



## IR-4 Specialty Crop Registration Program

In October, I attended the annual IR-4 meeting held in Denver this year. I have attended these planning meetings off and on for the 27 years I have been involved in ornamental disease control. The emphasis for many years was phytotoxicity testing performed to a large degree by the both University and ARS scientists. A few years ago, a change was made to give pesticide companies more efficacy data at the same time as targeting key and critical issues for ornamental growers.

A special questionnaire was sent out (mainly via the internet) to growers, researchers and indeed all interested segments of the ornamental industry. The aim was to identify the diseases critically requiring fungicide research. Separate questionnaires were sent for insects and mites and weeds. I am presenting a brief summary of the responses for your interest including a breakdown of the portion of the country responding. There were many more responses from the South than any other portion of the country—indeed there were more from the South than all of the rest of the country combined.

*Phytophthora* was the single greatest problem for growers throughout the US. This may be due to the extreme difficulty of controlling this disease but may also have been influenced by Sudden Oak Death—Ramorum Blight concerns. The level of the response mirrored the development of a number of experimental fungicides that work well on this pathogen. Thus for the second year, IR-4 will focus on aerial and soil-borne *Phytophthora* as well as *Pythium* this year (2007).

The second most serious group of diseases is crown and root rot. This large group includes the following: *Rhizoctonia*, *Sclerotinia*, *Thielaviopsis*, *Verticillium* and *Fusarium*. The catch-all nature of this designation would make is nearly impossible to handle with trials since there are really no fungicides that could be tested for all of these pathogens. It does indicate the problem of diagnosis since most crown rots appear the same and one root rot looks just like another unless an accurate diagnosis of the specific cause is found. Keep this in mind the next time you decide to guess the cause of the next root or crown rot you encounter.

Leaf spots and anthracnose was the third largest group of responses. This is another heterogeneous group including such diverse organisms as *Alternaria*, *Fusarium*, *Cercospora*, *Glomerella*, *Helminthosporium*, *Entomosporium* and *Myrothecium*.

It was interesting that downy mildew did not rank very highly in the West or East and that *Pythium* was only of high concern in the South where the weather makes many diseases are more severe.

Do you agree with these results? If not, be sure to fill out the questionnaire when it shows up early next year. We will go ahead and send the link to all our **Chase News** subscribers when it is available. Make yourself heard!

Disease/Pathogen	Number responses nationally	Regional Response
Phytophthora	130	North East, South, West
Crown and root rot	117	South
Leaf spots and anthracnose	96	South, West
Bacterial diseases	93	North Central, South, West
Botrytis	52	North Central, South, West
Powdery mildew	50	North East
Downy mildew	39	South
Pythium	36	South

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# Thielaviopsis—Black Root Rot Review

I want to thank each of you for sending in responses to our questionnaire last summer. One person asked for a review of black root rot so here it is.

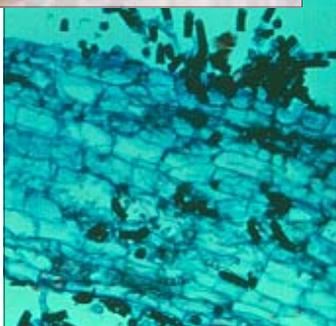
Black root rot (BRR) on pansy and other bedding plants is gaining ground once again. The disease is caused by *Thielaviopsis basicola* and is most troublesome on pansy but occurs on salvia, petunia and vinca as well. We also have seen a resurgence of importance on poinsettia and certain woody ornamentals like *Lithodora* and *Ilex*. A different species of *Thielaviopsis* also attacks palms causing a bud or heart rot.

The name black root rot was chosen due to the coloration of infected roots (photo to the below).

Black root rot on pansy (left) and healthy pansy (right)



The resting spores of the fungus are shown in the photo below (B) and depict the reason for the black color. Symptoms above-ground look like most other crown or root rots and proper diagnosis must be confirmed with isolations.



has shown that ZeroTol is effective when sprayed onto plug trays at 2.5 oz/gal and GreenShield is effective when used as a 10 minute dip at 1 tbs/gal. More recent work on Micro-Bloc Ultra showed that most efficacious use of disinfestants is following a cleaning treatment.

Fungicide control trials continue to be reported every few years (table below). 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 showed that they performed about the same in preventing BRR on pansy. We also tested some biological control products including Actino-Iron, PlantShield and Companion and none of them gave any control in our trial. Over the years we also tested control on annual vinca one time. None of the treatment gave any control which is perhaps an indication that vinca are exceptionally susceptible to BRR. As new products become available I am sure we will see new trials. If you have any ideas please be sure to send me a quick e-mail—[archase@chaseresearch.net](mailto:archase@chaseresearch.net). I am always interested in new research ideas.

Cultural control has been investigated over the past 20 years. The pathogen is a relatively common resident of peat bogs and appears to enter ornamental production occasionally through infested potting media. 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. Unfortunately, some growers (especially on pansy) 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. Some research

Treatment	Rate/100 gal	Interval	Result
3336	16 oz	14 days	Excellent
Compass O	2, 8 oz	14 days	Poor to none
Fungo Flo	20 oz	14 days	Excellent
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
PlantShield	4-8 oz	once	Poor to none
Terraguard	4-8 oz	14 days	Some to excellent

## Entomosporium Leaf Spot Review

In October, I visited Texas and a few big growers. As a result, I was asked some questions that required a little literature review. The result of one of these reviews is the following article on Entomosporium leaf spot.

Entomosporium leaf spot is caused by *E. mesplii* (= *E. maculatum*) and occurs on members of the rose family (Table below). The spots are at first tiny and slightly raised and can be found on either leaf surface. The spots become sunken, and tan and have a black, purple or reddish margin. They stay more or less round on most



hosts. When conditions are ideal, they grow rapidly and merge and sometimes cause leaves to drop. Infection only occurs when new leaves are being produced so in the landscape, it is most common in the spring. In nurseries, any time of year may be a problem since leaves are being produced in many cycles.

Genus (common name)
<i>Amelanchier</i> (Juneberry)
<i>Chaenomeles</i> (flowering quince)
<i>Cydonia</i> (quince)
<i>Eriobotrya</i> (loquat)
<i>Photinia</i>
<i>Pyracantha</i> (firethorn)
<i>Pyrus</i> (pear)
<i>Raphiolepis</i> (Indian hawthorne)
<i>Sorbus</i> (mountain ash)

Quite a bit of research has been performed on *Photinia* including conditions for disease and fungicides for control. Highest infection occurred with temperatures between 60 and 80 F with temperatures above 85 F too high for infection in the trials. Leaf wetness periods of 9-12 hours resulted in maximum infection. Leaf wetness times of 5-6 hours sometimes resulted in infection but not always. Unfortunately, the spores were found to survive well on leaves unless they were exposed to bright sun or high temperatures. Some excellent research was performed about five years ago on cultivar resistance to many landscape diseases including fire blight, anthracnose and Entomosporium leaf spot on Indian hawthorne. If you are interested let me know—

[archase@chaseresearch.net](mailto:archase@chaseresearch.net).

I reviewed the literature on fungicide control of Entomosporium on leaf spot over the past five years. The best product in nearly every trial was Daconil Ultrex (1.4 lb/100 gal) used on a 14-day interval. Some control was also seen with the following products applied on a 7-day interval: Compass O (0.5 oz/100 gal), Heritage (4 oz/100 gal), Phyton 27 (30 oz/100 gal), 3336 (16 oz/100 gal) and Spectro (16 oz/100 gal). Little if any control was reported in trials including Banner MAXX, Medallion and Milstop.

## Diagnostic Clinic Update— Winter Begins

We have been seeing a variety of problems including Fusarium crown rot (*Phormium*, *Liriope*), Phytophthora root and crown rot (wax flower, *Phormium*), downy mildew (Kong Coleus), Xanthomonas leaf spot and blight (*Iberis*, *Petunia*) and anthracnose (*Phormium*). The anthracnose on the *Phormium* showed distinct black specks (about the size of a pepper grain) in rings within the dead spots (A, right). Fruiting bodies of downy



mildew in Coleus are found on leaf undersides but not in the dead areas (B, left). Check the adjacent healthy appearing portions for the gray spores

that can be sometimes seen. This disease on Coleus is hard to identify without microscope and often is thought to be desiccation from wind or phytotoxicity.

Some of the characteristics of bacterial leaf spots like *Xanthomonas* on this petunia are that they are often bordered by veins giving the shape an angular or squared-off appearance (C, right). They are also often wet, black or greasy looking too.



We are seeing increasing amounts of *Fusarium* causing crown rot on a huge number of ornamentals these past two years. The plants attacked by *Fusarium* crown rot and root

rot include: Abelia, Aglaonema, Alstroemeria, Amelanchier, Aralia, Arctotis (3), Aster (2), Blueberry, Chamaerops, Cherry, Christmas Cactus, Chrysanthemum, Citrus, Clematis, Cordyline, Cyclamen (4), Daphne, Dianthus (2), Euphorbia, Ficus Belize, Gerbera, Gladiolus (2), Grape, Heteromeles, Liriope, Matthiola (2), Moraea, Nandina, Oxalis, Palm (2), Phalaenopsis, Phormium (3), Photinia, Pittosporum (2), Ranunculus, Rhamnus (2), Rose (5), Rudbeckia, Vinca minor (2) and Xerophyllum. The number in parentheses shows the number of submissions for that plant.

As a result of these diagnoses we will be doing some fungicide trials on *Fusarium* on *Phormium* in 2007.

# Products in Review—Insignia

Insignia fungicide from ASF Corporation will soon be available for ornamental use in most of the US. We have been working on Insignia for about five years and have run a large number of trials in a wide range of ornamental diseases. The table to the right summarizes that work and can be used as a reference. Be sure to check the product label for legal use rates and intervals in your state under your growing conditions.

It is sometimes easy to think you know exactly what a product will do after working on it for a few years. It is a trap I fall into off and on. To save myself this time, I have been collecting results other researchers whether or not they work on ornamentals. It really is interesting to see the similarities as well as the differences. The table below summarizes the work on non-ornamental crops. The results are very similar. The largest differences in how well Insignia works appears to be the specific genus involved. This was apparent on our powdery mildew trials (and also reported in the non-ornamental crops). We also have seen somewhat better results in our Fusarium trials that may be due to the ability to get excellent coverage in containers that might not be possible in the field. In contrast, we saw less control of Pythium than that reported for non-ornamentals. It will be up to you to determine your best uses for this new, very broad-spectrum fungicide.

Disease	Pathogen	Control
Anthracnose	<i>Colletotrichum</i> , <i>Glomerella</i> , <i>Phoma</i> , <i>Phomopsis</i> , <i>Mycosphaerella</i>	Very good to excellent
Leaf spots	<i>Alternaria</i> , <i>Bipolaris</i> , <i>Cercospora</i> , <i>Corynespora</i> , <i>Drechlera</i> , <i>Septoria</i>	Excellent
Botrytis blight	<i>Botrytis</i> , <i>Monilinia</i> , <i>Sclerotinia</i>	Some
Downy mildew	<i>Bremia</i> , <i>Peronospora</i> , <i>Plasmopara</i> , <i>Pseudoperonospora</i>	Some to excellent (depends on genus)
Powdery mildew	<i>Erysiphe</i> , <i>Leveillula</i> , <i>Microsphaera</i> , <i>Oidium</i> , <i>Podosphaera</i> , <i>Sphaerotheca</i> , <i>Uncinula</i>	Good to excellent
Fusarium	<i>Fusarium</i>	Some
Phytophthora and Pythium	<i>Phytophthora</i> , <i>Pythium</i>	Good to excellent
Rhizoctonia	<i>Rhizoctonia</i>	Good
Rust	<i>Puccinia</i> , <i>Uromyces</i> , <i>Hemiteleia</i>	Excellent

Pathogen (disease)	Rate and application method	Results of the trials
Alternaria leaf spot	2-4 oz spray	Very good to excellent
Anthracnose	8 oz spray	Some to excellent
Botrytis blight	4-16 oz spray	Poor to very good
Cercospora leaf spot	4 oz drench or spray	Very good on <i>Mollucella</i> seed as a drench, very good to excellent as a spray
Coniothyrium canker	16 oz spray	None to good
Cylindrocladium cutting rot	8-16 oz sprench	Good to very good
Downy mildew	2-8 oz spray	Poor on rose (2 oz) very good to excellent at higher rates on other crops
Fusarium wilt	2-8 oz drench	Good to very good
Fusarium stem rot	10 oz sprench	Very good on holiday cacti
Gliocladium (pink rot on palms)	10 oz stem spray	Very good
Mycocentrospora leaf spot	5 oz spray	Excellent
Myrothecium petiole rot	8 oz sprench	Excellent
Phytophthora aerial blight	8-16 oz spray	Excellent
Phytophthora root rot	8-16 oz drench	Very good to excellent (12-16 oz)
Powdery mildew	4-16 oz spray	Good to excellent (not as effective on rose as other hosts)
Pythium root rot	8-16 oz drench	Good
Rhizoctonia damping-off and cutting rot	2.5 to 4 oz drench, 12 oz sprench, 8-16	Very good on seedlings (2.5-4 oz) and good to excellent on cuttings (12-16 oz)
Rust	2-16 oz spray	Very good to excellent as a preventive (2-8 oz), some as an eradicant (8-16 oz)
Scab (Sphaceloma)	4 oz spray	Excellent
Sclerotinia blight	12-16 oz sprench	Very good