling some of the fungal diseases.

Probably the biggest surprise finding is the ability of certain copper fungicides to control Pythium root rot when used as a soil drench. We are currently finishing up a trial with Aliette, Subdue and Camelot for Pythium control on snapdragons. The isolate of Pythium I used is apparently resistant to Subdue Maxx and Aliette since at least these two products have failed to control the disease. The best treatments in the trial are Camelot at 1 or 3 pints/100 gal.

Another recent trial showed Camelot gave good control of Pseudomonas leaf spot on Delphinium at 1 or 3 pints/100 gal. We saw similar results with these two rates in a trial earlier this spring on downy mildew on pansy. We may see a label change reducing the lower end of the treatment range from 3 to 1 pints/100 gal.

(Continued at right)

It is now time to start watching for signs of Botrytis on many crops. While conditions are not ideal in most parts of the country, the weather is changing and our fall-winter diseases will start to appear. Botrytis blight is especially common on rooting cuttings (poinsettias and geraniums) and anything in flower.

We ran a couple of trials in later spring on some products for Botrytis. The first test was run on Ranunculus plugs that had developed Botrytis petiole rot. The table shows the products and rates tested.

Treatment	Rate/100 gal	% control
Chipco 26GT	1.5 quart	92
Decree 50WDG	16 oz	100
Medallion 50WP	4 oz	92
Camelot	48 oz	25
Phyton 27	16 oz	0

Excellent control was achieved with Chipco 26GT, Decree and Medallion (all industry standards at this point). I realize it is not a popular opinion but I think this test once again shows poor control of Botrytis with copper products.

**FYI TRADE SHOWS**

**2003 TPIE (Tropical Plant Industry Exposition)**

When: January 16 - 18

Where: Broward County Convention Center in Ft. Lauderdale, FL.

**2003 SAF Pest Management Conference**

When: February 23 - 25

Where: Sheraton Safari Hotel in Orlando, FL.

I would consider using a copper fungicide/bactericide (such as Camelot) in a rotational program for a wide variety of ornamental diseases. Just be careful not to mix directly with an acidic compound such as B-9 or Aliette since acidic solutions make copper more available and often lead to copper toxicity. Rotating with something like Aliette should be done with at least a week between sprays. It does not matter which is first.

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