CHASE NEWS

OCTOBER 2012 VOLUME 11 (TEN)

Disease Symposium Watsonville, CA

Last thursday I spoke at a conference in Watsonville, CA which was the brain child of Steve Tjosvold, (first picture on the left), University of California Farm Adviser. Steve has conducted this meeting a number of times before and somehow pulls off a full day of plague and pestilence.

You wouldn't think a bunch of plant doctors would be so happy but we were all in our element that day.

The speakers this year include Margery Daughtrey (Long Island Horticultural Research and Extension Lab - Cornell University). Marge is pictured above with Dr. Darryl Thomas, plant pathologist at Syngenta's Gilroy facility (previously Goldsmith Seeds). Margery updated everyone on boxwood blight (*Cyindrocladium*) recognition and control and impatiens downy mildew. She finished the day out with an overview of *Phytophthora* and *Thielaviopsis* (black root rot pathogen) as key culprits in root diseases on ornamentals.

Dr. Jennifer Parke was a great addition to the roster. Jennifer is a Plant Pathologist at Oregon State University where she has been working on a systems approach to disease control. She spoke specifically about using this method for control of Ramorum blight in Oregon nurseries and water treatment for water molds (afternoon talk). Jennifer is pictured above with Cheryl Fechner from Bay City Flowers in Half Moon Bay, CA.

The final image is of Dr. Jane Trolinger and Bryan Rodgers, also with Syngenta's Gilroy facility. Jane was originally a plant pathologist at Yoders in Alva, FL where she ran the diagnostic lab for many years.

Other talks include one by Steve Tjosvold concerning the use of environmental monitoring equipment to alert growers to disease promoting conditions. He gave price breakdowns of a variety of systems.

Dr. Deb Mathews came up from the University of California at Riverside to help coordinate the afternoon session as well as update us all on viruses on ornamentals. She spoke about tissue-culture and whether or not the process guarantees us the plants are virus-free is an extension virologist and has statewide responsibility in ornamentals. She also conducts some of the critical research needed by our industry as do Steve Koike and Steve Tjosvold. Deb came back in the afternoon to discuss water treatment for virus control.

Steve Koike, University of California Cooperative Extension followed up with a review of INSV including its biology and managment.

What did I do all day besides take a few pictures? I started the day off with an overview of the effect of fertilizer on disease which was well received despite the fact that there were few generalizations I could make. If you are especially interested in this topic, email me and I will send you the PDF of the talk. Right before lunch I gave a quick update of the newest bactericides, fungicides and biological controls for ornamentals. Some of them actually have OMRI listing or are registered for use on some greenhouse vegetables, fruit and herb crops.

At the end of the day, I helped Marge out with the root rot review by tackling Rhizoctonia and Pythium root rots.

It was a great day of focusing on diseases and their control and I thank Steve again for putting it all together for the plant pathologists at least.

Soil-borne Disease Prevention

Empress
Intrinsic™ brand fungicide

Empress fungicide (BASF Corporation) just received federal labeling in late October. We have worked on it for a couple of years and this seems like a good time to give you an overview of the product. I do not have a label at this time, so you must wait for use rates and intervals but at least this will give you an idea about this new fungicide.

Empress contains pyraclostrobin which is one of the ingredients in Pageant. This product is however going to be used primarily for root diseases. The MOA group is 11 which includes the strobilurins.

Last year we completed a few trials using Empress on newly seeded plug flats. We tested Pythium and Rhizoctonia damping-off on celosia and Fusarium damping-off on lisianthus. The rates of Empress tested were: 0.8, 1.5, 3.1, 4.6 and 6.1 oz/100 gal. They were compared to Heritage at 1 oz/100 gal and the inoculated and non-inoculated controls. Fungicides were applied once only before inoculation.. Results are shown below.

PATHOGEN (PLANT)	EFFICACY (OZ/100 G)
Fusarium Lisianthus	excellent (4.6-6.1 oz)
Pythium Celosia	0.8 oz too low very good (1.5-3.1 oz)
Rhizoctonia Celosia	excellent (0.8-3.1 oz) 4.6 or 6.1 too high

The best results were different depending on the pathogen in these three trials. For Lisianthus, optimal control was seen at the highest rates tested probably since Fusarium so hard to control. The pictures to the right show three lisianthus flats. You can see the small size and poor stand of the inoculated controls and good size and stand of the noninoculated controls and the Empress treated (4.6 oz/100 gal) lisianthus.

In contrast, the best rate of Empress on the Celosia inoculated with Pythium was 1.5-3.1 oz/100 gal and the level of control was very good. On the same plant inoculated with Rhizoctonia, the best control was 0.8-3.1 oz with all rates giving excellent control. In this case, the 4.6 and 6.1 oz rates had less control, perhaps due to some phytotoxicity.

PATHOGEN - PLANT	EFFICACY (RATE/100 GAL)
Fusarium wilt on Lisianthus	excellent at 2-3 oz in 2.75 inch pots excellent at 0.5-3 oz in 4 inch pots
Fusarium wilt on Dianthus	excellent at 0.5-2 oz in 2.75 inch pots excellent at 0.5-3 oz in 4 inch pots
Phytophthora stem and root rot on Vinca	good at 2 oz in 2.75 inch pots excellent at 1 oz in 4 inch pots
Phytophthora stem and root rot on Petunia	excellent at 1-2 oz in 2.75 inch pots excellent at 2 oz in 4 inch pots
Pythium root rot on Celosia	good at 0.5-3 oz in 2.75 inch pots excellent at 0.5-3 oz in 4 inch pots
Pythium root rot on Geranium	very good at 2-3 oz in 2.75 inch pots some at 0.5-3 oz in 4 inch pots
Rhizoctonia stem and root rot on Impatiens	excellent at 3 oz in 2.75 inch pots excellent at 3 oz in 4 inch pots
Rhizoctonia stem and root rot on Vinca	excellent at 0.5-1 oz in 2.75 inch pots excellent at 0.5-1 oz in 4 inch pots

Noninoculated controls - above) and inoculated control (below).

Empress treated flat (4.6 oz/100 gal) (below).

This year we worked in larger containers with 2.75 and 4 inch pots. The table above summarizes research we performed recently with Buzz Uber (Crop Inspection Services, in Valley center, CA). Trials were run with Heritage (1 oz/100 gal) as the standard for Rhizoctonia and Fusarium and Subdue MAXX(1 oz/100 gal) as the standard for the Pythium and Phytophthora trials. They were treated once before inoculation and then twice more on a 14 day interval.

These trials also showed variable results based on the pathogen and the size of pot. We did find that the smaller pots dried more quickly and disease was therefore less severe in this size.

Overall, Empress appears to be very good to excellent for Fusarium, Phytophthora and Rhizoctonia in many container sizes. It is slightly less effective on Pythium but still good. Be sure to read and follow the labeled use rates and intervals carefully once the product reaches the market. It will be an excellent addition to our tools for control of root diseases on ornamentals.

Managing Sclerotinia Blight

Many crops are affected by *Sclerotinia* spp. including ornamental bedding plants, cut flowers, vegetables and even alfalfa. Since few trials are reported on fungicides that are effective for control of this disease, I decided to share some performed on alfalfa (originally reported by Carol Frate, Univ. of California Cooperative Ext. Farm Advisor in Tulare County). The article was published in the October 2012 issue of CAPCA Advisor.

Trials were conducted in 2004-5, 2007-8, 2010-11 and 2011-12. The products tested were compared to paraquat (herbicide used to burn down the foliage of the alfalfa). Under sunny weather conditions, this can reduce severity of Sclerotinia blight - obviously not a possibility for ornamental crops. The products tested were pyraclostrobin and boscalid (the active ingredients in Pageant).

Disease level was moderate to severe in these years. In all years, using the fungicides improved yields on the alfalfa significantly. Yield increase over the untreated control ranged from 15-31% in years with moderate Sclerotinia pressure to 75% in a year with severe pressure.

These results have been seen on ornamentals as well when Pageant was used to prevent or even cure a Sclerotinia infection.

Sclerotinia blight on cut Gerber daisy production (top) and cut iris production (bottom).

Fungicides for Botryosphaeria Canker

Little work has been done on use of fungicides to prevent Botryosphaeria canker on any crop. It causes significant problems on horse chestnut, redbud, dogwood, beech, walnut, tulip poplar, sweetgum, crabapple, pine, oak, rhododendron, azalea, rose, willow, elm, yew, and many other woody ornamentals. The pathogen enters the plants through wounds, mainly following pruning. The image to the right above is an infected rhododendron and the one below shows a typical canker.

A group of Australian researchers recently reported on fungicide studies performed on grapevines to prevent Botryosphaeria canker. It was published in 2012 (Plant Disease 96:1303-1308). The first set of trials was done in petri dishes in the lab. In these studies, fludioxonil (Medallion), tebuconazole (Torque), iprodone (Chipco 26109), myclobutanil (Eagle), and pyraclostrobin (Insignia) were most effective. Several others that are not registered in ornamentals in the US were also effective in the lab studies.

Under field conditions, the only product registered for use on ornamentals that was effective was tebuconazole (found in Torque). Other effecitve fungicides had fluazinam and carbendazim as active ingredients. The treatments were applied immediately after pruning and the researchers stress that this is necessary for optimum control. The development of canker was reduced by 41-65% when this was done.

Regalia for Soil-borne Pathogens

Regalia is a new biopesticide from Marrone Bio Innovations. It is an extract from Giant Knotweed and has been effective on a variety of foliar diseases - especially powdery mildew.

Regalia recently received registration in California for control of soil-borne diseases on fruits and vegetables. It has very broad labeling and OMRI listing.

In a 2010 field trial on strawberry, Regalia was applied at 2 or 4 quarts/acre and increased both root and total plant weight significant compared to an untreated control. The pathogens involved in the trial were not mentioned. In 2011 trial on tomatoes, similar results were seen when Regalia was applied through the drip system at 2 or 4 quarts/acre. In this case the pathogen was Fusarium and the yield was increased from about 43,000 lbs/acre (untreated) to 63,000 lbs/acre with Regalia. Controlling Fusarium on most crops is very difficult with conventional fungicides.

These results on strawberries and tomatoes suggest that testing on ornamentals for soil-borne disease should be considered. The fact that Regalia is broadly registered for most crops and can be part of organic production make it worth checking on your crops. As we continue to add vegetables and herbs to ornamental production, products with broad labeling become more critical.

RootShield Plus Follow-up

Last month, I summarized the work I could find on efficacy of the new biological control product, RootShield Plus. The results were variable and often not very good against the pathogens chosen for the studies including *Rhizoctonia, Pythium* and *Phytophthora* species.

PHYTOPHTHORA AND PYTHIUM CONTROL

As a result, BioWorks was kind enough to send me more of the work they had completed prior to registering this product. The majority of these trials was conducted by Dr. Ramon Georgis of AgroSci R&D in Palo Alto, CA in 2010 and 2011. I am assuming Dr. Georgis had access to the same formulation of BW240 that the IR-4 and other researchers had during this time frame. I present below a summary of Dr. Georgis' research trials conducted for BioWorks.

PATHOGEN	PLANT	RESULT
Phytophthora cinnamomi	Buxus	exc/8 oz
Phytophthora parasitica	Tomato Azalea Petunia	exc/6 oz exc/8 oz vgood/8 oz
Pythium aphanider-matum	Mum	vgood to exc/8 oz in three trials
Pythium ultimum	Poinsettia Hibiscus Buxus Mum	vgood-exc/ 8 oz good/4 oz some/6 oz

The results are given as exc (excellent) or vgood (very good) and the rates per 100 gal follow.

Efficacy results are very impressive over these 11 trials conducted by a single researcher on two species each species of *Phytophthora* and *Pythium*. I cannot really guess why the other researchers did not have similar results very often. In any event, it is clear that you should trial this material yourself under your specific greenhouse conditions to determine how it can fit into an IPM program on your crops. This is a good example of why multiple trials are conducted all over the country.

CHARCOAL ROT ON STRAWBERRY

In another unrelated experiment, University of Florida researchers Mertley, Seijo and Perez (Gulf Coast Research and Education Center - Wimauma, FL) evaluated products for control of charcoal rot (*Macrophomina phaseolina*) on strawberries. This disease is also a problem in California and some other warm states on a large variety of crops including many ornamentals such as field-grown flowers. The work was done in 2009-2010 and 2011-2012. The treatments were applied after planting.

TRTS	2009-2010	2011-2012
thiophanate methyl	25.2 a	5.0 a
triflumizole	27.5 ab	15.0 c
azoxystrobin	31.0 ab	----
phosphite	42.5 d	----
Bacillus subtilis	----	6.3 ab
RootShield Plus	----	6.3 ab
RootShield	30.4 ab	15.0 c
Actinovate	33.5 abc	13.9 bc
SoilGard	37.8 bcd	----
Control	45.5 d	17.5 c

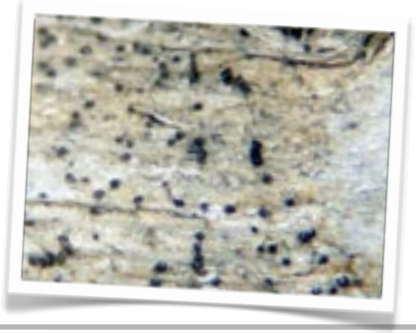
The numbers in the table are the percentage of diseased plants. Numbers in the same column followed by the same letter are not significantly different. I listed the fungicides by their active ingredient since we do not have the same products in ornamentals as strawberries. The biological control agents, however, are often the same.

These two trials showed some very interesting results for the biological agents. RootShield gave control equal to thiophanate methyl in the first trial (2009-2010) and *Bacillus subtilis* and RootShield Plus gave almost the same level of control as thiophanate methyl in the second year (2011-2012). It was also interesting to note that triflumizole (ai in Terraguard) was very good the first year but gave no significant control the second year. Even very good fungicides do not always give consistent results

Charcoal rot symptoms on strawberries (above).

Charcoal rot on sunflower - picture by Dr. Bob Mulrooney, Univ. of Delaware (below)

The name charcoal rot comes from the production of large numbers of black sclerotia (shown below) which cover the affected plant parts (roots, stems and fruit in some cases) with a fine black coating. These sclerotia make even fumigation relatively ineffective but it appears that biological control may be part of the solution.



Boxwood Blight - Cultivar Susceptibility

Ganci, Benson and Ivors, NC State University

Boxwood blight first appeared in the US last October and quickly was found in Connecticut, North Carolina, Virginia, Maryland, Rhode Island, New York, Massachusetts, Ohio, Oregon, and British Columbia. It has also been found attacking *Pachysandra* in Connecticut. Quiet a few researchers have not been idle and have actively sought answers for our questions on how to control this new Cylindrocladium disease (*Cylindrocladium buxicola = Cylindrocladium pseudonaviculatum)*. Trials at North Carolina State University have recently been posted on their website:

http://go.ncsu.edu/boxwood_blight_links

Ganci, Benson and Ivors have completed studies on cultivar resistance to this disease. Early work in the UK indicated that none of their cultivars was highly resistant to the pathogen. The NCSU researchers tested susceptibility of twenty three varieties of boxwood (*Buxus* spp.) at the Mountain Horticultural Crops Research and Extension Center in Mills River, NC during summer 2012. Disease assessments were based including percent symptomatic leaf area and percent stem streaking (see cankers at arrow below).

The final results indicate a wide range in susceptibility of *Buxus* spp. to the boxwood blight pathogen. In general, *B. sempervirens* types were more susceptible (a 2011 publication reported 'Justin Brouwers' to actually fall within the *B. sempervirens* cluster). The varieties listed as tolerant had minimal lesion development caused by *C. buxicola*. It is important to note that some boxwood varieties are limited in their optimal plant hardiness zones; make sure to look up specific growing requirements for each variety before recommending them in your area.

I will relate the results of fungicide trials when they are posted on this website. Be sure to check it for a good basic understanding of boxwood blight.

Highly susceptible

Buxus sempervirens 'Suffruticosa'

B. sinica var. *insularis* 'Justin Brouwers'

Susceptible

B. sempervirens 'Elegantissima'

B. sempervirens 'American'

Buxus x 'Glencoe' (Chicagoland Green)

B. sempervirens 'Marginata'

B. sempervirens 'Jensen'

B. microphylla var. *japonica* 'Morris Midget'

B. microphylla var. *japonica* 'Morris Dwarf'

Moderately susceptible

Buxus x 'Green Mound'

Buxus x 'Conroe' (Gordo)

B. microphylla 'Green Pillow'

B. microphylla 'Grace Hendrick Phillips'

B. microphylla 'Jim Stauffer'

Buxus x 'Green Mountain'

Moderately tolerant

B. microphylla 'John Baldwin'

Buxus 'Green Gem'

B. sempervirens 'Fastigiata'

B. sempervirens 'Dee Runk'

B. microphylla 'Winter Gem'

Tolerant

B. microphylla 'Golden Dream'

B. harlandii

B. sinica var. *insularis* 'Nana'

B. microphylla var. *japonica* 'Green Beauty'

Using Pageant Intrinsic Fungicide to Obtain Plant Health Benefits

Since this spring, there has been a lot of attention to the new 'Plant Health Benefits' and product labeling of Pageant Intrinsic fungicide. There have been articles in trade publications, distribution of marketing materials, and even a traveling road show to educate growers of these attributes. So what are these new 'plant health benefits' that Pageant Intrinsic fungicide provides and how can growers benefit and utilize this product to improve or maximize plant health.
This is the first of a series of a articles written exclusively for Chase News that will address using Pageant Intrinsic fungicide for plant health purposes. Over the past four years, I have been involved in a number of demonstration and replicated studies looking at using Pageant Intrinsic fungicide in various ways to obtain various 'plant health' benefits. Throughout this series, I will share details from several of these studies and provide insights on where and when growers can use Pageant Intrinsic fungicide to achieve the best results.

Before I get there, it is important to lay down the ground work regarding what exactly are 'plant health benefits' and how Pageant Intrinsic is causing them. The active ingredient pyraclostrobin (one of two active ingredients in Pageant Intrinsic fungicide) has been found to affect many plant processes on a cellular level. The short description is that pyraclostrobin reduces the respiration rate in plants which allows there to be more energy for other necessary plant processes. This extra energy and improved physiological activity increases a plant's tolerance to various stresses and allows them to develop better root systems in many instances.

This description greatly over simplifies how pyraclostrobin affects many of the physiological processes within a plant, but does provide a practical and easy to understand explanation growers can relate with. The bottom line for growers is Pageant Intrinsic fungicide is not only an excellent tool for controlling a wide variety of plant pathogens, it can now be used in certain situations to help decrease the consequence of various stresses.

Pageant Intrinsic fungicide has been shown to increase a plants ability to tolerate stresses from cold, drought, and shipping. Additionally, plants treated with Pageant during propagation tend to root slightly faster and develop more roots than untreated plants. In upcoming issues of Chase News, I will share specific trial results from my research where I evaluated 'plant health benefits' obtained from Pageant Intrinsic fungicide.

Paul Pilon

Perennial Solutions Consulting

Sneak Preview from Paul coming in November *Chase News*

Top Row: Untreated
Bottom Row: Treated with Pageant spray @ 4 oz/100gals after sticking the cuttings

Picture taken 17 days after sticking.

Chase Agricultural Consulting, LLC.
Practical Solutions for Growers

649 E. Cottonwood St., Suite 1
Cottonwood, AZ 86326
(928) 649-0400

www.chaseagriculturalconsultingllc.com

Thoughts from Mike

We are starting to wind down toward the end of the year and getting ready for the holidays, yes...they are fast approaching and the department stores are making it known big time....Christmas WAY before Halloween & Thanksgiving. Soon we all will be doing our holiday shopping, maybe some of you have already begun. As the TV commercials increase repeatedly, I sometimes find myself saying "**Why** should I buy from you?". What makes you different? What sets you apart from the others? Whatever that difference might be, just might be the difference in making a sale or not as we all know. Ann & I have been working with a business consultant for the past few years now and he's really gotten me to think differently about how we approach marketing our products.

And yes..he's even asked me "Why people should buy from you". I used to have a hard time answering that question. The changes we have made over the past year mean I CAN tell you "Why you should buy from us". If you see me at a meeting or show stop me and I will share my thoughts on this. OR give me a call anytime!

Mike