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CHASE RESEARCH GARDENS, INC.

CHASE NEWS

Finding Problems Everywhere

I do a little on-site consulting and otherwise visit nurseries and greenhouses anytime I get a chance. The first thing I often hear is that there really aren't any diseases in their operation but I always find something that the grower did not know was there. One reason is that hopefully I am more in tune to disease problems than a grower but another is simply that when you see something all day every day it is easy to miss subtle changes.

In November, I participated in a training meeting for one of the larger chemical companies at a San Diego resort. Mike and I walked around the extensive grounds a couple of times and I found some plant problems. You really can find problems everywhere. Some of these problems started back at the production phase while others start in the landscape.

We saw Phytophthora crown rot on some pansies (below), Alternaria leaf spot on Impatiens and daylily rust. Each of these problems started during production of the crop. It is unfortunate that once a ground bed is infested with something like *Phytophthora* it will likely remain infested and other plantings may suffer from the disease as well. There are very few steps taken (legal or otherwise) in a landscape to control a soil-borne disease. Our clinic received a sample of perennial that proved to be suffering from Phytophthora crown rot. In an effort to track down the source, the landscaper sent in a sample of the crop still in the can. It too was infected with *Phytophthora* although it appeared healthy. Some of the other problems I found included those caused by insects. It is often easier to locate problems caused by insects since they are more obvious. There were quite a few plants infested with sooty mold giving them a black coating that was very distinctive. Sooty mold grew on all of the plants immediately below trees and shrubs with scale, mealy bugs and GIANT whiteflies. This was especially easy to see on the plants with variegated leaves like this pittosporum. The sooty mold grows on the honeydew (droppings) from the insect pest which is sometimes difficult to find. The giant whiteflies were very active on these hibiscus. We ran into the resort manager who said they had just removed some other plants infested with this pest. Too bad they did not find it earlier when treatment was still an option. It is important for each of us to check our plants for problems routinely but especially before shipping and upon receipt. Diseases can and do occur at all phases of crop production from the seed to the landscape.

Inside this issue:

Chase Research—How We Work

We had a recent request for a description of how we operate here at **Chase Research**. So I decided to do just that.

Our research and diagnostic facilities are located in Mt. Aukum, CA about an hour east of Sacramento in the foothills. We have an office/lab about 2 miles from our greenhouses/lab facility. Mike and I normally work out of the office and Linda and Keith work out of the greenhouse/lab site.

Chase Research performs about 100 trials annually on products for the horticultural industry including fertilizers, wetting agents, potting media, biological control agents, fungicides and plants. We perform trials in ten small greenhouse/ shade house structures as well as in the ground and in containers in full sun. The photo above shows three greenhouses that were constructed similarly to perform replicated trials. They are each about 300 square feet.

Other greenhouses are setup with overhead sprinklers (left, below) which turn out to be necessary for some foliar diseases caused by bacteria and fungi. At other times, we use humidifiers to increase the relative humidity without putting excess moisture on leaves. These are often used for powdery mildew, downy mildew and rust trials. The foggers generate enough moisture to completely obscure the view in a 50 foot long greenhouse within 10 minutes. When all else fails we put plants into plastic bags.

We do as much to control the environment as possible but for the most part perform the trial when the conditions are most likely to promote the appropriate disease. Having ten small structures helps since they are each a little different and we can usually find the right spot for each trial.

We inoculate most of the trials with pathogens we have recovered in our diagnostic lab and then grown in culture plates with special nutrients for each type of pathogen. The photo to the right shows Linda making a batch of culture medium. Once the fungus or bacterium grows enough we can use it for inoculating an experiment.

We obtain plugs and liners from quite a few growers well in advance of starting a new trial. Most of the time we grow the test plants for 2-6 weeks to make sure they are disease and insect free as well as free of pesticide residues. Then we can apply the test product and follow-up with an inoculation of the specific pathogen we are targeting. This is the only way I know to make sure we are testing the right disease.

The trials are all set-up to allow statistical analysis of the data we collect. For trials that are sprayed we often arrange them in a randomized compete block with multiple pots per block. All of the plants are potted in a commercial medium (Sunshine No. 1 mainly) and we use Osmocote Plus 15-9-12 (3-4 month usually for indoor trials) as a top-dress. Plants are watered by hand generally although we do have a set of ebb and flood trays as well.

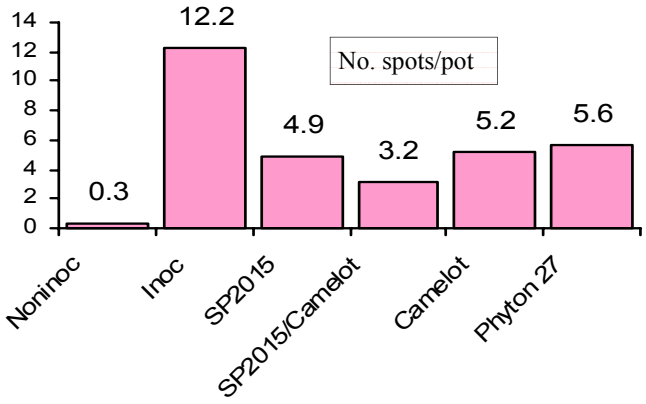
The trials take anywhere from 5 weeks to a year depending upon the protocols and the pathogens involved. We did rose work this past spring and summer (photo below) that lasted about 6 months. Linda and Keith rate everything from disease incidence and severity to plant growth (height, number flower, top weight and root weight) and residue. No two pathogens work the same.

At the end of each trial, Keith writes a draft of the report and I finalize it for the client. It is common for the report to be e-mailed to the client within a few days of trial completion and the greenhouse is already going with the next trial.

One More Bacterial Trial

In October, we reported on two trials with an experimental product from SePRO—SP2015. The product was tested alone and in combination and results on hydrangea and magnolia showed equal control to copper bactericides. We have been working on bacterial leaf spot control whenever possible in the past ten years. The first trials, centered on use of Phyton 27, quickly followed by Camelot, Kocide and Junction. At this time we are working on a numbered product from SePRO Corporation—SP2015. Results of two of these trials are presented here.

The third trial was started at the end of November with *Antirrhinum majus* 'Overture II Yellow' (snapdragon). Plants were inoculated, after one bactericide application, with an isolate of a *Pseudomonas* from snapdragon. Plants were treated with the products on November 29th and again on December 6th. The treatments included: water—noninoculated, water-inoculated, SP-2015 (x rate), SP2015 and Camelot (x rate and 48 oz/100 gal, respectively) and Phyton 27 25 oz/100 gal. They were inoculated with the bacterium on December 1st and placed in plastic bags for one day. Afterward, they were misted every 30 minutes for 30 seconds for 12 hours per day. On December 14th we ended the trial by counting the number of spots per pot (these plants were about 3-4 inches tall).



Results on this bedding plants were the same as those seen in the earlier woody trials. SP2015 was as effective as the copper standards used alone or in combination with Camelot. This spring we will be testing this new compound against fire blight (*Erwinia amylovora)* and some fungal leaf spots too.

Clinic Update From England

I have been receiving a great newsletter from England called the ADAS Hardy Ornamentals Technical Notes. I have been interested especially to see what their clinics are finding in samples during the preceding month. In November and December they reported the diseases listed in the table to the right. I use their lists as a warning of what I might see in our clinic or the nurseries/greenhouses I visit. We all grow the same crops and often have the same diseases.

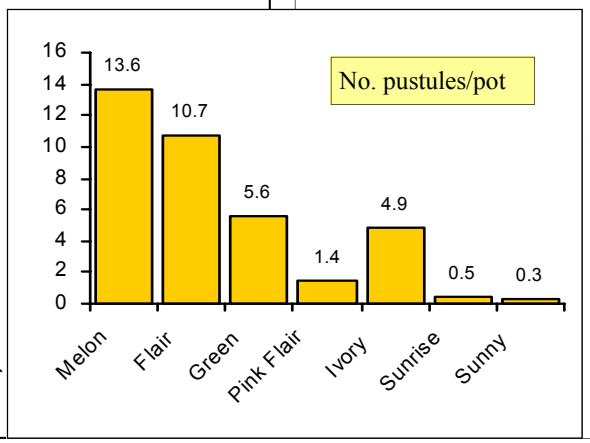
Disease	Plant
Botrytis blight	Clematis, Lonicera, Jasminum, cyclamen and primrose
Black leaf spot	Helleborus
Downy mildew	Hebe, Digitalis, sun-
Ramularia leaf	Primrose and pansy
Rust	Bellis and dianthus

I have been watching for certain diseases such as the Bellis rust for the past few months and have failed to find it on Bellis. I have however, seen it on our common groundsel in several nursery settings recently.

The most common problems I am finding on greenhouse crops are bacterial leaf spots (lavender and *Erysimum*) and LOTS of Botrytis on lavender, Salvia and other crops in propagation. We just started seeing Botrytis flower spot on our cyclamen in trials and finished a test with rose cuttings. Unfortunately, we were supposed to be testing Cylindrocladium cutting rot on the roses when the Botrytis took over and ruined the trial. We are repeating the trial in a week with Botrytis fungicides this time. The Cylindrocladium trial on roses will have to wait until warmer weather.

Hypericum Resistance to Rust

We work a lot on fungicide control of many ornamental diseases and once in awhile we get a chance to look at alternative means of reducing disease severity. One such opportunity occurred last summer when we received rooted cuttings of seven Hypericum cultivars. All of them are used for the cut foliage industry where rust can just as severe as in ground cover Hypericum plantings. The plants were incubated for 3 months before we counted the number of pustules (December 14th). The first sign of rust appeared on the Green cultivar about 2 months after the trial started but by the end of the trial, Melon and Flair had significantly more rust than the other cultivars tested. Too bad we cannot choose what to grow based on disease susceptibility alone.



Rust Control Strategies

A couple of years ago I was asked for a rust control program for roses and came up with the following suggestions. They are based on our research trials as well as many conversations with growers of all types of ornamentals. In the past 8 years we have completed one trial on roses rust, 7 on snapdragons, 5 on geraniums, 7 on Hypericum, 2 on *Bellis* (English daisy) and one on *Solidago*.

1. Heritage is the best rust product we have tried on all of the crops mentioned above except roses. We have used Heritage at 1-2 oz/100 gal. Heritage must be mixed with a spreader (wetting agent) if it is to work at all on rust eradication.
2. Mancozeb (Protect T&O, Fore and Dithane) is an excellent rust fungicide if used preventatively. This may not be possible in cut rose production due to severe residue and perhaps REI. Most of our trials have used the product at 16-24 oz/100 gal.
3. The most effective sterol inhibitor fungicide has been myclobutanil (Systhane 40WP is now called Eagle). We have seen it give 100% control in many trials when used at 2-3 oz/100 gal.
4. The spray interval should be once a week. Never go more often as the increased water from the spray makes some diseases (like downy mildew and Botrytis at least much worse).
5. Coverage is critical. Use a wetting agent – Capsil is as good as any other in our trials. We use it at 4 oz/100 gal.
6. Try to open up the canopy if possible. Are you practicing the bent cane method? That appears to make rust a lot worse than the previous upright system. This is obviously because of the increased relative humidity as well as the difficulty of thorough spraying.
7. Rotate or mix products. Work performed by University of Georgia researchers shows that the sterol inhibitors (triadimefon, myclobutanil and propiconazole) are poor at killing rust spores. In contrast, copper pentahydrate (Phyton 27), chlorothalonil (Daconil Ultrex), azoxystrobin (Heritage) and mancozeb (Dithane T/O) each gave 100% kill on the rust spores).

Gray Days Mean Gray Mold

Although *Botrytis* causes the most severe losses during the winter months it can actually be found year-round in some environments. The most common plants attacked include: geranium, cyclamen, poinsettia, rose, gladiolus, pansy and primrose. However, we can find Botrytis on many other ornamentals. *Botrytis cinerea* is the most common species that affects ornamentals but we do find others on lilies and tulips. *Botrytis cinerea* is a very cosmopolitan and undiscriminating pathogen. That means it is everywhere and attacks almost anything with the right conditions. The cool, dark winter months result in excessive humidity and/or free moisture on leaves and the fungus thrives.

One of the most important characteristics of Botrytis blight to remember is that the fungus is able to live on active and damaged tissues. It easily attacks flowers since they have poor ability to combat infections (Botrytis on New Guinea Impatiens–right).

Infections come from a variety of sources including infected cuttings, wind-blown spores from other infected plants and even petals from hanging baskets. When infected petals fall onto other plants or healthy leaves they can transfer the fungus into the healthy plant. The plants below received a rainfall of infected impatiens petals that resulted in some infections on the Gerber daisies. While this is not something that can necessarily be avoided you should at least recognize the potential for this infection source.

Cultural control of Botrytis can be effective but only if you can control the temperature and humidity in your greenhouse. If you produce plants in a less controlled environment then you may have to resort to fungicides for optimal prevention of Botrytis. We have found that the following four active ingredients perform best in our trials: chlorothalonil (Daconil), iprodione (Chipco 26019), fenhexamid (Decree), and fludioxinil (Medallion). Decree appears to be best at eradicating active sporulation although all four fungicides are very effective preventatively.

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