



## ORNAMENTAL VIRUSES

In late July, I attended the annual meeting of the American Phytopathological Society in Austin, TX. I attended a meeting of the ornamental virus working group. I try to sit in on at least part of this informal meeting every year to find out the most current research in this vital area. The group was formed a number of years ago and meets at least once a year. Much of the efforts have been to design sampling methods that are reliable and effective for the multitude of viruses being found in many of our newest crops.

Melodie Putnam is extension plant pathologist at Oregon State University. She runs the diagnostic lab and does research as well. Melodie reported on work she has been performing for 2-3 years on a new potyvirus on verbena that has been identified as Bean Yellow Mosaic Virus. It causes mosaic, dead spots, stunting and yellowing. The virus is easiest to detect in vigorously growing verbena at 70-78 F. The best recovery is from the tips of these shoots.

Deborah Mathews and Allan Dodds are virologists at the University of California at Riverside. They have found that some plants have as many as 4 or 5 different viruses (mixed infection). The virus they are concentrating on is a Tymovirus and has been found in *Diascia*, *Verbena*, *Nemesia*, *Torenia* and *Phlox*. This virus also is easiest to detect in the newest leaves and is unevenly distributed in the plant. This new virus has been found to pass through meristem culture (tissue-culture) which is very unfortunate since this is one of the best ways to clean up plants from virus infections.

Mike Tiffany is a virologist at Agdia, a company specializing in diagnosis of viruses, bacteria and other fastidious microorganisms causing plant diseases. Mike reported on the development of a relatively new test for Scrophularia mottle virus. It was first reported in 2002 in Europe but appeared to be widely distributed across the US by the end of 2003.

Clarissa Maroon-Lango (USDA—Beltsville) is working on a new Ilarvirus on *Bacopa*. She has also found that moderate temperatures (68F) are best for recovery of the virus and that higher temperatures reduce your ability to find it in the host. Mild symptoms usually mean low ability to recover this virus.

Amy Grincewicz from Ohio State University has been working on TMV (tobacco mosaic virus) in petunia. She has found that treating the petunias with IBA increases the concentration of TMV, thus making it easier to find in the plant.

Many more virologists across the US are members of this group working on a number of new viruses. Some of this work is supported by the Floral Initiative funding and we hope this continues. It is very important for ornamental producers to be able to reliably test and produce virus-free plants.

### Dahlia Mosaic Virus

Pappu, Wyatt and Druffel (Washington State University) reported in the June issue of *HortScience* (40(3):697-699) on their work on detection and distribution of Dahlia Mosaic Virus in US dahlias. Their survey occurred in 2003 and 2004. Symptoms included mosaic, yellow spotting, veinal yellowing, systemic yellowing, stunting, deformity and mottling. There was no correlation between the cultivar and the type of symptom expressed.

Of 156 samples received, 85% were positive for Dahlia Mosaic Virus including at least 25 different cultivars from eight states. None of the samples tested positive for Impatiens Necrotic Spot Virus (INSV), Tomato Spotted Wilt Virus (TSWV) or Cucumber Mosaic Virus (CMV). Each of these has been found occurring in dahlias and all are relatively easy to spread through propagation material. Their PCR test allowed rapid detection of Dahlia Mosaic Virus effectively.

### Inside this issue:

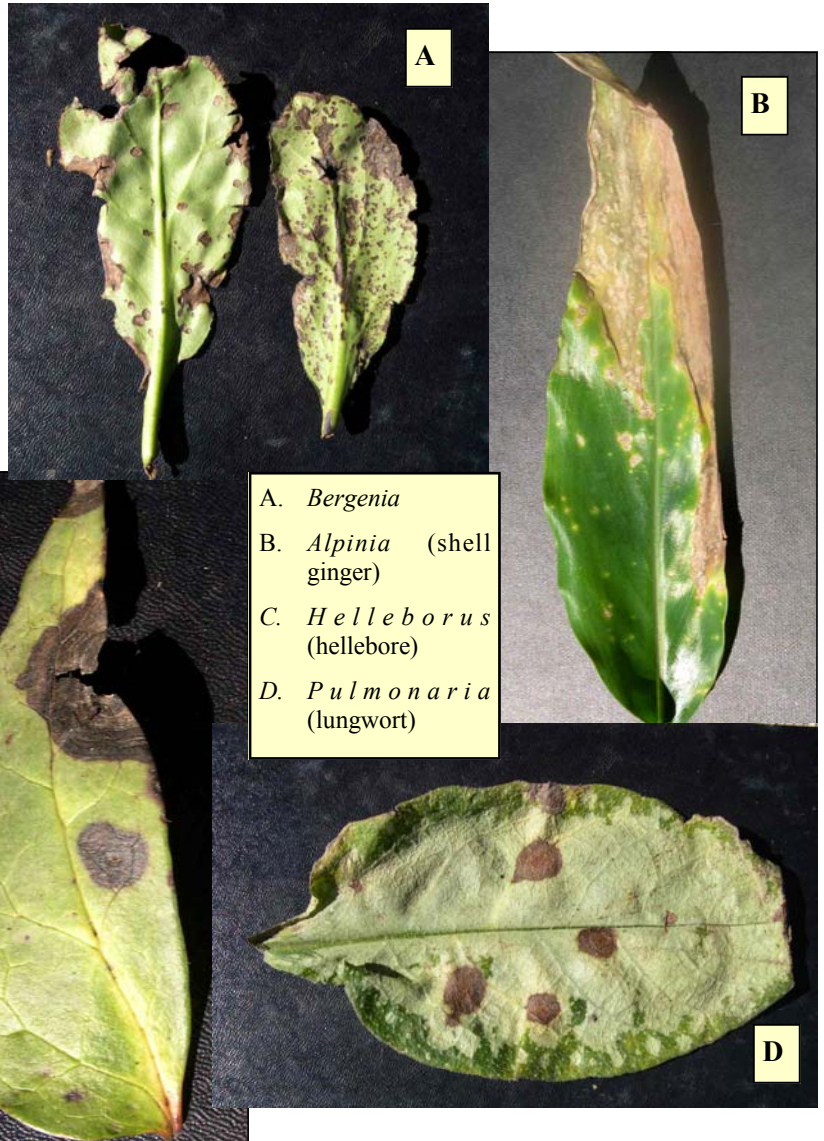
Watch out for Anthracnose and Related Diseases	2
Rhizoctonia Update	3
Rooting of Geranium Cuttings is not Affected by	3
Powdery Mildew Control on Miniature Rose	4
Some Costs of Herbicides for Control of Weeds	4

# Watch out for Anthracnose and Related Diseases

We have been getting quite a few samples in the past two months with anthracnose pathogens. These include *Colletotrichum*, *Gloeosporium* and *Glomerella*. The four pictures to the right show some of our most recent isolations including several perennials. I would include some related fungi (*Phyllosticta*, *Phyllostictina* and *Phoma*) that cause similar symptoms in this grouping.

The most common symptom caused by these fungi is leaf spot and blight. Blight occurs when conditions are very favorable for the disease and single leaf spots grow into each other, merging into a large blighted area. The spores of these fungi spread easily by rainfall and overhead irrigation. They are produced in a sticky mass and do not move by simple air movement via wind or fans.

The most common cause of anthrac-



A. *Bergenia*  
 B. *Alpinia* (shell ginger)  
 C. *Helleborus* (hellebore)  
 D. *Pulmonaria* (lungwort)

<i>Colletotrichum</i> , <i>Gloeosporium</i> and <i>Glomerella</i>	<i>Phyllosticta</i> , <i>Phyllostictina</i> and <i>Phoma</i>
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<i>Alocasia</i>	<i>Anisodonteia</i>
<i>Aster</i>	<i>Bignonia</i>
<i>Belamcanda</i>	<i>Bougainvillea</i>
<i>Bergenia</i>	<i>Centranthus</i>
<i>Bougainvillea</i>	<i>Cornus</i>
<i>Carpenteria</i>	<i>Cuphea</i>
<i>Chrysanthemum</i>	<i>Delphinium</i>
<i>Clematis</i>	<i>Gardenia</i>
<i>Gardenia</i>	<i>Hydrangea</i>
Gingers	<i>Lavandula</i>
<i>Helleborus</i>	<i>Penstemon</i>
<i>Hemerocallis</i>	<i>Phoenix</i>
<i>Heuchera</i>	Tarragon
<i>Hosta</i>	<i>Viburnum</i>
<i>Hydrangea</i>	<i>Vinca minor</i>
<i>Lupinus</i>	
<i>Penstemon</i>	
<i>Pulmonaria</i>	
<i>Stokesia</i>	
<i>Thymus</i>	
<i>Viola</i>	

nose that has been identified is *Colletotrichum gloeosporioides*. This fungus does not exhibit any host specificity. That means that one type can attack many different plants. The perfect state of this fungus is *Glomerella cingulata* so sometimes this is the stage that will be isolated.

The "anthracnose" fungi cause very similar spots and can be controlled with similar methods. If you can eliminate leaf wetting by rainfall and overhead irrigation they will not occur at all. They can be real problems during propagation since this nearly always means overhead mist on tightly packed cuttings. Disease spreads rapidly throughout the flats of

cuttings causing 100% loss. If you do not control anthracnose diseases at this stage you will be fighting them for the rest of the production cycle. Camellias have an anthracnose disease that starts as leaf spots in propagation and can resurface on 2-5 gallon pots a year or two later as a stem rot and dieback. At this stage you cannot do much to eliminate losses and disease can only be reduced if attacked during the propagation stage.

Quite a number of fungicides have been tested over the past few years. I summarized this work in July of 2004. The best products were mancozeb (like Dithane and Protect T&O), strobilurins (like Heritage and Cygnus) and chlorothalonil (like Spectro and Daconil Ultrex).

# Rhizoctonia Update

## Controlling Rhizoctonia Cutting Rot on Hydrangea

We have been doing a series of trials in the past two years on controlling Rhizoctonia cutting rot during propagation. Last year, we concentrated on poinsettias but this year we have been doing hydrangeas. In each trial, we have treated the cuttings a single time as a sprinch (spray directed to the stems). Treatments included Insignia (12 oz/100 gal), Heritage (2 oz), Contrast (2 oz), 3336 (16 oz), Terraclor (8 oz), Chipco 26109 (16 oz) and Terraneb (12 oz).

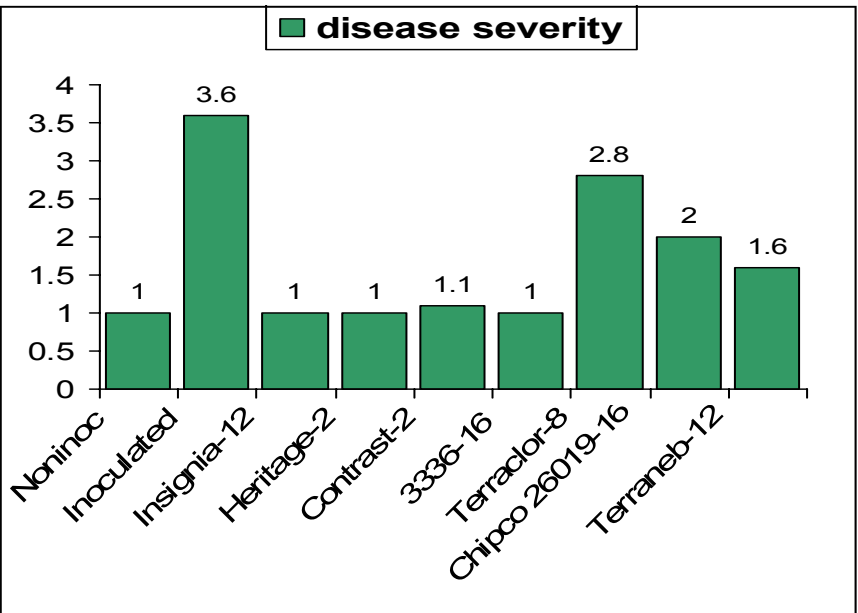
The day afterward we inoculated with an isolate of *R.solani* originally from hydrangea. In as short a time as three days after inoculation stem rot was obvious. The data in the bar graph below was taken 10 days after inoculation. Disease was rated as follows: 1 (none-healthy), 2 (slight stem canker), 3 (moderate), 4 (severe) to 5 (dead). The photo below shows a rating of 4.



Disease was completely prevented by Insignia, Heritage and 3336 with Contrast nearly as effective. Terraneb provided good control with Chipco 26109 almost as good. Least control was provided by Terraclor but even this was better than nothing (statistically).

<b>Very good to</b>	<p>The listing to the left is a summary of the results of our trials on Rhizoctonia control (1997-2005). Even the best products show a range of reactions since disease severity and even host plant affects how well they work from trial to trial.</p> <p>Best overall products for Rhizoctonia control in containers include Medallion, Heritage, Chipco 26109 and 3336. You can see that many other fungicides are also very effective.</p>
Chipco 26019	
Contrast 70WSP	
Daconil Ultrex	
Fungo Flo	
Heritage	
Insignia	
Medallion	
Spectro 90WDG	
Terraneb	
Terraclor	
Terraguard 3336	

**Rhizoctonia Web Blight on Azaleas** - Copes and Scherm recently reported on the effect of plant spacing on severity of Rhizoctonia web blight on container-grown azalea. The researchers measured the evaporation, relative humidity, leaf wetness and temperature as well as disease severity. Evaporation improved as plant spacing increased as one would expect. The number of hours that optimal disease temperatures (77-86F) were shorter as spacing increased. Neither leaf wetness nor relative humidity were affected by spacing. Finally, the severity of Rhizoctonia web blight was not affected by spacing treatment. Although plant pathologists have recommended spacing to reduce disease severity this research does not support its benefits. The authors mentioned the over-riding effects of daily overhead irrigation and tight canopy of the crop. For a complete report see HortScience 40(5):1408-1412.



## Rooting of Geranium Cuttings is not Affected by Fungicides

In 1983, Moorman and Woodbridge (Plant Disease 67:612-613) tested the effect of fungicide drenches on root initiation on geraniums. They studied the fungicides that were available at that time and found that they generally did not enhance or inhibit rooting of two zonal geraniums and an ivy geranium cultivar. Products that are still in use include etridiazole (Terrazole or Truban) and mfenoxam (Subdue MAXX – they actually tested Subdue 2E).

We performed similar work over the past few months. We reported on the first trial a couple of months ago and now can report on the second trial. We tested the products listed in the table to the right at the rates listed. The tests were performed

in Oasis cubes as the rooting medium and a zonal geranium cutting. We applied the products a single time after sticking and evaluated root formation after one month.

The results were the same as those reported more than 20 years earlier. The products were neither helpful nor harmful.

Product	oz/100 gal
Subdue MAXX	0.5 oz
Heritage	0.9 oz
Subdue MAXX/Heritage	0.5/0.45 oz
Aliette	12.8-16 oz
Banrot	8-12 oz
Terraneb	12 oz

## Powdery Mildew Control on Miniature Rose

Powdery mildew and miniature roses just seem to go together. One of our most recently completed trials evaluated two formulations of Terraguard (triflumizole) for “prevention” of powdery mildew on four miniature rose cultivars. When we started the test there were a few powdery mildew colonies but they were no obvious or widespread. We treated the plants on a ten day interval three times. One of the cultivars never developed any powdery mildew while the other three developed quite a severe infection (Mistral and Sonja) or only a moderate infection (Denise). We rated the percentage of leaves and stems showing active powdery mildew sporula-

tion. The chemical standard was Pipron and all products were used at 8 oz/100 gal. Although Pipron is used mainly as an eradicant it was certainly tested in this fashion after the powdery mildew had progressed. The table below shows the results 6 days after the final fungicide application.

Although Pipron was significantly better than the water control, it was less effective than either formulation of Terraguard on these three miniature roses in this trial. The Terraguard 4SC appears to be as effective as the Terraguard 50W for control of powdery mildew on miniature roses. We are doing tests on other diseases with these formulations of Terraguard..

Treatment	Rate/100 gal	Denise	Mistral	Sonja
Water	=====	36.0 b	85.6 c	81.0 c
Pipron	8 oz	5.0 ab	18.5 b	17.5 b
Terraguard 4SC	8 oz	3.5 a	5.5 a	0.5 a
Terraguard 50W	8 oz	2.5 a	2.0 a	0 a

## COPPER DAMAGE

Don't forget that if you mix copper with an acidic solution (like Aliette or B-9) you can have copper toxicity. This picture shows typical copper burn on stock. Be sure to apply products at least one



week apart if you must use a copper compound and Aliette or B-9.

## Some Costs of Herbicides for Control of Weeds in Containers

Product	Active ingredient	cost	Cost/Acre	Duration	Cost/year	Manufacturer
Rout	oryzalin and oxyflurfen	\$132/50 lb	\$264	3 months	\$1056	The Scotts Company
Snapshot	isoxaben and trifluralin	\$89/50 lb	\$267	3 months	\$1068	Dow AgroSciences
OH2	oxyfluorfen and pendimethalin	\$159/50 lb	\$318	3 months	\$1264	The Scotts Company
RegalKade	prodiamine	\$61/50 lb	\$183	2-3 months	\$878	Regal Chemical Co.
Surflan	oryzalin	\$340/2.5 gal	\$102	3-6 months	\$408	Dow AgroSciences and others
Ronstar 2G	oxadiazoin	\$84/50 lb	\$252	2-3 months	\$1008	Bayer Environmental Science



I recently attended the Far West Show in Portland Oregon and spent some time trying to learn something new. One talk I attended was given by Dr. Cheryl Wilen, UC Riverside Extension Weed Specialist. She gave a nice overview of container weed control including the information in the table above. I really thought her inclusion of information on actual annual cost of using each herbicide as affected by length of activity was very helpful. I added the columns on manufacturer and active ingredient but the rest is Dr. Wilen's work. Thanks—Cheryl!!!