Volume 3, Issue 3

March, 2004

CHASE RESEARCH GARDENS, INC.

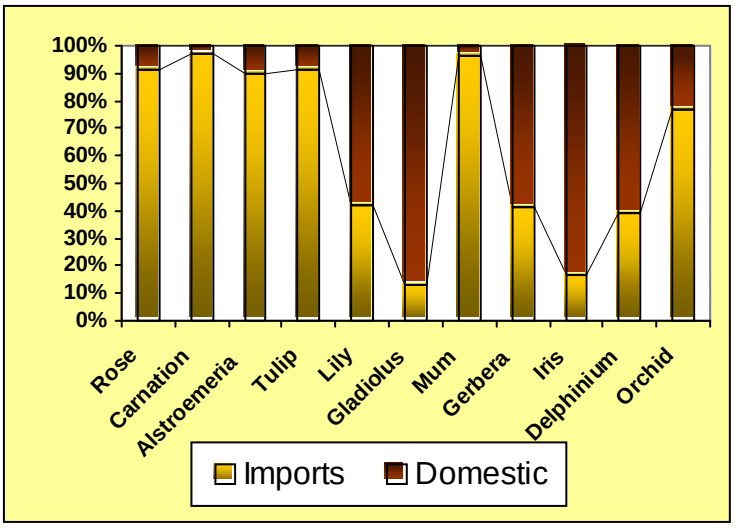
CHASE NEWS

The High Cost of Competing in a World Market

The ornamentals industry is in a constant state of flux with new cultivars developed every year, new diseases being introduced from all over the world and decreasing markets in many segments.

Nowhere is the competition from outside the US more obvious than cut flowers. Over the past 15 years many of our largest crops have been moved offshore. The graph below shows the percentage of key cut flowers produced offshore vs. domestically. An excess of 90% of our rose, carnation, *Alstroemeria*, tulip and mum cuts are produced offshore. We are still producing more than 50% of the lilies (Asiatic and Oriental), gladioli, gerber daisies, iris and *Delphinium* sold in the US.

Production of ornamentals in potting media offshore for sale in the US has been pursued for the past 20 years through a move to weaken Quarantine 37. Currently, a few products can be imported in containers. Although the quarantine is designed to keep new pests from being introduced, there have been quite a few notable introductions in recent times. White rust on mums is well-known and has been intercepted while daylily rust was introduced and well established throughout the continental US. Sudden oak death and *Ralstonia* are the most recent benefits of a shrinking world.



The only real way for US growers to maintain their market share is to stay ahead of the curve on growing and marketing these crops. There is a limit to what can be achieved with pest control chemicals even though we have been in a golden age of new chemistries for insect, pathogen and growth regulation in ornamentals for the past 10 years. Basic research on detection, identification, breeding for resistance and environmental control will be keys to growing ornamentals in the future.

I recently received a copy of the Fred C. Gloeckner Fund Report for 2003. It included quite a listing of the research projects funded over the past few years. The table on the next page shows a small portion of the entire report. I chose these items since they were all disease related projects. It was interesting to see what projects were funded, the amounts funded and the affiliation of the researchers conducting the proposed work.

At first glance, it may seem that there is sufficient effort is being made. Unfortunately, the amount of funding available is, in actuality, too small for much real success. Just think of what it costs you to run your business for a year. The only thing the University is providing in most cases is the researchers' salaries. That leaves all staff and overhead as costs on the current contracts. The range of projects funded by this source is large, although during the past three years, disease projects far outweigh insect and mite projects. It is gratifying to see so many universities involved as well.

Most of the growers I visit understand the importance of marketing and occasionally research. However, I don't think any of us has a full appreciation of the actual cost of doing this research. Funding work after it is needed is not the best approach. Next time you have an opportunity to contribute to research, think about playing a more active role in your future.

Inside this issue:

New Diseases on Some Ornamentals

In recent months quite a number of new diseases have been reported by various researchers. Some of the reports have been made on the web while others were published in magazines. The original source for each is given.

Rust on Simpson's stopper, bottlebrush and weeping willow

Dankers at the Division of Plant Industry in Florida reported on a couple of new rust diseases. *Puccinia psidii* causes rust on Simpson's stopper (*Myricianthes fragrans*) and bottlebrush (*Callistemon citrinus*). It was previously found on allspice in Florida. The other rust, *Melampsora epitea* was reported on weeping willow (*Salix babylonica*). Pictures are included of the symptoms and the rust spores.

(http://extlab7.entnem.ufl.edu/PestAlert/tmm-0209.htm)

Downy mildew on Rudbeckia

A new report of downy mildew on Black-Eyed Susan was also made from Florida by Dankers et al. early this year. He reports that *Plasmopara halstedii* was found causing disease in August 2003 on perennial 'Goldsturm' in a nursery. The disease appeared after extensive rainfall. This pathogen causes downy mildew on a large number of Asteraceae including sunflower and *Osteospermum*. Pictures of the disease and sporangia are included

(Online Plant Health Progress doi:10.1094/PHP-2004-0119-01-HN.)

Phytophthora on Liriope

Jim Strandberg has been working on a serious disease on *Liriope muscari* caused by *Phytophthora palmivora.* As the name suggest this pathogen attacks palms all over the tropical regions of the world. Symptoms on Liriope can include leaf rot and crown rot but always include root rot. 'Evergreen Giant' appears to be the most commonly produced cultivar of Liriope and also the most susceptible to this disease. Since this crop is often propagated via division it is critical that healthy plants are used to start each new crop. Even the best fungicides cannot stop this disease when infected divisions are used.

(Ornamental Outlook Jan 2004 pp. 16-17. jos@mail.ifas.ufl.edu)

Chlorine Dioxide for *Fusarium* and *Thielaviopsis*

Copes, Chastagner and Hummel reported on research conducted with chlorine dioxide (ClO2) for control of two fungal pathogens in water. This disinfestant is approved for treatment of public and private drinking water and handling of many meat, fruit and vegetable products. The oxidative potential for ClO2 is 2.5 times greater than that of the hypochlorites (like bleach). Use of this product in the ornamental industry has not been developed extensively.

The trials evaluated the effects of pH, nitrogen, copper, iron, manganese and zinc on ability of chlorine dioxide to kill spores of both *Thielaviopsis basicola* and *Fusarium oxysporum*. These fungi represent two of the toughest pathogens to control in water, potting media or soil.

More ClO2 was needed when the pH was 8 than when it was 5 to give an equivalent control of these fungi. All of the metal ions interfered with the action of the ClO2 and more was needed to kill the fungi if copper, iron, manganese or zinc were present in the solution. (Plant Disease 88:18-194, 2004)

Fred C. Gloeckner Foundation Ornamental Disease Control Funding

Research Topic	Researcher (Institution)	Year/Amount
Discovering powdery mildew resistance genes in roses	Rajapakse (Clemson U)	2001-2002/$24,000
Evaluation of *Myrothecium roridum* and *Thielaviopsis basicola* as potential seedborne pathogens of pansy	Warfield (North Carolina State U)	2001-2002/$20,994
Postproduction quality in the Regal Pelargonium: Botrytis	Craig (Penn State U)	2001/$10,400
The potential for biological control of Botrytis blight on geraniums with antagonistic yeasts	Jeffers (Clemson U)	2001-2002/$15,000
Integrated management of late blight on petunia in the greenhouse	Fry (Cornell U)	2002-2003/$19,000
Population database for tracing origin and movement of *Pythium*	Moorman (Penn State U)	2002/$10,000
Development of caladium cultivars resistant to Fusarium tuber rot	Harbaugh (U of Florida)	2002-2003/$18,000
Bacterial wilt of geranium	Norman (U of Florida)	2002/$10,000
Effect of inoculation and mycorrhizal fungi on growth, flowering and tuber composition of Zantedeschia/Canna	Scagel (USDA)	2002-2003/$18,000
Disease control of commercial greenhouse crops with essential oils from Monarda	Hamilton (U of Tennessee)	2002/$12,000
Potential use of chlorine dioxide gas disinfectant to control post-harvest diseases of ornamental bulbs and cut flowers	Chastagner (Washington State U)	2003/$10,000
Disease development in ethylene insensitive etr1-1 petunia infected by *Thielaviopsis basicola* under low phosphorous stress	Kim (Penn State U)	2003/$8000

Controlling Downy Mildew and Xanthomonas Blight—*Matthiola*

Over the past few months we have been working on a variety of winter-time diseases including downy mildew, Sclerotinia blight, Xanthomonas blight and Botrytis. In this issue of **Chase News** we report on results from some recent trials on stock (*Matthiola*).

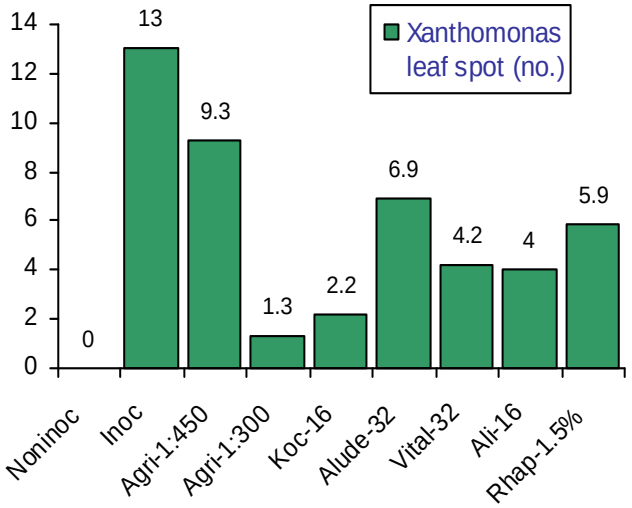
Stock is grown as both a cut flower and bedding crop with much the same range of diseases. Bacterial leaf spot and blight on stock is caused by *Xanthomonas campestris* pv. *campestris* and has been shown to be a seed-borne problem at times. The same pathogen can affect alyssum, cabbage, broccoli, wallflower and candy tuft.

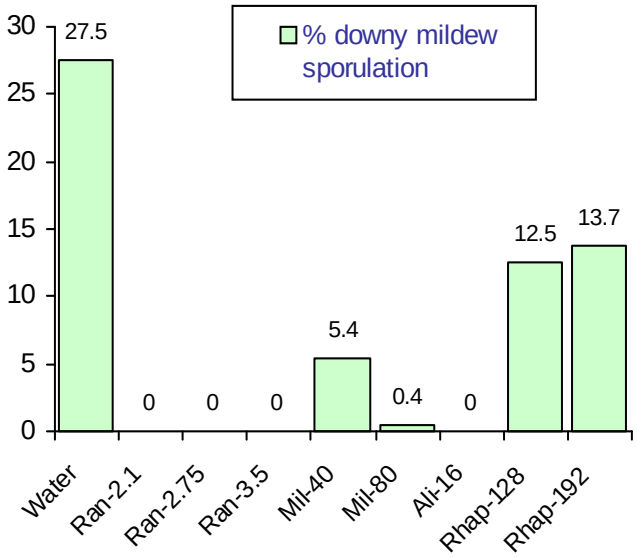

Xanthomonas blight

Chemical control has often been based on use of copper products. Over the years we have worked with Aliette for bacterial leaf spot control with mixed results. Since the advent of the phos-acid alternatives (like Alude and Vital) I have been wondering what control if any they might afford for bacterial leaf spots.

We started our trial by establishing stock plugs ('Midget Violet') in 3.5 inch pots containing Sunshine No. 1. We top-dressed the pots with Osmocote Plus 15-9-12 once at the beginning. Plants were sprayed to the point of drip with one of the following products: Agri-50 (1:450 or 1:300), Kocide TNO 2000(1 lb/100 gal), Alude (32 oz), Vital (32 oz), Aliette (16 oz), and Rhapsody (1.5%). Plants were inoculated with the pathogen after the first spray.

The number of spots per plant was recorded after the 4th spray (10 day interval) and is shown in the graph below (left, dark green bars). Both Kocide TNO and Agri-50 (1:300 dilution) gave very good to excellent control. Aliette and Vital and Alude to a lesser degree appeared to give good control of Xanthomonas on stock. Rhapsody was also reasonably effective in preventing Xanthomonas blight on stock in this trial.





We tried a few of the same products in a second trial on stock. This time we were targeting control of downy mildew. This disease is caused by *Peronospora parasitica* on members of the stock family.

We started again with plugs ('Vintage Yellow') in 3.5 inch pots containing Sunshine No. 1. We top-dressed the pots with Osmocote Plus 15-9-12 once at the beginning. Plants were sprayed to the point of drip with one of the following products: Ranman (2.1, 2.75 or 3.5 oz/100 gal) mixed with Silwet (2 oz/100 gal), Milstop (40 or 80 oz), Aliette (16 oz), and Rhapsody (1 and 1.5%). Plants were exposed to the pathogen after the first spray by placing infected stock in the same greenhouse. Fans were used to spread spores from infected plants onto the test plants.


Downy mildew

We rated the percentage of leaf area with downy mildew sporulation after the fourth spray (14 day interval). The graph above (light green bars) shows the trial results. Ranman provided 100% control at all rates tested with no signs of phytotoxicity. Aliette also provided 100% prevention without any plant damage. While Milstop gave good to excellent control, leaf burn and distortion did appear, especially at the 5 lb (80 oz) rate. It was slight at 2.5 lb but moderate to severe at the 5 oz rate and even resulted in slight stunting. Rhapsody did not cause any phytotoxicity at the rates tested and gave some control of this downy mildew.

Several products currently on the market might be used to control a variety of diseases. The fact that some can cause damage makes Botrytis a concern (see the next page).

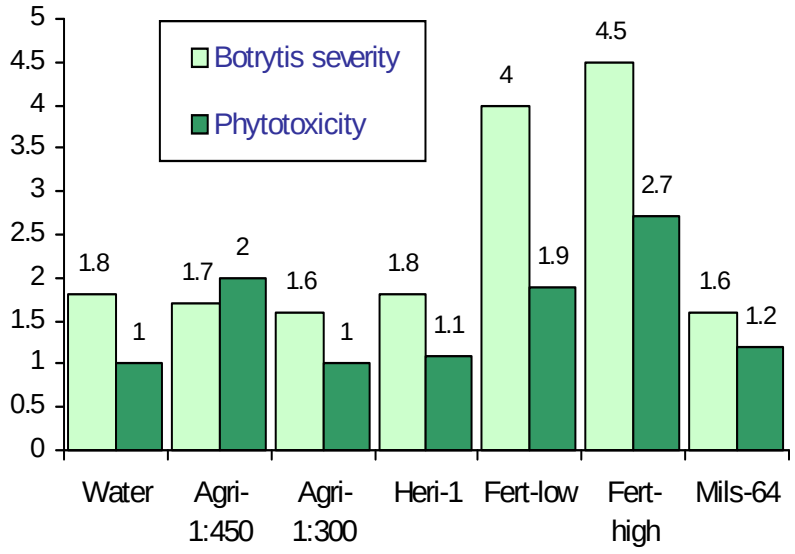
Botrytis Blight on Stock and the Effect of Phytotoxicity

We started a third trial with stock a couple of months ago. Our original disease target was downy mildew but the trial rapidly became a Botrytis blight trial. Plants were established again in 3.5 inch pots containing Sunshine No. 1 and top-dressed with Osmocote Plus 15-9-12. We used 'Vintage Lilac' and sprayed the plants three times on a 14-day interval. The following treatments were included: Agri-50 (1:450 and 1:300), Heritage (1 oz/100 gal), an experimental fertilizer (low and high rates) and Milsana (64 oz/100 gal).

Botrytis blight moved in about midway through the trial. We rated both phytotoxicity (dark green bars) and severity of Botrytis (light green bars). Both were rated on a scale from 1 (none) to 5 (dead plant). None of the treatments gave any control of Botrytis.

There was a correlation between phytotoxicity and Botrytis severity with the fertilizer treatments. Both rates of the fertilizer caused slight to moderate phytotoxicity (burning) and provided excellent growing grounds for Botrytis. The result was severe Botrytis. This indicates the potential for even slight damage to act as a starting place for Botrytis.

Our previous experience with some of the products for Botrytis blight indicates that Heritage might have given some control. Our trials have not been good with Botrytis for either Milsana or Agri-50. A comparison to one of the first string Botrytis fungicides would have been my preference but lacking that, we can at least conclude that avoiding phytotoxicity on tender ornamentals is critical in the winter. Even copper products can cause damage leading to development of Botrytis.



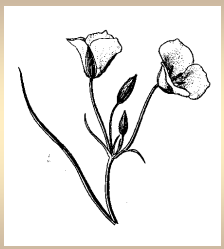
CHASE RESEARCH GARDENS, INC.

8031 MT. AUKUM RD., BOX 529

MT. AUKUM, CA 95656-0529

PHONE/FAX (530)620-1624

MTAUKUM@DIRECTCON.NET



Products in Review—Rhapsody

Late last summer, Agraquest received registration for a new biological control agent called Rhapsody. It is labeled for control of various foliar diseases and contains *Bacillus subtilis*. While it has the same type of bacterium as Companion, the range of activity of this strain differs.

Rhapsody has been very good for powdery mildew and bacterial disease control (including *Pseudomonas* and *Xanthomonas*), good for downy mildew control and some control of *Botrytis*. In addition, some to very good control

Disease	Efficacy
Alternaria leaf spot	**F**
Botrytis blight	**C**
Cercospora leaf spot	**A**
Downy mildew (*Peronospora*)	**B**
Fusarium wilt	**B+**
Phytophthora stem rot	**C**
Powdery mildew	**B+**
Pseudomonas leaf spot	**B+**
Pythium root rot	**B+**
Xanthomonas leaf spot	**B+**

of some soil-borne fungi including *Fusarium*, *Phytophthora* and *Pythium* has also been shown. Several other researchers including Margery Daughtrey (Cornell) and Mary Hausbeck (Michigan State University) have tested Rhapsody. Results of their work and ours are presented in the table above.

One of the most exciting developments is the potential for controlling bacterial diseases since this product makes rotation of chemical classes possible for the first time in many years. Tests over the past 18 months have included Xanthomonas blight on Ranunculus, stock (*Matthiola*) and Geranium and Pseudomonas leaf spot on impatiens, snapdragon and delphinium. Rates of 1 to 2% Rhapsody gave control equal to that achieved with copper products like Phyton 27. A rate of 1.5% appears to be generally effective although higher rates were needed for Xanthomonas blight on geranium.

It is important to know that Rhapsody can be used in rotation with copper or even combined in a tank mix. Agraquest has explained this unique situation as due to a high degree of tolerance of this *Bacillus* to copper.