



Downy Mildew Explosion—Preventive Fungicide Rotations

In the past few months we have seen an explosion in the number of reports of downy mildew. I was happy about being able to do a couple of rose trials and one on stock in September 2004 but now I am worried. By December we were finding it on standard crops like snapdragon and stock and others including *Osteospermum* and *Argyranthemum*. And we are just waiting to see what is ext. Keep your eyes on *Impatiens*, *Digitalis* (foxglove), *Felicia*, *Geum*, *Salvia* and *Scabiosa* over the next few months. See page two of this issue for a gallery of downy mildew symptoms.

At this point it seems clear that this is probably going to be a bad year for downy mildew. Winter storm patterns are different this year leading to record rainfall and snowfall throughout the country. On the West Coast, rainfall has already exceeded annual averages in some areas.

Downy mildew can reproduce as quickly as 4-10 days depending on the weather. The work on vegetables has shown that they can be seed-borne and can be systemic. They are usually host specific but there are a few such as *Plasmopara halstedii* and *Bremia lactuca* that have very wide host ranges. Spores form overnight when conditions are favorable and spread by wind or fans following release (usually in the late morning). Although fans may move spores they are important parts of a control program since wet leaves are needed for the spores to form. Keeping plant leaves as dry as possible overnight is very important.

Don't spray more often than twice a week. More often may result in worse disease. The result of the extra spray is more water on the leaves which make the downy mildew fungus very happy.

Wetting agents may be helpful if sporulation has already occurred since it will help the fungicide penetrate and act. Be sure to follow labels concerning adding a wetting agent and which wetting agent is safe. Downy mildew fungi respond best to systemic fungicides since the infection occurs within the leaf. Systemic infections can occur but are not as common as leaf infections. The situation that often confounds

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Low Disease Pressure or Prevention

Fungicide	Active	Rate/
Compass O	trifloxystrobin	1-2 oz
Aliette	Fosetyl	16 oz
Protect, Dithane	mancozeb	16 oz
Phyton 27	Copper	15-25 oz

High Disease Pressure or Eradication

Fungicide	Active ingredient	Rate/ 100 gal
Stature DM	dimethomorph	3.2 to
Heritage OR	azoxystrobin	1 to 2 oz
Fenstar	fenamidone	14 oz
Aliette	Fosetyl	32 oz

our industry is latent infections. It is possible for a plant to be infected with a downy mildew fungus and not have obvious symptoms. The conditions of shipping can be ideal for sporulation leading to a mass of spores found when the box is opened that were not present when it was packed. Spores formation during a 1-3 day shipping event is really not difficult.

On the other hand, with as short as a 4 day reproduction cycle for some downy mildew fungi, disease could appear within a week of receiving healthy plants if they are placed in the same growing area as infected plants. There is no easy answer and finding out where the pathogen is coming from should be more important than assigning blame.

Under cool, wet conditions, fungicides become a routine and unfortunately necessary part of growing many ornamentals. I have included above two scenarios with rotations to make sure you prevent resistance development. The first suggestion is for low disease pressure or a truly preventive program. The fungicides listed are very good to excellent but not all are systemic. In the second table, products are systemic making them slightly better for high disease pressure or eradication. AS ALWAYS FOLLOW LABELS TO BE SAFE AND LEGAL!!!

An Update from Bug land

I know you all think I only pay attention to diseases but sometimes I decide I should learn something about insect and mite control as well. You all ask me often enough for information on insects and mites and I am getting tired of admitting I don't know. So I have been attending some of the same talks available to you and even taking notes.

Insecticide Resistance— How stable is it?

Last September I attended a meeting sponsored by Syngenta Professional Products. Dr. David Cox (Syngenta) covered a number of topics including insecticide resistance and how long it might continue once developed.

When a new product enters the market place it can be a little as two seasons before resistance develops and the product is no longer effective. The question of how long the insect population remains resistant to the insecticide has been investigated and was reported in a recent paper (J. Econ. Entomol. 97 (1):112-119 (2004). Ferguson tested three populations of leaf miners (two from California and one from Georgia).

The populations were resistant to abamectin (Avid), cyromazine (Citation) and spinosad (Conserve). They were reared without the insecticide pressure and each generation was tested for resistance level to the three insecticides. Sometimes the resistance level did not drop as low as that of a population that never was resistant to the insecticide but it always dropped dramatically in as few as five to nine generations. Additionally, there was no evidence of cross-resistance between abamectin, cyromazine and spinosad.

This is very good news since it indicates that even if resistance develops it can revert to sensitivity in a relatively short time. This does not mean rotation of insecticides is not critical. In many states, where vegetables are also grown, the population of pests outside a greenhouse may become resistant and move into the greenhouse. Since controlling the population inside a greenhouse may be compromised by these insects, it is doubly important to follow label directions on using each product to maintain its activity without costly interruptions in efficacy. Dr. Ferguson suggests rotating after two applications a practice he says vegetable growers in California and Florida currently embrace.

Verdicon—Romeo Seminar

I attended a half day meeting in Carpinteria, California a couple of weeks ago. I had the last talk before lunch so I was able to concentrate on Jim Bethke's (University of California at Riverside) talk on insect growth regulators (IGRs). I don't keep much mode of action (MOA) information in my head for fungicides but I am actually beginning to absorb some of what I hear on insecticide MOAs. Jim gave a really informative talk on mode of action of the various IGRs complete with information on rotations.

He also described how nicotine relates to neonicotinoids. It was interesting to note that while nicotine is very toxic to mammals, neonicotinoids are less toxic to us and more toxic to insects. The neonicotinoids include Flagship, Marathon, Safari and Tristar. These products work on homopterans like whiteflies, mealy bugs and aphids.

For more information on insecticide rotation and MOA: In the October, 2004 issue of *Greenhouse Product News* (GPN), Ray Cloyd (University of Illinois) gave a comprehensive review of rotation and MOA. You can find most GPN articles at their website. Ray suggest the following products as good rotation partners for some key insect pests.

Aphids (Endeavor, Marathon, Ultrafine Oil, Orthene and Insecticidal Soap).

Thrips (Conserve, Avid, Mesurol, Orthene and Pedestal).

Two-spotted spider mites (Floramite, Pylon, Avid, Akari or Sanmite and TetraSan).

Whiteflies (Marathon, Endeavor, Distance, Talstar and Orthene).

Verdicon Meeting Notes— Su Harris

I attended the Verdicon, Inc. seminars in Sacramento a week ago and learned quite a lot from all of the speakers on new products and developing issues.

Erin Nachbar, from Valent, introduced two new herbicides, Broadstar and Sureguard. Both herbicides have the active ingredient, flumioxazin. Broadstar granules kill broadleaf and grass while Sureguard, with a higher amount of the active ingredient kills weeds for 6 to 9 months.

Dr. Jeff Higgins, from Pursell Technologies, Inc. discussed Precise, a polymer coated formulation of acephate (active ingredient in Orthene). This new formulation of acephate is coated with ammonium sulfate, which stabilizes this usually short-lived insecticide. Tests have shown activity up to 250 days in plants. He also mentioned development of a fungicide using the same slow release coating.

Diana Nisbet from Dow (she was previously with Crompton), gave a basic talk on mites and thrips. Mites spread by wind (or fans), weeds and equipment. They are especially damaging to plants stressed by under feeding, heat and water extremes. Thrips cause most severe damage under dry conditions and are vectors of viruses such as Impatiens Necrotic Spot Virus (INSV). Crompton Products include Floramite for mites and Pedestal for thrips control.

Rick Miller, from SePRO Corporation, told us about Sudden Oak Death caused by *Phytophthora ramorum*. Rick described quarantine regulations for California and Oregon as well as a current host list for this serious pathogen. He advised growers to keep host plants at least 30 feet from other crops just in case they show symptoms. Rick also reported on recent trials with fungicides for SOD, including Stature DM (SePRO)

Finally, Marianne Waindle with Olympic Horticultural Products and Mike Bell with Blue Rock Sales and Marketing discussed some new insecticides. Discus (Olympic) is a mixture of imidacloprid and cyfluthrin. It has systemic and translaminar activity and can last from 10-12 weeks. Mike talked about a new organic fungicide/insecticide made from the herb thyme.

Choosing the Right Targets for Medallion

Since starting this newsletter about two and a half years ago, I have written quite a few product reviews. Medallion was actually the subject of the first review in July of 2002. I realized that in the ensuing years we had expanded our experience with Medallion and decided to review Medallion once again. The table to the right represents a current summary of that work.

Medallion is one of the most under-used fungicides available to ornamental growers. This product was registered for ornamental use before any other use. The active ingredient is fludioxinil and is sold in a 50WP formulation. Medallion is a contact, preventative fungicide that has a relatively wide range of activity. It is known in some parts of the country as a key *Botrytis* fungicide in other parts its main use is against *Rhizoctonia*.

When I worked at the University of Florida we tested Medallion for *Rhizoctonia* aerial blight and stem rot, *Alternaria* leaf spot and *Cylindrocladium* root and petiole rot (*Spathiphyllum*). Our results were very good to excellent with these diseases. Since returning to California we have tested Medallion on many other serious diseases including *Botrytis* blight. Medallion is one of the top four fungicides for *Botrytis* control. We have also found good to excellent control of a number of leaf spots besides *Alternaria* including *Heterosporium*, *Cercospora* and *Myrothecium*.

Medallion appears most active against *Rhizoctonia* and *Alternaria* with 0.5 oz/100 gal often affording 100% prevention. In contrast, Medallion rates for *Botrytis* are 2 to 4 oz/100 gal resulting in very good to excellent control.

Use of this contact fungicide for soil-borne pathogens other than *Rhizoctonia* is very good when the product is used at 4 oz/100 gal. These targets include *Cylindrocladium* and *Fusarium* diseases. Although control is not always excellent against these pathogens, Medallion usually offers some of the best control available.

Medallion has also been tested on *Phytophthora*, black spot (*Diplocarpon*), downy mildew (*Peronospora*) and *Pythium* with no control seen.

There are no other fungicides in the

DISEASE	PLANT	RATE/ 100 GAL	DEGREE OF CONTROL
Alternaria leaf spot	<i>Impatiens</i>	0.5 to 1 oz	Excellent
Anthrachnose	Many	2 oz	Good
Botrytis blight	Cyclamen flowers, <i>Fuschia</i> , Pansy, <i>Ranunculus</i>	2 to 4 oz	Very good to excellent
Cercospora leaf spot	Pansy	1 oz	Excellent
Cylindrocladium cutting rot	Azalea, myrtle, <i>Spathiphyllum</i>	2 to 4 oz	Very good to excellent
Fusarium crown rot	Lisianthus	2 oz	Excellent
Fusarium wilt	Cyclamen	2 oz	Some to very good
Heterosporium leaf spot	<i>Dianthus</i>	4 oz	Good
Myrothecium leaf spot	<i>Dieffenbachia</i> , New Guinea <i>Impatiens</i>	1 oz	Excellent
Phyllosticta leaf spot	<i>Vinca minor</i>	4 oz	None
Rhizoctonia damping-off	<i>Celosia</i> , <i>Gomphrena</i>	0.5 to 1 oz	Excellent
Rhizoctonia stem rot	<i>Impatiens</i> , <i>Vinca</i>	1 oz	Excellent
Rhizoctonia cutting rot	Poinsettia	0.5 to 2 oz	Very good to excellent

chemical class with Medallion so rotation to another fungicide is easy. This will be especially important for diseases with many spores such as *Botrytis* blight. To my knowledge, resistance to Medallion has not reported but rotation is a good idea. We have seen excellent results with tank mixes with Subdue MAXX for soil-borne diseases.

Be sure to read the product label carefully before use. Be cautious using Medallion as a drench on un-rooted cuttings since it can stop root development. This possibility can be avoided if you spray stock plants with Medallion the day before taking cuttings. They will be protected against the target disease without delays in rooting.



Join Our Focus Group

Last week we held our first focus group in San Diego. A select group of growers attended and spent an hour or so giving us some much wanted feedback on our products and services. Below you will find some of their suggestions. If you would like to help direct our business, please print this page, add your responses/comments to any one or all areas FAX it back to us. We appreciate your input and will take all comments and suggestions seriously. Thanks for taking a few minutes to help us.

Disease Diagnostics

We started doing diagnostics in the fall of 2003. We do samples for California growers and offer digital image diagnosis and control programs for growers outside California.

1. How fast do you need a diagnostic answer? _____
2. Do you prefer a phone call _____, FAX _____, e-mail _____ before receiving a hard copy?
3. Do you need the pathogen identified to genus (like *Phytophthora*) _____ or to species (like *Phytophthora parasitica*) _____?
4. Would you like a picture of the disease included in the report? _____
5. If you had a diagnosis from another lab would you pay for a control strategy from us? _____

Comments _____

Flashcards/Books

We have a series of flashcards for problem identification (you can check these out on the website).

1. Are the photos large enough? _____
2. Are there enough photos of a problem to identify it? _____
3. Would a close-up of the problem be helpful? _____
4. Do you want more variety in the problems in a set? _____
5. Do you want the chemical controls included? _____
6. If you have a set, how do you use it now? Scouting _____
Education _____ Other _____
7. Would you rather have new books? _____

Comments _____

Website/Member Zone Ideas

One new idea that came up during the focus group was a website for members only.

1. Would you be interested in this service? _____ yes _____ no.
2. A site where you could diagnose your problems directly using a simple stepwise process from general symptoms to specific _____ yes _____ no
3. Interactive with a searchable data base _____ yes _____ no.
4. Would you like a consultation with Ann after you make your diagnosis? _____ yes _____ no
5. Would you like the membership tied to others discounted services? newsletter _____ yes _____ no, diagnostics _____ yes _____ no, products like the flashcards _____ yes _____ no, consulting/site visits _____ yes _____ no.

Comments _____

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What topics should we include in future issues of *Chase News*?

New diseases _____

More pictures _____

Fungicide reviews _____

Meeting highlights _____

Trial reports with graphs or tables _____

Other _____

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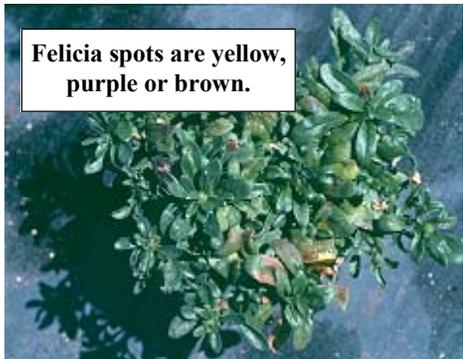
INDOOR PLANTS

BEDDING PLANTS IN SPANISH

FLOWERING POTTED PLANTS

PERENNIAL PLANTS

Downy Mildew Symptoms



Felicia spots are yellow, purple or brown.



Scabiosa have purple, yellow or brown blotches often between veins.



Geranium leaves look silvery underneath.



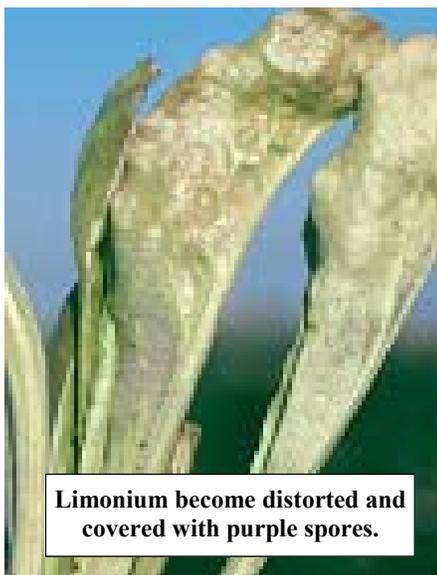
Geum have yellow, purple or brown areas between veins.



Snapdragons develop purple blotches.



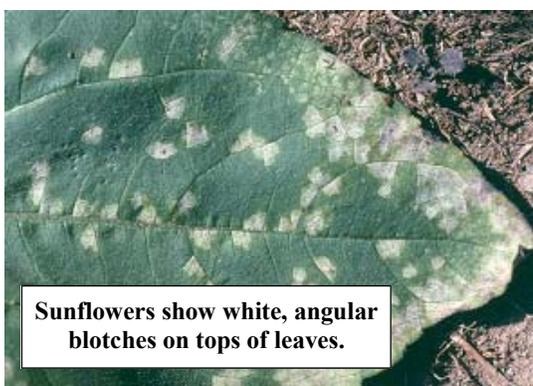
Rose leaves have purple spots that look like phytotoxicity. Flower spots look like Botrytis.



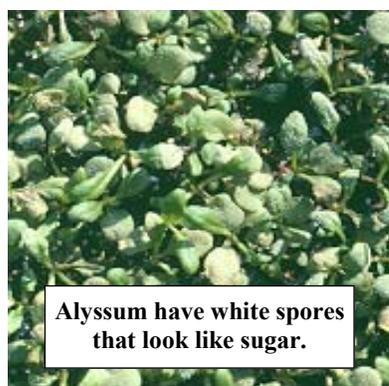
Limonium become distorted and covered with purple spores.



Salvia leaves show yellow blotches on tops and undersides.



Sunflowers show white, angular blotches on tops of leaves.



Alyssum have white spores that look like sugar.



Digitalis have purple spores in clusters between veins.