

BULLETIN

March/April 2006 • Number 895

What's Wrong with this Plant?

by Ann R. Chase

The most critical step in finding out what is wrong with your plant is to recognize that something is wrong with your plant. That means you must be familiar with the normal growth of the crop. This seems like it would be one of the easiest things for an experienced grower to do, but in our world of ever changing crop mixes you may see many new plants with which you have little to no experience. Knowing when one of these new crops is not performing up to par can be a real challenge. If possible, you should obtain a picture of the crop showing normal growth characteristics as well as normal crop times. New crop or familiar, you can watch for symptoms as indicators of a disease (Table 1, page 6).

Once you have noticed that a crop has a problem, you must start the detective process known as diagnosis. The most important distinction to make is whether the disease is caused by a pathogen (biotic) or an environmental (abiotic) factor. When I attended graduate school in the late 1970s at the University of California at Riverside, the convention was to define disease as only those conditions caused by biotic organisms, primarily bacteria, fungi, and viruses. The "diseases" caused by nutritional or environmental factors were relegated to another discipline – namely



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Tap Into Your Energy Resources

by Robyn Dill

Like any good businessperson, if you're going to be around for the long haul, you've gotten very good at juggling all of the challenges that seem to be working against you. You can take heart in knowing that you're not alone. At varying levels of sophistication, growers across the country are dealing with most of the same issues: labor, government regulations, market volatility, shrinking margins/profitability, changing product mixes, the rising costs of staying in business, the weather, and the list goes on. For now, energy costs are taking another turn as one of the weightier issues growers have to face. Fortunately, you have many resources you can turn to for help.

Since energy costs aren't expected to come down anytime soon, you should work with your supplier to build on what you were able to accomplish this winter to further develop your 2006-07 energy-saving strategy. Next winter is likely to offer more of the same. A warmer-than-usual January proved to be a gift for growers in the Great Lakes and Midwest regions. Here's hoping this sets the stage for a fantastic 2006 with less of an energy emergency than was anticipated!



Use the resources available to you as you evaluate your own operation and energy use. There is plenty to learn about tightening up a growing facility and

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OFA Mission Statement

To support and promote floriculture professionals through lifelong learning, career enhancement, and public awareness.

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OFA Bulletin

March/April 2006
NUMBER 895

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Published Bimonthly

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ofa Forum

Container Labeling Update

by Jonathan Bardzik

Congratulations! If you are reading this, you are most likely part of an \$80-billion industry. That's about 10 times the size of Hollywood! You've come a long way baby! With this success come some fabulous prizes. You get two television networks largely devoted to your products and services. Any bookstore in the country will carry shelves of books and at least 20 magazines featuring plants and gardening. Heck, you get to be the #1 outdoor leisure activity in America!

But, there are a couple other surprises that come with this success: increased legislative and regulatory attention. The last four years alone have brought *P. ramorum*, Ralstonia, Emerald Ash Borer, a rapidly growing labor crisis, and, of course, consumer product labeling regulations.

The container labeling situation began in Pennsylvania with a complaint from a small retailer who was unhappy with another result of our industry's success, the emergence of the mass market retailer. A complaint – about an empty hanging basket that did not actually measure 10 inches across – was levied against a mass merchant, bringing attention to the fact that our industry had long been out of compliance with labeling regulations that apply to all consumer products.

As awareness of the situation in Pennsylvania grew, the American Nursery and Landscape Association (ANLA) began

to work with other national associations, including OFA, to identify regulatory requirements and compliance solutions. This work culminated with the release of *The Industry Guide to Marketing Container Plants*.

Since their release, the guidelines have appeared in national and state association magazines and newsletters around the country, have been featured in all of the major industry trade publications, and presented at more than 10 trade shows, including last summer's OFA Short Course. If the letters and e-mails coming into ANLA's offices are any indication, many questions still exist.

• What are the regulations?

The regulations cover the presentation of specific information that must be included on all consumer products. The guidelines represent the task force's recommendations for green industry compliance. These guidelines can be found on both OFA and ANLA's Web sites.

• When do they come into effect?

These regulations have been in effect for over 30 years. With our industry's significant growth we have earned the attention of regulators. They could begin issuing fines today, but the industry's swift reaction toward coming into compliance has some regulators giving businesses a chance to adjust their tags and signage.

• Has anyone been fined?

There has been no reported enforcement as of yet, but several states were already looking into this issue when the complaint occurred in Pennsylvania. Regulators may still increase their policing of container grown plants.

• Why do I hear different versions of the requirements?

There are more than 500 weights and measures jurisdictions in the United States.



The guidelines adhere to a national standard that represents the strictest enforcement of the regulations. With the significant amount of interstate trade in our industry, the task force developed a one-size-fits-all solution. Companies that comply with the guidelines are safely within regulatory requirements anywhere in the country.

• **How has the industry responded?**

Many industry companies have already begun using containers, tags, and signs that comply with the regulations. Other firms have studied the regulations and plan on updating their labels as they exhaust current inventories and place orders.

• **Can we ignore these regulations and hope they go away?**

Businesses always have the freedom to decide how to deal with regulations. If you have a governor on your company trucks keeping them at 65 miles per hour, you probably want to work on compliance solutions. If you tell your drivers to go as fast as they can to save time, you may be comfortable ignoring these regulations as well.

• **Who do I contact if I need more information?**

The associations involved in developing the guidelines all serve as a resource to their members. Specific questions are best directed to these folks.

Fifteen years ago, the industry debated whether we really needed to bear the additional cost of using large, flashy picture tags on our plants. Today, companies are fighting to make their tags as bold and distinctive as they can to earn recognition on the shelves. The market let our industry know that it was time to make that change. Our industry is well positioned to keep growing and prospering. In another few years we'll likely see compliant tags on most containers and that we have moved on to the next challenges and opportunities that this industry's continued success will bring.

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Electronic Marketing for the Garden Center

by Bob & Susan Negen

Let me just get straight to the point: electronic marketing is the perfect marketing tool for independent garden centers. It is an incredibly cost effective way to increase customer loyalty, increase the number of transactions you get from each of your customers, and it's an effective way to get new customers also.

Before we go any farther let me define electronic marketing: electronic marketing is using a web site and/or e-mail to market your business. Each can be done independently, but later in this article I'll explain why they go together like Aunt Jemima pancakes and her syrup.

First let's talk about web sites, because Internet technology is here to stay: hoping that it will go away or choosing to ignore it is plain foolish. Every day new advancements are making the Internet easier to use and therefore it's increasingly important that you have a web site and are using it effectively. Here are two important examples.

Broadband Technology

You don't really need to know what "broadband" is – all you need to know is that it's making surfing the web and buying online much faster and easier for almost all users. No more waiting around for pictures to load or orders to process.

Because it's so quick and easy, more people are going to check you out online – for store hours, location,

customer service questions – than ever before. If you don't have a web site, or if you have a site that doesn't market your business well, you are missing out big time.

Local search

I doubt that the Yellow Pages book will be around in 20 years. Here's why. Most of the popular Internet search providers now have a feature that lets people search for products and services right in their own neighborhoods by typing in what they are looking for and then their zip code.

The first listing when you do this search says "Local results for XYZ products near your town name." When you click it, local businesses with web sites that offer the product or service you're looking for are listed. I suggest you try it. Go to Google or Yahoo and type in garden centers and then your zip code. This is what savvy shoppers are doing when they are searching for a product or service and they aren't sure where to go. Based on your quick search, are they coming into your garden center or going down the road to a competitor, or worse yet, going to a big box store?

The Truth About Web Sites

Regardless of what the techies and web gurus say, as a small business your web site isn't going to bring you hoards

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Electronic Marketing

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of new customers, let you compete with the “big boys” in your industries, or make you rich. It’s just not true.

What your web site can and should do, however, is be a wonderful tool to **market to your existing customers and hottest prospects**. More and more customers are going online to find out your store hours, if you’re open on Sunday, if you carry a brand of products they are looking for, what’s new at the store this month, or even what your phone number is.

Every business should have at least a “brochure” type web site with three to seven pages about their business. It’s just good customer service. If you’re not making it easy to shop with you, your customers will eventually go elsewhere.

Which brings us to the very interesting subject of how to get people to visit your site in the first place.

The “If You Build It, They Will Come” Myth - Revisited

Just like opening the doors to your store and doing little marketing, merely creating a web site and doing nothing to entice people in will get you very few visitors. There are lots of search engine optimization strategies and fancy marketing maneuvers you can do to drive traffic to your web site, but these are not usually tactics that are feasible for small business owners.

The best, easiest, most sure-fire way to get your customers to visit your site is to use e-mail marketing. This e-marketing strategy is so important, easy, and inexpensive that I think everyone – especially garden centers – ought to be doing it!

E-mail marketing is quite simply the cheapest, easiest, and fastest way to stay in touch with your customers. Here’s why.

• It’s Cheap

Almost any message you decide to send to your customers via snail mail can also be sent via e-mail – and you avoid the printing, materials, and postage costs. It’s definitely a big savings.

• It’s Easy

Sending an e-mail is easier than sending regular mail, too. You don’t have all the hassle of designing, printing, stuffing, stamping, and hauling. All you do is write your message and click send.

• It’s Fast

No more waiting around for the postman to deliver your letter. When you send it, it gets there immediately. This is great if you have time-sensitive offers, like a special price only good through the end of next week.

Big Bonus!

Here’s one of the biggest pluses with e-mail – your customer has an easy and immediate way to respond to you. All they have to do is hit reply or click a link to your web site. They don’t have to decide to pick up the phone; they don’t have to put anything in the mail; and they don’t have to wait for regular business hours. Making it easy for your customer to do business with you is very important.

All this adds up to one thing: you can – and are much more likely to – communicate frequently with your customers and build great “Top of Mind Awareness.” As a result, you’ll get stronger, deeper, better customer relationships.

The most important thing you can do right now – even if you don’t want to use this tool immediately – is to **start gathering the e-mail addresses of every customer, every prospect, and every professional contact you have**. That way, when you want to start using this tool later, you’ll have a list of addresses ready to go.

What can E-marketing do for you?

Notify your customers about sales, special events, and promotions

In fact, if you really want to push an event, you can send a series of e-mails to promote it. The first would be a “mark it on your calendar” message about four weeks out, then a “don’t forget” reminder about 10 days out, and finally a “it’s happening this weekend” reminder a day or two before the event. Every event doesn’t warrant a series of e-mails but your major events certainly do.

Generate immediate interest in your products or services

During the shoulder seasons, or if you get a big order of new items in, send an e-mail and fill your store fast. These types of messages are generally more “off-the-cuff” but can still be very successful. There are two tricks:

First make sure your message puts the “Law of Scarcity” into play (“one day only”... or “for the first 27 customers”... or “just three more ultra widgets left”). This makes taking action an urgent priority. The second is to give them a special offer if they do take action quickly.

This example does both: “My pain is your gain – UPS dropped off 47 boxes of new holiday decorations today, and I don’t have quite enough room for all these beautiful garden gifts in the store. So to make extra room, I’m offering you a special two-day deal. On these two days ONLY, get 25 percent off any purchase in the store, plus I’ll throw in a bottle of tree preserver (\$11.95 value) as a special thank you.”

Time Sensitive Offers

E-mail messages are very effective for perishable items like plants and flowers or for any weekly/daily specials

ofa Garden Center

that are only available for a short period. If you have a weekly plant special, e-mail your list the day before it arrives to generate interest and remind people to stop in. You could even send a picture of the plant in the body of the e-mail!

Inform your customers about changes that affect them

If you hire a new landscape designer, let your customers know. If your fax number changes, blast out an e-mail. If you change your store hours, get the word out. It's important information – plus it's one more communication from you that keeps your name at the top of your customer's mind. Also if you ever plan on moving, having a solid list of your customers e-mail addresses allows you to make the move with minimal interruption to your customer base. If you can't notify them of what's happening you will surely lose them with your move.

Establish yourself as the expert

E-mail is a great format for sending out a weekly or monthly tip, article, or idea – something that will position you in the mind of your customer as an "expert." Try a "Great Gardening Tips from your Garden Center." Give your customers valuable gardening information that makes them want to read your newsletter and keeps your company name in front of them. This type of regular communication reinforces your position as the expert and helps to keep your customers loyal. Note that this kind of message is not exactly like a newsletter – these should be short and have one simple point. Do not try to do too much.

Short, sweet, and often is the name of the game. Several garden center owners who participate in my Marketing Mentor Program send out a short, weekly tip with great success. Their customers love it!

Drive customers to your web site

This is the best way for small businesses to drive customers to their web site to buy products or book appointments. In the text of your e-mail message,

just include a link with an invitation to get more information on your web site. Like this: "Just click here www.yourwebsite.com for complete information about next Tuesday's Pond Seminar."

Your link can go to the home page on your web site or directly to a specific page that relates to the message. If you're not sure how to put a link in your e-mail or don't know how to make a word or image a "hyperlink", ask.

You should try to include a link to your web site in every e-mail you send. Get your customers used to visiting your site frequently! The more they come to your site the more they will use you, and you alone, as their source for plants, growing materials, and their other gardening needs.

This strategy of building your customer e-mail list as actively as possible, sending a short, informative e-mail every week, and having an information-rich, customer-friendly web site can take the place of thousands of dollars in traditional media advertising.

Using this strategy of getting the absolute most from every one of your existing customers through electronic marketing diminishes your need to constantly find new customers through advertising. It adds up to more loyal customers, more efficient marketing, and more money in your bank account.

Get FREE business building ideas delivered to your e-mail every week. Sign up for your "WhizBang! Tip of the Week" at www.WhizBangTraining.com.

Bob will be doing two marketing sessions at the OFA Short Course on Monday, July 10.

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Mark Your Calendar
for the
2006 OFA Short Course
July 8 to 11
Program & registration available in April.

What's Wrong with this Plant?

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Table 1. Some symptoms of disease in ornamentals.

Root Disease	Stem Disease	Leaf Disease
Lower leaves are yellow	Lower leaves are yellow	Distortion
Leaves drop	Stem bases are mushy	Leaves drop
Plants are stunted	Plants fall over	Small size
Plant growth is irregular and uneven (some are small and others are normal size)	Cankers or sunken areas near base	Spots
Roots are sparse		Mottled color
Roots are brown to black		
Roots disintegrate		

plant physiology. This distinction is not meaningful for diagnosticians whether they are growers or trained plant pathologists.

When typical symptoms of a disease or signs of the pathogen are present, it is fairly easy for an experienced person to determine not only whether the disease is caused by a pathogen or an environmental factor, but also to identify the specific one. Comparing symptoms with those shown in “identification” books containing full color pictures, in addition to books or articles that report the known diseases and their causes, can often help identify the cause of the disease. Unfortunately, many diseases cause a variety of symptoms and it can be confusing to identify them by picture comparisons alone. In most cases, a detailed examination of the symptoms and an inquiry into other factors such as culture of the plant, crop history, and recent weather conditions are necessary.

Checklist of preliminary facts

- Recent environmental conditions
- Recent treatments
- Common diseases of your plants
- Time of year

The first thing is to evaluate the possibility that the symptom is caused by a recent environmental condition (cold, heat, drought, wind, or rain) or treatment (pruning, fertilization, pesticide application, or irrigation). It is surprising how often we forget this step. Making the connection between an unusual environmental event or a cultural treatment and a damaged crop is critical. If you can rule out this possibility then you can move to the next

step, to know what diseases are common on your crop. Knowing that impatiens can be attacked by Impatiens Necrotic Spot Virus, Pseudomonas leaf spot, and Alternaria leaf spot can save a lot of time in determining the cause of a particular leaf spot. Start a list of common diseases of your crops or buy a pertinent reference book. Our diagnostic lab routinely includes a color photograph of symptoms observed on submitted samples with each diagnosis to act as a future reference guide.

Additionally, you should keep records of when specific diseases occur on the crop. Recording the dates and environmental conditions under which a specific disease problem occurred will help you know when to expect its possible reoccurrence in the future. For instance, Botrytis blight usually occurs in the winter or anytime when conditions are cool, wet, and dark. It is important to limit the long list of possible problems to a few that might be the culprit.

Checklist of secondary facts

- Where are the symptomatic plants?
- Where are the symptoms on the plants?
- Where are the symptoms on the leaves?

The secondary facts that can help in a diagnosis include where the symptomatic plants are located in your greenhouse or field. Are they near water, near new construction, or near a road? This can lead you to the realization that the environment in that area may be the cause of the problem. Are the symptoms near the fans or near the pads in a greenhouse? For instance, a virus that is vectored by an insect may appear near doors first.

Table 2. Typical characteristics of abiotic and biotic diseases.

Characteristic	Abiotic (phytotoxicity, nutrition and environment)	Biotic (fungal and bacterial)
Texture	Dry, papery	May have wet or moist margins
Color	White or tan	Dark brown or black
Spot size	Uniform	Variable
Leaves affected	Can be all leaves	Often only same-aged leaves
Speed to develop	Can be in a single day	Over a period of time from days to weeks

Table 3. Typical characteristics of fungal and bacterial diseases.

Characteristic	Fungal disease	Bacterial disease
Shape	Round, elliptical, and grow across veins	Irregular, can be angular (between veins)
Water-soaked	Usually dry	Often wet
Location	Anywhere on leaf	Often on edges
Colored margins	Often yellow, red, or purple	Rare
Fruiting bodies	Often present	No
Target spots	Concentric rings common	Unusual

Where are the symptoms on the plant? Are they on shoot tips, bottom leaves, or all over the plant? Some diseases only attack new leaves while others specialize in attacking older or senescent leaves. Finally, what does the damage look like on the leaves? Do they form on edges or tips? Are they confined between veins or scattered all over the leaves? The answers to these and other questions can allow you to determine whether the problem is caused by a biotic or abiotic factor.

Fungal Structures

The first thing I like to check for is the presence of fungal structures. These include gray mold, powdery mildew, downy mildew, rust, and anthracnose.

Botrytis blight or leaf spot is often accompanied by gray to brown masses of spores. The spores look the same on all of the crops I have seen attacked by this pathogen. In contrast, powdery mildew appears anywhere on leaves, flowers, and stems as a white, frosty patch of fungal growth. Downy mildew sporulation is usually found on the undersides of leaves and can be lavender, purple, or white. Rust pustules also usually form on undersides of leaves (and sometimes stems) and can be off white, tan, yellow, orange, or dark brown. Finally, the anthracnose fungi (*Glomerella*, *Colletotrichum*, *Gloeosporium*, *Phyllosticta*, and *Phoma* sp.) often form fruiting bodies, similar to black pepper grains, in the dead spots on the upper leaf surface.

If there are no fruiting bodies then you should examine the spots for key characteristics that may be present. Abiotic

causes like pesticide phytotoxicity tend to have different characteristics than those caused by fungi and bacteria. Table 2 lists some of the characteristics that can be used to separate one group of problems from the other. If the spot appears to be caused by a biotic factor then you can differentiate between those caused by bacteria and fungi with another short list of typical characteristics (Table 3).

Conclusions

Even after nearly 30 years as a plant pathologist specializing in diagnosis and control of ornamental diseases, I rely on culturing the pathogen in many cases. I have been wrong enough times with a preliminary diagnosis that I usually follow-up with a lab work. The other thing to keep in mind is that mixed infections are more common than a single pathogen causing the disease. This is especially true for root diseases but can be common in leaf diseases as well. Once you have a diagnosis you can choose an effective control strategy. Remember that the most effective control is not based on a single approach. Relying on fungicides or bactericides may be successful many times but it will never be as good as including cultural methods in your control strategy.

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Tap Into Your Energy Resources

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tweaking management practices. Many universities, associations, suppliers, and trade magazines have been busy putting together their summaries of all the tips and tricks growers can implement to conserve energy. Some of us will also be looking more closely at alternative energy sources in the coming years.

Even though a lot of the energy conservation information available came to the forefront during the energy crunch of a few decades ago, most of the same advice still applies. Much of it is basic common sense. You know if you have gaps and holes, you're losing heat. You know if you're heating houses with empty benches, you're wasting heat. In short, the take-home message is tighten up, insulate, monitor more precisely, and put the heat where it's needed.

A few words of caution:

1. Be aware of the issues related to growing in a tighter greenhouse. According to Dr. Peter Ling, agricultural engineer, Ohio State University, OARDC, Wooster, Ohio, it's important to have a strategy on hand for managing CO₂, humidity, and off gases from your heating unit. All kinds of issues develop with increased humidity levels, ethylene, and CO₂ enrichment. Learn more about this so crop quality doesn't suffer.
2. There's also been a great deal of discussion this winter about growing crops cooler. Make sure you're not trading degrees for days. Make certain you know the temperature requirements of your crops. Growing certain crops at cooler temperatures can increase production time. You may end up growing cooler but longer. There go the savings.

Across the board, most advice from university sources has zeroed in on a handful of energy-saving products that have a relatively short payback time and are universally beneficial. Growers in the Midwest and Great Lakes regions have focused on the following strategies, and in some cases successfully used government energy-saving grant money to offset costs:

1. Starting crops later.

We've definitely seen growers firing up their spring season a little later than usual. The other part of this strategy is buying in larger plug sizes. Larger plugs that give growers a leg up on the growing cycle have been big sellers this season.

2. Installing heat retention/shade curtains or thermal blankets.

This has been the number one step growers are taking to stretch their energy dollars. These movable panels of fabric or plastic film are used to cover and uncover growing space. Small systems can be moved by hand, while larger systems are usually controlled by motor drive. These internal shade systems mount to the greenhouse structure below the rigid or film covering of the house, and are ideal for retrofitting in existing greenhouses. The systems provide heat retention, shading, and day length control. Using a retractable shade/energy curtain at night can significantly reduce heat loss by providing another insulating layer to the greenhouse. Energy savings can run in the 30 percent to 40 percent range.

3. Installing bottom heating systems.

Floor and bench systems heat the plants, not the air. It's just more efficient. Placing the heat under the plants allows the heat source to react faster to temperature changes at the plant level. Heating from below also offers a more consistent temperature, better plant quality, and lower heating costs. By controlling the soil temperature, both rooting and plant growth can be accelerated. Use bottom heating as a base and supplement with space heating. Potential savings are around 20 percent.

4. Sealing interior walls and zoning.

Roll-up curtain systems allow more consistent temperature control and zoning off of bays. This allows you to concentrate crops by temperature requirements, as well as manage your growing space most efficiently. Electric operation provides a fully automated curtain system that can't be beat.

5. Installing efficient heaters.

Replacing older, inefficient unit heaters with new, more efficient models just makes good sense. This is a case where newer really is better. A good service plan goes a long way toward improving efficiency as well. There are numerous options available that can fit any growing operation, layout, and budget.

6. Updating greenhouse controls for more accurate temperature monitoring and venting operation.

You can't control your energy use if you don't have an accurate picture of how much energy you really are

using. Accurate monitoring is a must. Check the accuracy of thermostats. Switching from mechanical to electronic thermostats or controllers alone offers potential energy savings. More sophisticated monitoring and controls allows for more even heating and cooling and improved accuracy. Make sure sensors are placed correctly. It's important to put them where the plants are and take air movement into account as well.

"Saving on energy costs is a multi-tiered effort," states the Energy Conservation pamphlet published by the National Greenhouse Manufacturing Association. "Once you have taken the obvious steps to reduce energy waste, careful investment in energy saving technology must be kept in balance with capital costs, additional maintenance, and payback periods." Good, sound advice.

None of the steps taken to offset rising energy costs should be a knee-jerk reaction to deal with the current

energy issues. Consider this a long-term project and investment. Tap into the product knowledge readily available from your supplier. Those folks are a ready resource for learning the return on investment and payback periods for updating and upgrading equipment in your growing operation. Carefully planning with your supplier how best to integrate the most cost-effective, energy-saving improvements is truly an investment in your ability to grow profitably now and in years to come.

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PGRs on Perennial Plants: Examples from the Asteraceae Family

by Joyce Latimer, Holly Scoggins, and Velva Groover

Asteraceae is a huge family, containing about 950 genera, but only about 190 of these are grown commercially. These cultivated genera include many of our floricultural annuals and potted crops and more than 100 commercially important herbaceous perennial crop species. Some of the more popular perennials include achillea, aster, artemisia, coreopsis, echinacea, gaillardia, leucanthemum, rudbeckia, and solidago.

For PGRs applied for height control, it is important to remember that the goal is regulation of plant growth which determines the final plant height. Therefore, applications must be made when the plant is in active growth, but before the plant has begun to stretch. In general, the applications should begin about two weeks after transplanting spring plugs, which allows time for the roots to establish and for the plant to resume active growth. For overwintered material, the PGR should be applied when the new growth is 1 to 3 inches long, depending on the crop. Overwintered material is likely to be more vigorous than newly planted material and may require slightly higher PGR rates or earlier treatment if the growing temperatures are high enough for growth.

Another caution to heed is that PGR rates used in the South are generally higher than rates used in the North. In addition, these lower rates may be applied at wider treatment intervals in the North. For example, Paul Pilon used a base rate of 2,500 ppm B-Nine (Chemtura Corp.) at Sawyer Nursery in Hudsonville, Michigan (*Grower Talks*

Special Supplement on Perennial Height Control, May 2005), whereas in the South we start with 5,000 ppm B-Nine on perennials. Paul's rate suggestions recommend multiple applications at two- to four-week intervals, whereas in the South we recommend reapplication of B-Nine or lower rates of the other PGRs at 10- to 14-day intervals. Most of the information presented in this article is from research done in the South. **Northern growers should trial rates beginning at about half those presented in this article.**

Responses to B-Nine

B-Nine (daminozide, Chemtura Corp.) is a short-term growth retardant that has been quite effective on a wide variety of perennials. In the South, we generally use 5,000 ppm at 10- to 14-day intervals for control of plant height and form. Many of the genera in Asteraceae tested were responsive to B-Nine. Height control was generally moderate (20 percent to 30 percent reductions) and required multiple applications at 5,000 ppm to obtain four to six weeks of height control. Some of the plants responsive to B-Nine include multiple cultivars of *Achillea*, *Agastache* x 'Blue Fortune', *Alcea rosea* 'Powder Puff Mix' and 'Chater's Double Mix', multiple species and cultivars of *Coreopsis*, including Baby Sun, Moonbeam and Zagreb, *Echinacea* 'Magnus', and *Stokesia* 'Purple Parasols' and 'Klaus Jellito.'

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There are several notable Asteraceae plants that are not responsive to multiple applications of B-Nine. These include several cultivars of *Phlox paniculata* (except 'David' which was responsive), *Chelone glabra*, *Eupatorium coelestinum*, *Gaillardia grandiflora* 'Goblin' ('Burgundy' was responsive), *Leucanthemum x superbum* 'Alaska' and 'Becky', and *Rudbeckia fulgida* var. *sullivantii* 'Goldsturm.'

On the other end of the spectrum, *Heliopsis helianthoides* 'Summer Sun' was very sensitive to B-Nine with a greater than 50 percent reduction in plant height at four weeks after treatment with two applications of 5,000 ppm B-Nine. This reduction persisted through the 12 weeks of evaluation in the nursery with no additional treatments and during subsequent landscape evaluation. Overdoses are possible with B-Nine, but this is the first time that we have seen an overdose on perennials with this PGR. For your operation, test lower rates of B-Nine (2,500 to 3,000 ppm) on *Heliopsis* 'Summer Sun' with critical evaluation of growth prior to additional applications.

In summary, B-Nine proved effective on a wide variety of genera in the Asteraceae family. Multiple applications are likely to be required, with most species in the South requiring 5,000 ppm. Rates for northern growers may be slightly less to one-half this rate, again with multiple applications required.

Responses to B-Nine/Cycocel Tank Mix

The tank mix of B-Nine and Cycocel (chlormequat chloride, OHP Inc.) provides a very active PGR that is more forgiving of non-uniform application than are the



Figure 1. *Gaillardia x grandiflora* 'Burgundy' was responsive to B-Nine. Left to right: Untreated control, two applications (at two-week interval) of 5,000 ppm B-Nine or one application of a tank mix of 5,000 ppm B-Nine and 1,500 ppm Cycocel. Photo taken three weeks after treatment. Multiple applications of the tank mix were required for long-term control.

triazoles. However, relatively few of the Asteraceae genera have been tested for response to this tank mix. Some of those which were responsive to a single application of the tank mix, usually at 5,000 ppm B-Nine plus 1,500 ppm Cycocel, included *Achillea* 'Paprika,' *Agastache* x 'Blue Fortune,' *Coreopsis grandiflora* 'Sunray' and 'Baby Sun,' *Coreopsis verticillata* 'Zagreb,' *Gaillardia* 'Burgundy,' *Rudbeckia triloba*, and *Stokesia laevis* 'Purple Parasols' and 'Klaus Jelitto.' In most cases, a single application of the tank mix provides control equivalent to two or more applications of B-Nine alone. However, in some cases, such as with *Gaillardia* 'Burgundy,' multiple applications of the tank mix may be required to provide adequate height control through a six-week production period.

Of the non-responsive plants tested, *Phlox* 'David' was responsive to B-Nine alone, while *Leucanthemum* 'Becky' was not. As with the B-Nine alone, a single application of the tank mix resulted in an overdose effect on *Heliopsis* 'Summer Sun' with height reductions similar to B-Nine alone that also persisted throughout the 12-week test.

Although there have not been enough genera tested to make a generalization for the Asteraceae family, the tank mix of B-Nine and Cycocel is worth trying on your perennial plants. Evaluate the growth response at three to four weeks after treatment to determine if a second application will be required to maintain your plants for your market window.

Responses to Paclobutrazol

The paclobutrazol products include Bonzi (Syngenta Professional Products), Piccolo (Fine Americas, Inc.),



Figure 2. *Alcea rosea* 'Chaters Mix' treated with a foliar spray of Piccolo at 0, 40, 80, 120, or 160 ppm. Photo was taken two weeks after treatment. Multiple treatments may be required.

Paczol (Chemtura), and Downsize (Greenleaf Chemical LLC). This triazole-type PGR is very active and has been very effective on many of the vigorous perennial plants. Plants controlled by paclobutrazol varied in their responsiveness, from *Chrysanthemum parthenium* which is very sensitive to 40 ppm, to *Rudbeckia* 'Goldsturm' which requires 160 ppm for an effective treatment. Multiple applications of lower rates may provide better control than a single application of a higher rate. Other plants responsive to paclobutrazol include *Achillea* 'Coronation Gold,' 'Moonshine,' and 'Summer Pastels,' *Coreopsis grandiflora* 'Sunray' and 'Baby Sun,' *C. rosea* 'Sweet Dreams,' and *C. verticillata* 'Moonbeam,' *Echinacea* 'Bravado' and 'Ruby Star,' *Leucanthemum* 'Snow Lady' and 'Alaska', *Phlox subulata* 'Apple Blossom,' *Rudbeckia* 'Goldsturm' (at high rates and/or multiple treatments), *Solidago* 'Golden Fleece' and *Stokesia* 'Purple Parasols'.

Some genera had species or cultivars that had little response to foliar sprays of paclobutrazol but were responsive to drenches. These include *Aster x frikartii* 'Monch,' *Coreopsis rosea*, *Eupatorium coelestinum*, and *Heliopsis* 'Summer Sun.' Others not responsive to Bonzi include *Gaillardia* 'Goblin,' *Liatris spicata* 'Floristan Violet,' and *Leucanthemum* 'Becky.' In addition, *Gaillardia* 'Burgundy' was responsive to drench applications of Bonzi (results of spray applications have not been reported on this cultivar).

The effectiveness of the drench applications suggest that using higher volume application methods, such as drenches or spraches, will improve the efficacy of paclobutrazol on perennial crops. However, the differences in cultivar response make it unlikely that we can make meaningful recommendations based on family relationships. For new crops, test rates from 40 to 60 ppm, plan on multiple applications, and develop estimates for single applications based on your test results.



Figure 3. *Rudbeckia triloba* treated with Bonzi sprays at 0, 40, 80, 120, or 160 ppm. Photo taken four weeks after treatment.

Responses to Sumagic

Sumagic (uniconazole, Valent USA) is another triazole PGR which has a higher activity level than the paclobutrazols and has also been very effective in height control of perennials. The final height of plants treated with spray applications from 0 to 60 ppm tended to be fairly linear, i.e., the height was reduced to an increasing extent with increasing rates of Sumagic. *Coreopsis*, with three species and multiple cultivars tested, was consistently responsive to Sumagic, but rates varied from multiple applications of 15 ppm to a single application at 40 ppm. *Achillea*, with four cultivars tested, 'Coronation Gold' and 'Paprika' were very responsive at a low rate (15 ppm) whereas 'Moonshine' and 'Summer Pastels' were not responsive to rates up to 60 ppm Sumagic. *Echinacea* 'Bravado' and 'Ruby Star,' *Phlox subulata* 'Apple Blossom' and *Rudbeckia* 'Goldsturm' are responsive to Sumagic at 30 to 40 ppm.

Several genera have species or cultivars that have been non-responsive to the Sumagic: *Achillea* 'Moonshine' and 'Summer Pastels,' *Aster* 'Monch,' *Heliopsis* 'Summer Sun,' *Liatris* 'Floristan Violet,' and *Stokesia* 'Purple Parasols' and 'Klaus Jelitto.' *Gaillardia* 'Goblin' was non-responsive (as seen with paclobutrazol), but 'Burgundy' was responsive to a single application of 60 ppm. *Leucanthemum* 'Becky' was also not responsive to Sumagic, while 'Alaska' was very sensitive to 15 ppm. Again, these cultivar differences were similar to those seen with paclobutrazol.

In summary, for the family, the effective rates of Sumagic varied widely from less than 15 ppm to more than 80 ppm with just over half of the genera tested showing height control with Sumagic. In addition, cultivar differences were found in several genera. Based on the existing information, we can make no rate recommendations for other Asteraceae crops. For untested crops, test rates around 30 ppm and make



Figure 4. *Phlox subulata* 'Apple Blossom' treated with Sumagic sprays at 0, 15, 30, 45, or 60 ppm. Photo taken six weeks after treatment. For some crops, plant height is not as important as width. Remember that growth retardants affect plant growth regardless of its orientation.

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additional applications as necessary, and be alert to excessive growth regulation for sensitive crops.

Summary

In summary, either there is little commonality of plant response to PGRs within a family, or we simply haven't tested enough members of the family to find those commonalities. Given the differences that we find between cultivars of the same species, it is not surprising that we can't make generalizations across an entire family, especially one as large and diverse as the Asteraceae.

However, this article summarizes much of the information available on the primary crops in this family and will provide you with a good starting point for using PGRs in your operation. Responses of many of the individual species discussed in this article may be found in our searchable PGR database at *GPN* magazine's website (www.gpnmag.com). Be aware that many of the results discussed are from a single experiment and most involve a single application. These are also the results of scientific experiments, which means that the treatments are applied on a pre-determined schedule. A grower should evaluate growth on a frequent basis and apply treatments according to plant growth and growing conditions, which would improve the overall quality of



Figure 5. *Coreopsis* 'Sweet Dreams' treated with Paczol liner dips (two minutes in solution) at the time of planting showed excessive control of plant height with higher rates at eight weeks after treatment with 0, 1.3, 2.7, 4.0, 5.4, or 6.7 ppm Paczol. The lowest rate gave good control for four to six weeks

the plant and may actually affect the efficacy of the treatment. In other words, don't be afraid to try a treatment that we found to be ineffective.

Plant condition, growing environment, and your specific application methods will all affect the response of the plants to your treatment. **Keep records** so that you can duplicate your successes and learn from your mistakes. Growth regulation is an art that you must perfect. Through science, we can give you suggestions for starting points in the process and guidelines to develop your own PGR program, but successful growth regulation of these wild and wonderful perennials is in your hands.

The authors wish to thank the Fred C. Gloeckner Foundation, Chemtura, Valent USA, Fine Americas Inc, Syngenta Professional Products, SePRO, and OHP Inc for their support of this research, and Yoder/Green Leaf for donation of plant materials.

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Ten Steps to a Happy Customer: Customer Service for Interior Plantscape Technicians

by Kathy Johnson Fediw, CLP, CLT

In today's economy, no business can afford to lose a customer. Even with a great sales team, your company will not grow if you are losing existing customers as fast as or faster than you are gaining new ones.

As a horticultural technician, you are the key person responsible for keeping customers happy. You are the representative from your company customers see and interact with on a regular basis.

The best way to keep your customers happy is to make them feel important and respected. Everything you do should show how important they are and that you respect them as professionals and as individuals. When these two needs are met, you will have a happy customer!

There are many things you can do to make customers feel important and respected that don't cost a dime. Here are ten suggestions to get you started.

1. Your plants must look great all the time.

You have a job because your customers are paying you to keep their plants looking like new. They don't want to have to worry about their plants – they have more important and urgent work to do. They are counting on you to use your expertise to take care of their plants.

Customers don't want to wait more than a couple of days for a replacement plant to be delivered. Do not turn their office into a "plant hospital" as you try to nurse a sick plant back to health. If their plants are dying, nothing else you do will make them happy.

If, on the other hand, they see beautiful, lush, green, thriving plants, they will be excited to see you each time you visit. You'll also make your client look good to her boss and visitors. Making the customer look good is what it's all about.

2. Use the Power of the Name™.

Get to know your customer's name and use it whenever you are talking with her. Use her last name until she gives you permission to call her by her first name. This shows respect for your customer and that you have a genuine interest in meeting their needs.

When you use a person's name, you are telling them that you think they are important enough for you to remember and that you recognize them as an individual, not a number or piece of paper. A person's name holds power – use it!

Likewise, wear a name tag if possible so your customer will get to know your name, too (talk with your supervisor if you don't have one since each company's policy is

different.). Your customer will feel more comfortable talking with you if they know your name.

3. Respect your customer's time and busy schedule.

Limit your conversation to a few words of greeting and a sentence or two of friendly chit-chat. She doesn't have time to hear about the trouble your kid is having at school or details about your medical condition. You have a business relationship with her and need to respect her time.

4. Respect your client's workspace.

Most companies have made a sizeable investment in providing a comfortable workspace for their employees, including the plants you take care of. Carpeting, furniture, computers, artwork, and wall finishes can cost big bucks.

Your customer is depending on you to treat their property with care and to protect their investment. The extra care you take, such as using drop cloths, covering computers, and moving valuable papers out of the way while you work, shows that you value their investment.

5. Respect your client's need to concentrate.

Perform your work quietly and unobtrusively, interrupting work as little as possible. Turn your cell phone or beeper to a silent mode. If you get a phone call, tell your caller to wait one moment and walk quickly to an isolated area or outside before you start your conversation. Always speak quietly when answering your phone in a voice just barely louder than a whisper.

At no time should you have a long conversation in a client's workspace. Never answer a phone call while you are talking with a customer face to face. It is very rude and sends the message "you're not important to me." All calls should be kept brief and to the point.

6. Protect your customer from any accidents.

Be alert to the people around you, keep aisles clear and clutter-free, and try to limit your use of pesticides. Whenever possible, use pesticides during off hours or in isolated, well ventilated areas. You never want a client to have an accident or get sick because of something you did or failed to do. Good safety practices will help keep everyone healthy and injury-free.

7. Be consistently reliable.

If your customer expects to see you at a specific time or on a certain day and suddenly you miss work or are late, they will worry about you. If you arrive on Monday one week, then Wednesday the next week, then Saturday morning, your customer will be confused and may perceive you as unreliable.



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Interior Plantscape

Ten Steps to a Happy Customer

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If your schedule varies due to subirrigation, print out a copy so your customer knows when to expect you. If you are sick or on vacation, have your supervisor call so your customer does not worry.

Your customer will also trust you more and feel respected if you keep your promises. Be careful to only make promises that you know you can keep. If you promise a customer that her plant will be delivered tomorrow, you better be prepared to deliver it yourself if something goes wrong!

8. Be an ambassador for your client.

When you are at a customer's business, you are representing two companies: the one you work for and your customer's company. Both your boss and your customer work hard and invest money in presenting a professional image, and how you look is a part of that image. No, you do not have to be a beauty queen or wear designer clothes. But you should start the day looking neat, clean, and pressed. Looking well groomed shows your client that you respect their business culture and standards. Your clients will also respect you more if you look like the professional you are. Wear your uniform because it identifies you as a vendor who has a legitimate reason for being on the premises and is important for security reasons.

You may not be as fresh at the end of the day as you were at the beginning and that is understandable. If you have "grubby" work to do (such as an installation or heavy pruning), you may want to schedule it for the end of the day, or bring along a change of clothes.

If you work in a lobby, shopping mall, or other public area, know as much as you can about where things are located. People will ask you for directions to the elevators, restrooms, etc. Being knowledgeable enables you to work with your client to make visitors feel welcomed, and what's important to your client should be important to you, too.

9. Really listen to what your clients have to say.

When they are talking, give them 100 percent of your attention and make strong eye contact. Take notes if you need to follow up on any requests. Whenever a client requests something of you, they are telling you "this is important to me." After a short while, you will get to know each of your clients so well that you can start anticipating what they need before they ask for it. Be proactive and tell them what you have planned, rather than waiting for them to ask.

10. Act quickly.

Consider any request, comment, or criticism from a client to be urgent and important. Jump on it and call your supervisor right away. You may even be able to get an answer for your client before you leave the account. In this age of cell phones and computers, your client expects a quick response and will appreciate when you are able to quickly respond to their needs.

Remember that any requests, complaints, or criticism are your client's way of telling you what is important to them. Instead of taking their comments personally, listen for the message behind the comments. Then respond quickly.

If you respect your client and make them feel important, you'll find that you have very few complaints and some really wonderful people to work with. You'll enjoy your job more and will look forward to each day. When something does go wrong, your clients won't be angry because you've developed a strong relationship with them and they can trust you to make it right.

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Kathy Johnson Fediw will be presenting four sessions on **Saturday, July 8** at the **OFA Short Course**.

These sessions are **Plant Care Tips for Techs: Parts 1, 2, and 3**; and **IP Human Resources**.

Watch www.ofa.org in April for complete details.

ofa Management

The Employee Handbook

by Danny Takao

A company handbook is one of the most important elements in any business. It is the foundation for all rules, procedures, and guidelines within your company and is absolutely essential. With it you will be able to have all of your practices on record, making it easier for you to enforce them, and to create and maintain a safe working environment. It is also a significant aspect in defending your company against wrongful termination, discrimination, and harassment claims, in addition to many other employment-related claims from current or past employees.

Here are some topics that you must, at a minimum, include in your company handbook:

- The company's goals, philosophy, and mission statement
- Non-discrimination and harassment policies and procedures for complaints
- "At-will" employment disclaimer
- Work schedule and compensation system
- Vacation and holiday policies
- Safety and accident rules
- Job site etiquette and use of company property
- Attendance/absence from work policies
- Equal opportunity employer policy
- Reasons for termination

Any other procedures and policies that you feel every employee should be aware of should be listed in your company manual as well. Attach an acknowledgement form with the handbook stating that it is the employee's responsibility to read, understand, and abide by the manual, and to ask if he/she has any questions or concerns about it or their duties. The employee should print, sign, and date the form to acknowledge that they have done so. Not only will the employee handbook help to protect the company and its employees, but it will also help introduce new employees to all the procedures and policies that they will need to be aware of.

Policies and procedures on non-discrimination and harassment are very important and should cover any possible scenario. Make it apparent that the company has a zero-tolerance policy and will not allow any type of discrimination or harassment whatsoever. Clearly list the procedures that an employee should follow if they feel they have been discriminated against, harassed, or have witnessed such things. State that complaints will

be handled confidentially, except as necessary for investigation and resolution, and that there will be no retaliation against an employee for exercising his or her right to report discrimination or harassment. An open-door policy can encourage employees to discuss their work-related concerns with management or human resources before they escalate into a major problem.

The "at-will" employment disclaimer simply states that the employee is working for the company at-will rather than in a contract. This means that the employee or the company can terminate the employment relationship at any time, without notice, for any lawful reason.

Safety is always a major concern at any business. Discussing safety in your employee handbook is the first step toward creating and maintaining a safe working environment. In this section you will want to list general safety rules and specific safety rules for various aspects of the job or position. Give general precautions and procedures for instances such as slipping and tripping hazards, fire prevention, sharp instruments, and on-the-job falls. We even list the "Laws of Lifting" in our handbook to protect our employees against back injuries, which can be common. Make sure employees are aware of what to do when an injury happens and what steps need to be taken. Vehicle, machinery, and chemical safety policies are some other areas you may want to further discuss.

Under job site etiquette you should include what is not approved while on the work site, such as smoking or chewing tobacco, drinking of alcohol, and theft and vandalism to name a few. It may seem like common knowledge, but if it's not listed in your handbook as unacceptable, you may have no recourse on which to fall back later should it become an issue.

To protect yourself against wrongful termination claims, do not forget to discuss and explain the various reasons for termination of employment, including resignation, retirement, abandonment, and discharge. Abandonment is when an employee fails to report to work without calling or giving notice for consecutive days (the company can decide the number of days) and will be considered terminated. Discharge can result from the company's dissatisfaction with the employee's performance, changing business needs, breach of



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The Employee Handbook

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company policy, theft or criminal activity, intoxication on the job, falsifying records ... the list goes on and on, and you should list any possible grounds for discharge so that it is perfectly clear what the company will not tolerate.

The employee handbook should be a wealth of information to your employees. Clearly state all that defines your company including any policies, procedures, rules, and regulations. Both you and your employees will need to refer to it time and time again. I'm definitely not

an expert on the topic, but if you have any questions or concerns on starting or updating your employee handbook, please feel free to contact me.

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Biology, Spread, and Survival of Waterborne Pathogens

by Robert L. Wick



With the advent of recirculating water systems in greenhouses, both the potential and real threat of system-wide dissemination of plant pathogens through irrigation water has increased. Plant pathogens in irrigation water are not restricted to greenhouses; contamination has long been known to occur in nurseries and vegetable farms where holding ponds, rivers, or other surface water are used for irrigation. Despite the risks, sub-irrigation systems in greenhouses, whether recirculating or not, can reduce foliage diseases, conserve water, and reduce usage of agricultural chemicals. This article is not intended to present a case against recirculating water systems.

Water coming into a greenhouse from a municipal source or deep well is an unlikely source of plant pathogens. However, any water source, even if treated before entering the greenhouse, is readily contaminated by pathogens associated with diseased plants. If contaminated water is reused, the population of the pathogen tends to be higher, potentially resulting in widespread root and/or vascular diseases.

A wider range of plant pathogens are capable of spreading in greenhouses than we are probably aware of. For example, it is likely that foliar nematodes, which are tiny aquatic worms, could be spread down-flow from plant to plant. For the purposes of this discussion only *Pythium*, *Phytophthora*, and *Fusarium* will be covered. These three genera are prevalent in greenhouses and have been recovered from recirculating water a number of times, but *Fusarium* less so than the other two.

Pythium and *Phytophthora* are closely related aquatic, fungal-like organisms but they are unique in several

ways. *Pythium* is widespread in nature, occurring in nearly all field soils, whereas *Phytophthora* is only locally distributed in nature. Likewise, *Pythium* is much more common in greenhouses than *Phytophthora*. *Pythium* is a weak pathogen compared to *Phytophthora*. However, in soilless growing media and water systems, *Pythium* has little competition and can cause widespread damage to plants. In addition, there are several differences in morphology, physiology, and sexuality between the two organisms.

The aquatic nature of these organisms make them particularly troublesome in recirculating water systems. Both require significant amounts of water to complete their lifecycle, and with few exceptions, produce swimming zoospores in large numbers. The zoospores are released into the water and disseminated from plant to plant where they reinfect, resulting in the release of more zoospores. As the zoospores come into close proximity to the roots, they can find the roots through a process known as chemotaxis. Both *Pythium* and *Phytophthora* produce structures that allow them to survive for relatively long periods of time (years) in the absence of fresh plant material to infect. Indeed, a feeder root only 1 mm long could have 50 to 100 survival spores embedded in it. Despite their aquatic nature, these organisms can live in a dried state on concrete floors for long periods of time (certainly months, probably years).

There are several places in greenhouses where infected plant material can reside. The most obvious repositories are the holding tanks for the recirculating water. Here organic material and soil of all kinds, washed away from thousands of infected plants, comes to rest. Perhaps less

ofa Grower

obvious are all of the corners, crevices, nooks, crannies, and cracks that occur on benches and concrete floors (Figure 1). Even less apparent are the corners and deadheads of pipes that recirculate the water – and the biofilms that coat the inside of the pipes (Figure 2). Once a system is contaminated, every effort needs to be made to eliminate the organic deposits in these areas.

Fusarium is not an aquatic fungus, but it has proven to be very successful at spreading from plant to plant in greenhouse irrigation systems, resulting in significant disease problems. Fusarium wilt of hydroponically-grown basil provides us with an excellent example. While this particular *Fusarium* does not infect floricultural crops, there are several *Fusarium* species that can. Fusarium wilt of cyclamen is a case in point. Like *Pythium* and *Phytophthora*, *Fusarium* produces spores and mycelial fragments that travel in the water stream and also produces special survival spores that can survive in the absence of plant material. For the same reasons mentioned above, recirculating water systems contaminated with *Fusarium* have been challenging to decontaminate.

Regardless of the root pathogen involved, there are several patterns of disease development that may occur on the floor or bench, and the history of disease in the greenhouse may affect the pattern. Root diseases first occur on very few plants and will typically occur in a random or a clumped distribution. If the recirculating water is contaminated, and the plant material has only recently been distributed on the floor/bench, then the pattern of development would be expected to occur close to where the incoming water first meets the potted plants. From here, one would expect symptom development to

occur in the direction of flowing water, but this can vary greatly from system to system.

The management of plant pathogens in recirculating water systems requires a holistic approach. We can begin by assuming that the water coming into the greenhouse is free of pathogens, but all bets are off if the source is local surface water. Ideally, plant material coming into the greenhouse should also be free of plant pathogens but this is an unrealistic assumption. Nevertheless, incoming plants should at least be visually surveyed to make sure they do not have evidence of root diseases, such as random wilting, stunting, or chlorosis. Preventive fungicides specifically targeted for root pathogens are advisable if the range has a history of root diseases.

Losses due to pathogen-contaminated water require that the system be thoroughly disinfested. All plant material, including plant debris and soil, must be removed from the floors/benches, preferably by sweeping or vacuuming the dry surface. All surfaces are then disinfested with a reliable greenhouse product. Care must be taken, especially on floors, to make sure that the corners are not neglected. Machines that scrub the floors with rotary pads will miss corners. The reservoirs need to be emptied of water, mud, and organic material followed by disinfestation. Screens and filters for incoming water need to be treated similarly. The distribution network under the floor is the most difficult to thoroughly clean. Unless all pipe joints have rounded corners, organic material can build up and resist flushing. It may be possible to insert high pressure hoses at strategic points and blow the offending material out of corners. Do the same thing to cracks in the floors. In older distribution



Figure 1. Cleaning, then disinfesting concrete floor joints and cracks is critical for minimizing potential disease problems in recirculating systems like flood floors.



Figure 2. Organic deposits and biofilms in pipes can harbor and reintroduce pathogens.

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Biology, Spread, and Survival of Waterborne Pathogens

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systems biofilms will develop, much like the plumbing in your residential homes. Biofilms can trap pathogen-infected plant material, slowly releasing it back into the water stream. It is important to realize that the organic material contains mycelium, chlamydospores, and oospores, all of which are protected by the roots from chemical disinfectants. There are no products on the market that will effectively penetrate into root systems and destroy resting structures of plant pathogens.

There has been a renewed interest in adding chemicals to recirculating water systems to prevent or correct contaminated water. Products were introduced in the past for algae control but for several reasons were not acceptable to the industry. Here are a few things to keep in mind about chemical disinfectants (including ultraviolet light) for recirculating water. Oxidants have a very short period of effective activity that probably can be measured in minutes at the concentrations used in the industry. This means that they cleanse the water but afford no *protection*, they only cleanse the water. Chlorine dioxide is longer lasting than the other oxidants. Oxidants are corrosive to metals, and chlorine dioxide damages natural rubber and rubber products. It may be possible to provide a continuous dose of oxidizing material to the system but it may be impractical or cost-prohibitive. Copper materials do not lose their activity like oxidants but, if over-dosed, coppers can be toxic to plants and inhibit root growth. Ultraviolet light water cleansing systems must be rated to match the water flow, and the water must be relatively clean for them to be effective. Like oxidants, UV light does not offer any protection against recontamination.

All of the above-mentioned interventions suffer from the same severe limitation: they are ineffective for treating infected organic material and mud that exists in the pots, root systems, nooks, crannies, cracks, and corners of the greenhouse. For this reason, it is essential to undertake a thorough cleaning and disinfecting process between crops. Remember this basic tenet: surfaces must be cleaned first and then disinfested. You cannot adequately disinfest dirty, soiled surfaces, nor penetrate infected organic material.

If chronic root rot continues, consider raising the pots or flats off of the floor and watering overhead until the situation can be brought under control. Despite these seemingly daunting obstacles, growers have managed to have successful crops following episodes of contamination. While still not thoroughly proven to be effective in large distribution systems, it is recommended to add an oxidizing agent to the water prior to or during start-up following a cleansing cycle. *Pythium* and *Phytophthora* zoospores are very sensitive to oxidizing agents.

There are several things to consider when constructing greenhouses with recirculating water systems. Distribution pipes should be designed so that all corners are round and no dead ends occur in the system. Strategically integrated “clean-out points” should be incorporated in the design to allow for introducing pressurized water for flushing. There should be several water reservoirs in the greenhouse range, each with a closed distribution system dedicated to a particular section or sections of the range. This allows a portion of the system to be thoroughly cleaned if necessary, and prevents widespread contamination throughout the greenhouse system. Install an effective filter system that prevents organic material and debris from settling in the reservoir. Workers should not be allowed in any part of the greenhouse range with soiled shoes or equipment, and all areas where flood water is distributed should have restricted access and be protected by foot sanitizing baths. All employees should be given written and verbal information about the consequences of contaminating the flood floor and distribution system.

For more information on this topic from Dr. Wick and others, attend the education session on Treatment of Waterborne Pathogens at the 2006 OFA Short Course.

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Do You Have a Picture of YOUR Customer?

by John Stanley

I was recently discussing with a retail client's display manager their merchandise strategy. I asked about two products on the same display and who would buy them. The display manager thought that one of the products would be purchased by a 65-year-old woman, while the product next to it would be purchased by a 25-year-old woman.

Was the display working? I'm afraid not. Why wasn't it working? Because the person building the display did not start with a picture of the consumer in mind.

Generational Marketing

In recent months there have been number of articles in the press about generational marketing. What does this mean? It means that as a retailer you need to consider who to target. Is it Generation Y (15 to 25 years), Generation X (25 to 35 years), the Jones' Generation (35 to 49 years), Baby Boomers (50 to 65 years), or Greying Tigers (over 65 years)?

A flick through a glossy magazine will soon reveal that marketers have a well-defined target and present the pictorial or promotion accordingly. But it's more than marketers getting the message across; it's display teams understanding the message and merchandising accordingly.

The Challenges

This does present some challenges. Traditionally, merchandisers have presented products to consumers based on specific categories, such as placing all of one series of products together. But is this the answer in the future?

Some retailers have an easy task. They have refined their retailing to already attract one specific age group and can merchandise accordingly. The real challenge occurs when you are a retailer who needs to attract customers from across a wide band of age groups.

If you fall into this latter category, there is a real argument for splitting up product categories based on target age groups.

In the scenario mentioned at the beginning of this article, the merchandiser had built the display based on an overall product category. The result, in my opinion, was that all age groups were put off because the display did not appeal to any specific age group. The display manager would have had more success if she had built a display based on a specific age group.

One of my clients, a German gift company, now segments its product range based on age. Each

segmented display is supported by a promotional board that features a person from the selected age group enjoying the product experience. The result is locating displays targeting selected age groups in different areas of the store. This does mean that more space is required in store to "sell the picture," but the end result is increased sales per square foot.

Where do Your Start?

Start with the customer in mind, not the product. Have a defined age group in your mind when you're building a display, and then build the display with that age group in mind.

Let me give you a simple example based on my observations when it comes to display signage. Generation X (I prefer to call them IKEA Babies) knows the trends fashions. If you sign a product telling them what is new and trendy, they may feel you are talking down to them and resist purchasing.

The next generation up, the Jones' Generation, wants to be trendy and fashionable, but they need to be told what's new. If you don't tell them what's new, they may never discover it.

The Baby Boomers tend to pick up trends later. Tell them it's new, and they will often wait. Greying Tigers may resist new products completely as they look at it as a new gadget they don't understand and that will quickly go out of fashion anyway.

Segmentation Opportunities

Some retailers will go to considerable expense to get the formula right. Wetherby's in South Africa has divided their store into two. One half is targeted at Baby Boomers and the other half at Generation X. Both groups walk through the same entrance, but are then split into two, Baby Boomers turning left into the store, while Generation X turns right. Both sections of the store have their own coffee shop to ensure both consumer segments linger longer in the comfort of their own generational group.

Become a Leader of Retail Generational Marketing

Encourage your retail team to become leaders of a trend. Make sure that the business subscribes to magazines that target each generational group you are targeting. Get the team to produce "storyboards" on trends from those magazines that can help them build appropriate displays.

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Do You Have a Picture of YOUR Customer??

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One display will not serve all; start with the customer in mind and build displays that a generation can relate to.

John Stanley is a conference speaker and retail consultant with over 20 years experience in 15 countries. John works with retailers around the world assisting them with their merchandising, staff and management training, customer flow, customer service, and image. John Stanley Associates produce an e-newsletter specific to retailing; this includes innovative ideas and advice to help you grow your business. If you would like to receive

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The IR-4 Ornamental Horticulture Program

by **Cristi L. Palmer**



What is IR-4?

IR-4 is the fourth of seven research projects involving more than one region in the Cooperative State Research, Education, and Extension Service (CSREES) of USDA - hence its name "Interregional Research Number 4." Since its inception in 1963, the IR-4 mission is to facilitate registrations of management tools on specialty crops grown on minimal acreage, both food and non-food crops.

The Ornamental Horticulture Program is one of three major programs in IR-4 (Food, Ornamentals, Biopesticides) and focuses on safe and effective pest management tools for greenhouse, nursery, landscape, Christmas tree, and forestry producers. IR-4 works with growers, researchers, registrants, and regulatory agencies to generate research data that can be used by manufacturers to register new products and add new crops, diseases, insects, and weeds to existing product labels.

The IR-4 Ornamental Horticulture Program is supported by two major funding sources: the USDA Agricultural Research Service (ARS) and the USDA Cooperative State Research, Education, and Extension Service (CSREES). The ARS research staff conducts research trials across all pest disciplines and is a critical component of the effort to provide pest solutions to the green industry. The funding provided by CSREES typically supports research through the state university and State Experiment Station systems.

CSREES has four regions utilized by IR-4 to coordinate its research efforts - Northeast, North Central, Southern, and Western. The IR-4 headquarters operation is located at Rutgers University in New Jersey. All of these units operate independently under the umbrella of the Project Management Committee (PMC), which has members from

ARS and CREES. Each regional coordinator is based at one of the land-grant universities: Cornell, Michigan State University, University of Florida, and University of California-Davis. These regional coordinators place research trials with experts in entomology, plant pathology, and weed science.

How IR-4 Decides on Ornamental Horticulture Research Projects

IR-4 selects research projects by soliciting input from growers and researchers, and ensuring that registrants support these projects by placing the researched crops and pests onto labels. Growers, researchers, and Extension personnel fill out project request forms and submit them to either their regional coordinator, State Liaison Representative, or to the ornamental horticulture program manager via a web-based form. Growers, researchers, and Extension personnel may also complete an annual survey to determine which diseases, insects, and weeds are the most problematic, meaning they may not be easily or economically managed with the currently available tools. A workshop is held each year for participants to discuss the major pest issues and rank them for study priority. In general, those diseases, insects, and weeds that have no registered management tools are ranked higher than those that can be controlled with commercially available products. In addition to efficacy research, crop tolerance projects are sponsored in order for growers to know which products can be safely applied to their sensitive plant material. IR-4 is also engaged in sponsoring research on plant growth regulators. Before trials can be initiated, registrants of the active ingredients must endorse the research.



The 2006 High Priority Projects

At the annual workshop, the pathologists elected to continue researching *Phytophthora* management tools and added a project for *Pythium* research. The entomologists selected thrips as the primary project, with tools to manage coleopteran pests also ranking highly. The weed scientists selected tools to manage broadleaf weeds and sedges as the primary project for 2006, with the USDA-ARS contingent volunteering to finish out the remaining plant materials from the 2004-05 perennial plant tolerance project. In a separate meeting, researchers examining plant growth regulators selected two high priority projects: enhancing herbaceous plant shelflife and stimulating controlled branching of woody ornamental plant materials.

Who to contact at IR-4:

For more information about the IR-4 Ornamental Horticulture Program, contact Cristi Palmer (see author

box below) or visit www.ir4.rutgers.edu. A Regional Coordinator can also help those who wish to learn more about studies in a particular region. Regional Coordinators can be contacted at: Northeast Region – Edith Lurvey, 315-787-2308, ell10@cornell.edu; North Central Region – Satoru Miyazaki, 517-336-4611, ncrir4@msu.edu; Southern Region – Charles Meister, 352-392-2399, cmeister@ifas.ufl.edu; Western Region – Rebecca Sisco, 530-752-7634, rsisco@ucdavis.edu; and USDA-ARS Office of Minor Use Pesticides– Paul Schwartz, 301-504-8256, schwartz@ba.ars.usda.gov.

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University of Illinois Research Update

by Daniel Warnock

The University of Illinois is one of the original 37 public land grant institutions created in 1862 upon the signing of the Morrill Act by Abraham Lincoln, an Illinois' son. Residing in the cities of Urbana and Champaign near the eastern border of Illinois, the university is centrally located between Chicago, St. Louis, and Indianapolis. With so many nearby metropolitan areas, one is not surprised to find that Illinois frequently ranks in the top ten states for the production of floricultural crops. On the University of Illinois campus, all aspects of horticultural research, teaching, and extension are located in the Department of Natural Resources and Environmental Sciences (NRES), which houses more than 270 undergraduates, 180 graduate students, and 45 faculty members with interests ranging from wildlife ecology in rural areas to the impact of landscaping on human behavior in urban environments. As a discipline within the department, horticulture has about 20 faculty members, 70 to 80 undergraduate students, and an additional 40 to 50 graduate students.

Learning Opportunities at UIUC

The College of Agricultural Consumer and Environmental Sciences (ACES) focuses on academic

success. This is exemplified by the ACES Academy of Teaching Excellence, where faculty members, academic professionals, and graduate students are equipped to engage students to develop the essential skills needed in today's global society. The horticulture program also empowers students for success by offering undergraduate horticulture degrees in production and management (turf, nursery, and landscape design; floriculture and greenhouse management; or food crops), horticultural science, or urban forestry. Master of Science and doctoral degrees are offered in natural resources and environmental sciences. Faculty members blend research expertise, industry experience and contacts, and active learning methods in and out of the classroom to create student success and a dynamic learning environment. Dianne Noland, Art Spomer (emeritus), and Daniel Warnock are responsible for floricultural research and teaching, but are girded by additional faculty members, extension personnel, and academic professionals with expertise in ornamentals, turf, entomology, pathology, and ecology.



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University of Illinois Research Update

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As society becomes increasingly global in focus, businesses require employees to have a comprehensive understanding of international issues. “Global eminence with local relevance” has become one focus of education at UIUC in recent years. Horticulture education within NRES is expanding beyond the Urbana and Champaign city limits. The Chicago Area Degree Transfer Program, instigated by our department, allows Chicago area residents the opportunity to obtain a University of Illinois horticulture degree without campus residency. Collaboration with Chicago area community colleges allows students interested in a four-year degree to obtain credit for some horticulture courses. The final two-year campus residency requirement is waived so Chicago students receive credit for specific UIUC horticulture courses taught in the Chicago area. We expect a growing number of floriculture students in this program because many of the Chicago area floricultural businesses have expressed a need for additional employee expertise. This program is a great example of how industry partnerships with universities can lead to creative academic programs that have local relevance.

On the issue of global eminence, the University of Illinois is recognized as one of the top 20 universities for international students. The College of Agricultural, Consumer, and Environmental Sciences actively promotes, encourages, and supports international experiences for undergraduate students. The floriculture program is no exception to this. Many students have taken advantage of international agreements with Wageningen University in The Netherlands, and completed study abroad programs during their undergraduate tenure. Some horticultural courses offer a short-term international experience – typically two weeks – in which students visit production facilities, gardens, and historical sites as a method of active engagement. For those students that are unable to travel, many undergraduate courses have international dimensions.

The global eminence of UIUC floriculture is extending beyond students. The University of Illinois is the lead for a multi-institutional project with the University of Florida, Purdue University, University of Minnesota, The Ohio State University, and Lincoln University to enhance Egyptian agriculture and undergraduate education. Dr. Warnock is working with colleagues at five Egyptian universities to improve their horticulture curricula. Undergraduates at these universities are facing many of the same challenges as our students when competing in a global market. Unfortunately, the Egyptian education system currently has little ability to make rapid and necessary changes to curricula. Partnerships



Department of Natural Resources
and Environmental Sciences

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

developed with Egyptian agribusiness, academia, government, and U.S. academia have allowed significant shifts toward improved core competencies for Egyptian students. Innovative thinking and partnerships have resulted in direct industry involvement in Egyptian undergraduate education. Indirectly, the undergraduate horticulture curriculum at UIUC has benefited from the increased international dimension.

The floriculture program at UIUC is focused on providing students with the essential competencies necessary for success in business or research environments. Curriculum changes have centered on improved business skills, communication skills, and critical thinking to solve real world problems. Classroom instruction often involves active participation by the students for an industry applicable outcome. The integrated curriculum is designed to sequentially build successes and utilize products developed by students throughout the semester.

For instance, students enrolled in the greenhouse management and floricultural crops production courses Dr. Warnock teaches produce several cut and potted flowering crops each semester. These courses are required for agriculture education majors and horticulture majors emphasizing floricultural aspects. As students in these courses are likely to become teachers and advocates for the industry, a dynamic approach to teaching is utilized that blends relevant scientific research, industry experience, and student-led discussions that extend beyond the classroom walls. Computer controlled environments, graphical tracking software, nutrient monitoring tools, insect monitoring devices, and cost accounting spreadsheets are employed to create commercial settings in greenhouses managed by the students. The crops produced are then “marketed” to several campus outlets including scholarship banquets, floral crops quality evaluation courses, and floral design courses. Students actively develop industry networks during these courses through field trips, guest lecturers, and collaborative classroom research opportunities with industry partners, such as a regional poinsettia trial.

Professor Dianne Noland is a nationally recognized instructor who brings a tremendous amount of passion to her floral design and the herbaceous perennials course. She co-teaches a floral quality evaluation course with Dr. Warnock. Cut flowers produced at UIUC are routinely utilized in the courses taught by Professor Noland. Students in the design courses may be observed creating and displaying projects for public and peer evaluations. An annual design to music competition is a tremendous


 The logo for 'ofa Research' features the lowercase letters 'ofa' in a stylized, blue, cursive font. A green leaf-like shape is integrated behind the 'o' and 'f'. To the right of 'ofa' is the word 'Research' in a clean, green, sans-serif font.

ofaTM Research

outreach opportunity to the community for students, fostering goodwill, and public recognition. Professor Noland also hosts a weekly local television show devoted to gardening in Illinois. This outlet provides an opportunity for faculty and students to engage in conversation with local community residents to solve gardening problems. The commitment for learning opportunities outside of classrooms is an example of how the floriculture program at UIUC is preparing students for success.

Students are encouraged to participate in extracurricular activities related to floriculture. Floriculture students actively participate in national competitive events such as the Pi Alpha Xi (PAX) Floral Quality Evaluation and Design Competition and the Mid-America Collegiate Horticultural Society (MACHS) Competition. Our department and horticulture faculty are actively involved with these events and hosted the 2005 PAX competition, and will host the MACHS competition in 2006.

Outside of national competitions, there are several horticulture related clubs on campus, including Horticulture Club, Hands-on-Herb Society, Orchid Club, SAIFD, and Pi Alpha Xi Honor Society. These clubs provide opportunities for students to grow, design, and market floriculture products as fundraisers for scholarships, travel to national conferences, or public outreach. The largest student organized event is the Horticulture Club's Mom's Day Flower Show that has occurred annually for the past 50 years. Modeled after the Chelsea Flower Show in England, this two-day event annually attracts over 10,000 people to observe a floral design competition and tour 10 to 15 gardens that are designed, constructed during a 3-day period, and maintained by club members. Partnerships with local industry allow students to produce the majority of the plants used in the gardens and provide the opportunity to develop contracts for many of the woody ornamental species that cannot be produced within one year. The show is considered a capstone event for undergraduate floriculture students at UIUC, as it provides a unique opportunity for students to apply the skills acquired during their academic career while honing leadership, communication, and business skills.

Floriculture Research

Production of Alternative Crops

Collaboration among UIUC faculty working with native herbaceous prairie species, faculty working with herbs, and local agribusinesses has resulted in expanded opportunities for production of niche floricultural crops. Native perennial species may be produced in rockwool

or bed systems containing soilless media for use as cut flowers. Postharvest life of these cuts, however, does not meet current market standards. Evaluation of several rosemary cultivars indicates that some are more adapted to mechanical shearing for Christmas tree shaped topiaries than others. Research with cut poinsettia has revealed that pinched plants in a bed system are likely to be more profitable and more uniform than unpinched plants or those produced as potted plants. The research on the production of alternative crops for floriculture producers is ongoing under Dr. Warnock's guidance.

Integrated Pest Management

Integrated pest management research focused on floriculture is conducted mainly by Drs. Warnock and Raymond Cloyd. This team is interested in developing integrated pest management (IPM) systems that limit insect and mite damage to horticultural crops. While under the single umbrella of integrated pest management, the team is evaluating multiple production components in greenhouse settings. Current research is focused primarily on 1) evaluating bedding plant cultivars for improved levels of thrips resistance, 2) identifying synergistic effects between resistant plants and insecticides, 3) understanding how tank mixes and pesticides impact pest and prey behavior, foraging, and survival, 4) understanding the interactions of soilborne pests, including fungus gnats with their natural enemies under different watering regimes and growing medium, and 5) evaluating the use of trap crops in managing western flower thrips in floriculture production systems.

Results indicate that host plant resistance to western flower thrips exists and is heritable; tank mixes of commonly used pesticides may have synergistic or antagonistic effects on target pests and beneficial control agents; insect pests can develop resistance to biorational insecticides; cultural practices impact pest population levels; pests may arrive in greenhouses in bagged media or on propagules; and trap crops may be utilized to mitigate pest damage.

Floricultural crop producers have directly benefited from these findings through published articles and suggested alterations in cultural practices to mitigate pest damage. Additionally, plant patents for impatiens populations with improved resistance to western flower thrips were recently granted. The research has been sponsored by U.S. Hatch Projects, Illinois Department of Agriculture, Gloeckner Foundation, California Cut Flower

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Commission, F.I.R.S.T., and many industry collaborators. We are honored to be participants in these partnerships and thank the funding agencies for their ongoing support of our work.

Industry Inspired Research

Growers have unique insight into production problems as they develop, so we try to collaborate with industry partners as often as we can. These projects are often incorporated into classroom settings where undergraduates and graduate students interact to design, implement, and analyze short-term research on grower-identified issues or ideas. Recent projects have revolved around media amendments, such as fly ash, bakery byproducts, and cocoa hulls; application of plant growth regulators on native plants; pesticide phytotoxicity; and pest monitoring techniques for research greenhouses. These projects provide the opportunity for immediate feedback to producers and unique learning opportunities for students.

Extension and Outreach

Regional Poinsettia Trials

Cooperative efforts with Dr. Kimberly Williams at Kansas State University, Dr. Chris Catanzaro at Tennessee State University, Ecke Poinsettia, Fischer Poinsettia, Dummen, First Class Selecta, and Oglevee Poinsettia have resulted in the development of a regional trial whose goal is to determine how identical cultural practices impact poinsettia performance. Consumer preference surveys, phytotoxicity reports, and cultivar performance data are available for most currently produced poinsettia cultivars. Previous years' trial information may be viewed at www.oznet.ksu.edu/poinsettias/home.htm.

Hartley Gardens at the University of Illinois Arboretum

When completed, the Arboretum's gardens, collections, and habitats will transform 160 acres of the UIUC south campus farmlands into an exceptional "living laboratory" for studies in plant sciences and fine and applied arts. The Arboretum is an annual host for multiple regional field day events, typically providing four internships for students, and is often used by the community for recreational and social events. It currently houses four main gardens: the welcome garden, the idea garden, the Japan house and gardens, and the Hartley garden.

The 3-acre sunken garden, known as Hartley Selections Garden, is considered one of the hidden gems on the UIUC campus. The Hartley Selections Garden, dedicated in the fall 1994, was the first stage in the Arboretum's development, offering hundreds of different flowering annuals and bedding plants. The garden is an All-

America Selections Trial Site for annual and perennial plants. During 2005, more than 1,200 cultivar entries from 36 industry partners were evaluated for garden performance under mid-western conditions.

Japan House is used as a classroom and a cultural center. Regularly scheduled classes include a tea ceremony class, a Zen meditation group meeting, a calligraphy class, and a sweet-making class (for the tea ceremony), as well as a series of extramural courses featuring different types of Japanese art forms.

Green Industry Survey

Initially performed in 1999, the Illinois Green Industry Survey has directly impacted UIUC floriculture. This survey was the first comprehensive measure of the green industry in Illinois that included production and service industries for all ornamental and turf areas. The survey provides a wealth of information on economic impact, business needs, industry success, and future limits.

Annually, sectors of the green industry are updated with the most recent additions indicating an economic value of \$3.95 billion in Illinois, second only to corn and soybeans. The comprehensiveness of this survey is rapidly becoming the standard for industry surveys conducted by other states. Nearly 20 industry associations were involved with formulating, conducting, and funding the survey. For additional information, please visit <http://research.nres.uiuc.edu/report01-01/>.

Our Future

The Department of Natural Resources and Environmental Sciences at the University of Illinois is dedicated to educating students and supporting industry in a manner that enhances environmental stewardship. Cooperative efforts in education, research, and extension activities are directed toward the promotion of sustainability in agricultural and natural systems. We look forward to continued partnerships with the floriculture industry. For additional information about floriculture at the University of Illinois or for partnership opportunities that benefit students, please contact Dr. Warnock.

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Biological Control: "Quality" Makes All the Difference

by Raymond Cloyd

Biological control is a pest management strategy that involves the use of living organisms such as parasitoids, predators, and pathogens to manage insect and mite pests ... BUGS!! Because biological control agents or natural enemies are living organisms, they require special handling when reared, delivered, and released into interior plantscapes such as greenhouses, conservatories, and interiorscapes. Typically, natural enemies are purchased from a commercial supplier/producer or distributor and then released; this is referred to as augmentation biological control. However, before natural enemies are released they must be checked to verify quality or viability to ensure that they are able to provide control. The quality of natural enemies (i.e. their health and ability to do their "job") is dependent on many factors including rearing conditions, packaging, survival in transit, and handling by the end user. This article will focus on factors that affect the quality of natural enemies after they leave the rearing insectary.

Natural enemies should be delivered in a container within a larger package filled with either styrofoam peanuts or newspaper to minimize movement during transit. In addition, an ice pack should be placed with the container to keep the natural enemies cool during transit. It is important to note the number of days in transit and how cold or warm the ice packs are. Consult your supplier on how to best evaluate incoming packages of natural enemies. Even if natural enemies leave the insectary of a producer/supplier in good condition, inappropriate shipping and handling procedures by the distributors or end users may result in deterioration of the natural enemies prior to release. For example, rough handling or exposure to excessive heat or cold can impact the performance of natural enemies when released into greenhouses, conservatories, and interiorscapes.

As mentioned previously, natural enemies are living organisms and they need to be handled very carefully. Shipping containers must provide adequate environmental conditions that are conducive for survival including proper relative humidity, but still allow for some air exchange. The supply of air is normally more than adequate even in sealed containers, unless some kind of fermentation process occurs or heat raises the respiration level of the natural enemies. Natural enemies that are improperly packaged may experience stress, which can reduce their effectiveness or even result in death. It is quite obvious that dead bugs won't kill live bugs. If there are any concerns regarding temperatures in transit, request your supplier to track temperatures by adding a

data logger in the shipment, which will allow you to assess the temperatures encountered during shipment.

Many natural enemies are shipped as eggs or pupae, so temperatures inside the shipping box and the length of transport should be carefully monitored to prevent hatching or emergence during transport. Other natural enemies such as the predatory mite, *Neoseiulus* (= *Amblyseius*) *cucumeris* (used for control of western flower thrips), are shipped with an abundant food supply. These predators are typically shipped with prey-storage mites (*Tyrophagus* spp.). Shipments of *A. cucumeris*, whether in bulk or in slow release sachets, do not require cooling and benefit from good air exchange inside the shipping box. Sterilized ephestia (*Ephestia kuehniella*) eggs, which are frozen cereal moth eggs, may be included in shipping containers as a food source for predators such as *Orius insidiosus* and *Dicyphus hesperus*. This ensures quality by reducing stress while in transit. Shipments of natural enemies in the adult stage that are not supplemented with food should be delivered via UPS or FedEx to prevent mortality. Longer shipping times can lead to high mortality and a reduction in fitness, which can lower the effectiveness of biological control programs. In addition, delays during shipping may result in death from cannibalism (eating each other), desiccation (drying up), or even the simple process of aging. For example, the predatory mite *Phytoseiulus persimilis*, when packed for shipping in granular carriers, is susceptible to mortality due to starvation, cannibalism, or desiccation when delays occur during handling.

Most parasitoids, predators, and pathogens should only be stored for a short period of time. Consult your supplier for maximum storage time. If natural enemies are stored too long (more than 1 to 2 days for most packages) they may not have the fitness and ability to forage. Natural enemies stored in the adult stage tend to be more susceptible to stress than natural enemies stored as immatures or pupae. However, it has been reported that the leafminer parasitoid *Diglyphus isaea* can be stored at low temperatures for two months without increasing mortality and reducing fecundity. In general, natural enemies should be released immediately upon arrival. It is a good idea to check the package(s) prior to releasing the natural enemies, to determine that they are alive. You can do this by counting the number of live adults observed or assessing percent emergence. For example, make sure adult parasitoids are flying around



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Biological Control

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or predators shipped as adults or larvae are active. Consult your supplier and request either replacements or credit if the natural enemies appear dead or inactive. To determine the quality of predatory mites such as *P. persimilis* that are typically shipped in containers consisting of corn cob grit or vermiculite, place a small sample on a white sheet of paper and check with a 10X hand lens to make sure the predatory mites are active (they will be moving rapidly). Natural enemies that are shipped as eggs or pupae can be evaluated using a different method. For example, the quality of whitefly parasitoids such as *Encarsia formosa* and *Eretmocerus eremicus*, which are shipped on cards containing parasitized host scales, can be checked by placing a sample card inside a small glass or plastic jar and regularly monitoring to make sure that adults are emerging and are capable of flight. Research in Canada* has led to the development of simple techniques that can be used to assess the quality of a product - based on emergence and flight ability - for the two parasitoid species *E. formosa* and *E. eremicus*. Results have demonstrated that cold storage at the insectary or during shipment can reduce emergence and the ability of the parasitoids to fly and parasitize whitefly nymphs (scales). Hence, the need to assess the parasitoids at receipt.

In addition to parasitoids and predators, it is also important to verify the quality of entomopathogenic or beneficial nematodes prior to use. Beneficial nematodes should be evaluated within 24 hours after receiving them. Consult your supplier to determine the appropriate procedure(s) to test the viability of beneficial nematode shipments. In our research at the University of Illinois we have found that there is a wide range of variability in entomopathogenic nematode survival - 7 percent to 70 percent mortality based on the company and batch. Currently, all companies producing natural enemies use the guidelines set forth by the International Organization for Integrated and Biological Control (IOBC) and American Society for Standards and Testing Materials (ASTM) working groups to determine the quality of insectary cultures and the product at receipt. Guidelines have been developed to assess the quality of natural enemies in the laboratory using such characteristics as emergence, sex ratio, fecundity, lifespan, and adult size. In addition, tests to evaluate flight and field performance

of the product at the final destination are being developed. Quality control guidelines have already been developed for many natural enemies including *Neoseiulus* (= *Amblyseius*) *cucumeris*, *Aphelinus abdominalis*, *Aphidoletes aphidimyza*, *Chrysoperla carnea*, *Encarsia formosa*, *Leptomastix dactylopii*, and *Phytoseiulus persimilis*.

Holding your supplier accountable and maintaining an open line of communication optimizes shipping and handling conditions, which will greatly enhance the prospects of succeeding when using natural enemies to control insect and mite pests. Obtaining a consistent supply of natural enemies throughout the season is extremely important in order to ensure the success of any biological control program. Typically the peak demand for natural enemies is in the spring, although requests for natural enemies may occur from January through August. Remember that "quality" makes all the difference when using natural enemies to control plant-feeding insects and mites.

For those interested in obtaining more information on quality control standards for natural enemies, refer to the publication Quality control and production of biological control agents: Theory and testing procedures (J. C. van Lenteren, editor. June 2003. 327 pages. ISBN 0 85199 688 4. Price=\$120.00), and the following websites:

<http://biocontrol.ifas.ufl.edu/amrqc/IOBCproceedings/qc/08-vanLenteren.pdf>

<http://biocontrol.ifas.ufl.edu/amrqc/IOBCproceedings/amrqcbook.htm>

<http://www.unipa.it/iobc/download/IOBC%20InternetBookBiCoVersion1sept2005.pdf>

<http://users.ugent.be/~padclerc/AMRQC/images/guidelines.pdf>

<http://users.ugent.be/~padclerc/AMRQC/>

<http://www.anbp.org>

* Annual Progress Report September 2003 to May 2004. Development of a National Quality Assurance Program for Bio-Control Agents. Authors: Anna Luczynski and Ian Shi. For more information contact Anna Luczynski at Luczynski@krann.ca.

The author wishes to acknowledge the valuable comments and suggestions of Carol Glenister (IPM Laboratories), Rene Ruiter (Koppert Biological System, Inc), and Anna Luczynski.

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Ask the Doctor

Erik Runkle



Editor's Note: In response to the article, "Temperature Effects on Floriculture Crops and Energy Consumption" written by Dr. Erik Runkle of Michigan State University, an OFA member wrote: "... I would like to express my thanks for such a timely and informative article on the subject of Temperature Effects on Floriculture Crops. This is right up the alley for today. Many of us have experienced a lot of this over the years but it is sure good to hear it again and see the info in black and white. Your article stimulated me to think about the blooming time for Wave petunias, something we seem to have a problem with for mid-April flowering. You mentioned that in addition to temperature that photoperiod and the 'average daily light integral' were factors in time to flower. Tell me more about 'average daily light integral.' Does this have something to do with accumulation of light hours in the plant system?"

Because we believe the answer is of interest to a number of growers, OFA asked Erik to pen his response in this installment of "Ask the Doctor."

Thank you for your letter expressing interest in the article "Temperature Effects on Floriculture Crops and Energy Consumption" that appeared in the January/February 2006 issue of the *OFA Bulletin*. You asked some good questions about how light can also be used to accelerate greenhouse crop development.

In addition to temperature, photoperiod can influence flowering time of bedding plants, herbaceous perennials, and potted crops. Many common bedding plants are long-day plants, including ageratum, blue lobelia, dianthus, pansy, petunia (including Wave petunia), rudbeckia, sunflower, and verbena. These plants flower earlier or only flower when the day length is sufficiently long. Natural long days don't begin until late-March to early-April. To accelerate flowering of these long-day plants, provide low-intensity lighting (delivering at least 10 footcandles) until then as a night interruption or to extend the natural daylength.

You also asked about the "average daily light integral" (DLI). The average DLI describes the cumulative amount of photosynthetic light received per day. The DLI is analogous to rainfall; with rainfall, we are more concerned about knowing how much rain we receive over a 24-hour period than the instantaneous rate of rainfall. Similar to a rain gauge, we use a light sensor

to collect light received over a 24-hour period. Therefore, the DLI is not something that can be measured quickly; rather it requires continuous measurements to determine the value. Many environmental control computers already measure the DLI, but often not in the "mols per square meter and day" unit that we use in plant science. In that case, I suggest you contact the manufacturer of your greenhouse computer to determine the appropriate conversion factor. Alternatively, you can purchase a light meter that collects light data and records the DLI.

In the past five years, researchers at the University of Minnesota, Clemson University, the University of New Hampshire, Michigan State University, and others have been determining how the DLI impacts plant growth and development of greenhouse crops. The DLI influences the time it takes for cuttings to root, for seedlings to mature as plugs, and for finish plants to flower. The average DLI during the winter and early spring is low in the northern half of the United States and Canada. Without supplemental lighting, cuttings take longer to root, plugs take longer to become "pullable," and finish crops take longer to flower than when we receive more light later in the spring.

There are several resources for more information on photoperiod and DLI. First, the 98-page book *Lighting Up Profits*, published by Meister Media Worldwide, contains information on specific plant responses to daylength, as well as presents strategies for how to deliver photoperiodic lighting. This book can be purchased through the publisher or online at Ball Publishing (www.ballpublishing.com/commerce/detail.aspx?ID=367). John Erwin and colleagues (University of Minnesota) have also written articles on this topic that appeared in *Greenhouse Grower* magazine. These articles, entitled "The Fundamentals of Flowering," are also available online at www.greenhousegrower.com/grower_tools/index.html. Both of these resources have much more information on DLI as well.

Best wishes for a great spring season.

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Nominees for 2006-07 OFA Officers and

All active OFA members are encouraged to vote for officers and Board members. OFA is **your** organization. Exercise your right to vote. Elect those persons you want to represent you. All active members will be mailed the ballot by early April. The ballots must be returned to OFA by **May 12, 2006**.

President



Doug Cole, Loudon, New Hampshire, is the president of D.S. Cole Growers Inc., which is a young plant and pot plant producer. Doug serves as general manager of the 145,000-square-foot operation, and he also oversees new product development and business planning. Doug earned his bachelor's degree in plant science from the University of New Hampshire, and he has worked nearly 20 years in the greenhouse business. He is a FIRST board member and a New Hampshire Agriculture Advisory Board member, as well as a former vice president of the New Hampshire Farm Bureau. Doug is currently serving as the OFA President.

Vice President



William Robert (Bobby) Barnitz, Mason, West Virginia, is vice president of Bob's Market & Greenhouses Inc., a family-operated wholesale/retail bedding plant operation and a regional plug supplier. Bobby serves as the general manager in charge of production and assists with sales. He is also responsible for customer service in the plug business. He is a graduate of Gallipolis Business College and has worked in the greenhouse business for 25 years. The company is a Gold Supplier for Ball Seed and has been awarded Ball Seed's Top Plug Topper Award. Bobby was also named as the 2001 *GrowerTalks* "Up and Comer." He has served on the OFA Board of Directors since 2003.

Grower-At-Large (1 elected)



Karl Batschke, West Chicago, Illinois, is the production manager for Ball FloraPlant, a producer and breeder of vegetative annuals, perennials, and geraniums with world-wide distribution. Karl manages production sites in Costa Rica, Guatemala, and Mexico for distribution to North America, Europe, and Asia. He is a graduate of Michigan State University with a degree in commercial floriculture. He is a past production manager for Oglevee, and production manager for Smith Gardens in Washington. Karl has served on the OFA grower committee.



Peter Konjoian, Andover, Massachusetts, is the co-owner and operator of Konjoian's Greenhouses and Konjoian's Floriculture Education Services (KFES). The greenhouse is a family-owned and operated one acre, retail growing range specializing in spring bedding, potted, and hanging basket crops. KFES is a floriculture research and consulting business serving commercial floriculture greenhouse operators. Peter has a bachelor's degree in plant science from the University of New Hampshire, and a master's and Ph.D. in horticulture from The Ohio State University. Peter has served on numerous OFA committees, including grower, publications, research, grower extension, educational affairs, and OFF. He has been a regular Short Course speaker and contributor to the *OFA Bulletin* and the "Tips on Growing..." book series.



Danny Takao, Fresno, California, is the president of Takao Nursery, which is a propagator of perennials, roses, and woodies. Danny is responsible for developing relationships with breeders and agents worldwide, developing product direction for the company, and helping with day-to-day operations. Danny took over the family business in the 1980s; and he has redeveloped the company's production based on groundcovers, perennials, roses, and woodies as the newest addition. Takao Nursery is a Ball Seed Gold Supplier and has received Ball's Topper Award for perennials. Danny has been a speaker at the OFA Short Course, an OFA grower committee member, and on the OFA board of directors.

the Board of Directors

Allied Trade (1 elected)



Kerstin P. Ouellet, Fallbrook, California, is founder and president of Pen & Petal Inc., a full-service marketing firm for the horticulture industry. Pen & Petal's services include media relations, catalog production, website services, advertising, and more. She is a well-known author and frequent industry speaker, including at the OFA Short Course. She earned her master's degree in horticulture from a German university, and then worked for EuroAmerican Propagators for seven years as the marketing director. Kerstin is a former board member of the San Diego County Flower & Plant Association, and is a current member of the Garden Writers Association, the American Horticultural Society, and the San Diego Horticultural Society. Kerstin has served on several OFA committees since 1997. "As a board member I will do what I can to help OFA maintain and strengthen its role as the premier floriculture association, because I believe that the strength of the horticulture industry depends on a strong organization like OFA," Kerstin states.



Joep Bosch, Vineland, Ontario, is the general manager for Priva North America. The company develops and manufactures greenhouse automation, environmental control equipment, and manages systems for the greenhouse industry. Joep manages a staff of 30 employees in production, service, sales, marketing, finance, and administration to support greenhouse operations and their control systems in the United States, Canada, and Mexico. He has a bachelor's degree in horticulture. He is a member, exhibitor, and Short Course speaker.

Florist (1 elected)



Beth Mills is a designer and sales manager for Carlisle Flower Shop, a retail floral and gift shop in Carlisle, Ohio. She is responsible for maintaining the sales area, ordering inventory, creating displays, customer service, community contact, and design. Beth is a frequent Teleflora and FTD design and hands-on program attendee and designer assistant, and has volunteered at the OFA Short Course in the design and decorations areas.



Dalene (Baker) Page, Dover, Ohio, is the manager of Baker Florist and Greenhouse, a full service family-owned retail florist business. Dalene is responsible for design work, wedding consultations, ordering, and scheduling. She attended The Ohio State University-ATI. Dalene has been a frequent OFA Short Course volunteer in the design area, and is serving on the florist committee.

Continued on page 30

Watch your mail in April for the complete **OFA Short Course program**.

This year you can purchase a **4-day general session package AND the complete CD-Rom set** at a *special* member pre-registration rate of **\$400**.

Nominees for 2006-07 OFA Officers and the Board of Directors

Continued from page 29

Ohio Grower (2 elected)



Lisa Graf, Akron, Ohio, is an owner/partner of Graf Growers, a retail greenhouse, garden center, and farm market, which also includes a landscaping division and vegetable farm. Lisa is the director of business development for Graf Growers and is responsible for retail operations, human resources, and oversight of the landscaping division. Lisa attended Akron University and is a graduate of The Ohio State University LEAD program and Hixson's School of Floral Design. She has worked in the industry since 1975. Lisa was awarded the 2004 Summit County Farm Bureau Distinguished Service Award. Currently, she is serving as a member of the strategic planning and finance committees, and as chair of the communications and public relations committee. Lisa has previously served on the OFA garden center committee and board of directors.



Cathy Kowalczyk, Avon, Ohio, is vice president and general manager of Willoway Nurseries Inc., a family-owned wholesale nursery and greenhouse. The company has more than 5 acres of greenhouse, 300 acres of container-grown nursery stock, and 500 acres of field grown nursery stock. She has a bachelor's degree in agriculture from The Ohio State University, and is a certified nursery technician (grower). She is an active member of the Greater Cleveland Flower Growers Association and serves on the OFA grower committee.



Ralph Ostendorf, Cincinnati, Ohio, is a second generation owner/operator of Ostendorf Greenhouses. He is responsible for growing, purchasing, and scheduling at the 50,000-square-foot wholesale greenhouse, which produces annuals, garden mums, and poinsettias for independent garden centers and retail florists. Ralph earned his bachelor's degree in electrical engineering from the University of Cincinnati. Before returning to the family business in 1998, he worked for an engineering firm for the electrical utility industry. Ralph has been an active OFA member and Short Course participant for the past seven years, and is very active in the Cincinnati Flower Growers Association.



Tom Wardell, Waterville, Ohio, is the owner of Wardell's Farm Market. The garden center/farm market grows annuals, hanging baskets, herbs, perennials, and nursery stock. They also have 11 acres of vegetables. As the owner of a small business, Tom does just about everything, including ordering, paying the bills, and selling. Tom has a bachelor's degree in music education and was a band director before taking over the farm in 1982. He has served on the board of the Toledo Area Flower and Vegetable Growers Association, Lucas County Extension Advisory Committee, and the USDA-ARS Advisory Committee for the Greenhouse Research Center at the University of Toledo.

Welcome New OFA Members!

Lenny April - Sunarc of Canada Inc, Montreal, Quebec, Canada
Rose Angela Barnett - Kishwaukee College - IL, Belvidere, Illinois
Angela Beaman - Iowa State University, Ames, Iowa
Lee Benovitz - Ovasco Industries, Louisville, Kentucky
Meshele Conley - World Publications Garden Design, Winter Park, Florida
Christine Dillon - Bo-Ka Flowers & Gifts, Findlay, Ohio
Chuck Evanhoe - Evanhoe & Associates Inc, Dayton, Ohio
Lynne Fraser - Indoors Outdoors, Cincinnati, Ohio
Anthony Gaspari - Sigma Corp, Brampton ON, Canada
Ekh Gazar - Ekh Gazar Company Ltd, Wasnbaatar, Mongolia
James Gibson - West Florida Research & Education Center, Milton, Florida
Manuel Guerrero - Asthor Agricola SA, Gijon Asturias, Spain

Monica Hoerth - The Plug Connection, Vista, California
Shayne Johnson - Fred C Gloeckner & Company, Lakeville, Minnesota
Christine Kelleher - Yoder Brothers Inc, Barberton, Ohio
Mike Klonicki, Cincinnati, Ohio
Mike Lilek - Shining Brow Software, Wauwatosa, Wisconsin
Christopher Lowe - Franklin Park Conservatory, Columbus, Ohio
Kathleen Mathers - Mathers Enterprises Inc DBA Bayfield Gardens, Bayfield, Colorado
Shannon Miller - GroLink, Louisville, Kentucky
Ron Newble - EuroAmerican Propagators LLC, Bonsall, California
Phil Norcom - Direct Energy, North Canton, Ohio

Continued 

Four important reasons to attend this year's OFA Short Course, July 8-11.

1. Learn and Grow

The 2006 OFA Short Course, North America's premier event for floriculture professionals, will have a fresh focus on industry education. The theme is Learn and Grow. Discover solutions and techniques to deal with falling profits, workforce issues, and rising energy costs – challenges facing every segment of the floriculture industry. With more than 120 educational sessions, stimulating idea exchanges, innovative business solutions showcased in 1,300+ trade show booths, and the shared experiences of 10,000 friends and colleagues, you cannot afford to miss the OFA Short Course.



2. Falling Profits

If the bloom has been falling off your profits recently, attend the OFA Short Course to learn how to survive and thrive in tough times. Strategies will be provided for controlling costs, marketing, "lean" manufacturing, industry trends, merchandising, innovative production techniques, and smarter selling.



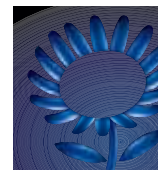
3. Workforce Issues

The ability to find, train, and retain your workforce is a skill essential to the management of a successful business. Owners and managers can Learn and Grow from sessions designed to teach you how to plan and implement effective human resource strategies. Employees of all skill levels, positions, and industry segments are encouraged to attend the OFA Short Course. There's something for every employee in the educational sessions, hands-on workshops, and idea exchanges.



4. Rising Energy Costs

Every segment of the floriculture industry is affected by rising energy costs. Heating, lighting, and transportation all add costs and cut margins. Learn from the experts about what you can do to insulate your business from these challenges.



Be a Fast Learner. Register Early to Learn and Grow.

Advance hotel reservations and registration open on April 24, 2006. Check www.ofa.org for the latest program updates.

Don't Miss Out on Your Monthly OFA E-Bulletin

Many OFA members are not receiving their monthly OFA E-Bulletin because their spam control is refusing the monthly e-mail we send to you. Please add ofa@ofa.org to your address book or to your list of accepted addresses so you will receive this monthly benefit.

To make sure we have the correct e-mail address for you, visit the Members-Only section of the OFA web site and check the contact information we have on file.

Also, if you are having difficulty viewing the OFA E-Bulletin, make sure your e-mail preference is set to "text only" so you can view the important information.

Welcome New OFA Members! (Continued)

Glen Oosterhoff – Richard Oosterhoff & Son, Momence, Illinois
 Ed Palmer – Creative-Displays, Virginia Beach, Virginia
 Myron Paul – Paul's Farm Market & Greenhouses Ltd, Zanesville, Ohio
 Patricia Pierce – Of the Earth, Rayville, Missouri
 Bob Rice – RIMACO, Beavertown, Pennsylvania
 Carl Ruisi – GroLink, Oxnard, California
 Kim Santolla – Kimberly's Greenhouse At Pisgah, Tazewell, Virginia
 Lin Schmale – Society of American Florists, Alexandria, Virginia
 Bill Schweizer – Schweizer Greenhouse, Oregon, Ohio

Mark Shepherd – Riceland Foods Inc, Suwanee, Georgia
 Richard Simpson – Rolling Green Nursery LLC, Greenland, New Hampshire
 Joseph Springer – Angel's Florist & Gifts Inc, Tipp City, Ohio
 Eric Stuewe – Stuewe & Sons Inc, Corvallis, Oregon
 Tim Sutton – Canarm/Leader Fan, Brockville, Ontario, Canada
 Marc Van Iersel – University of Georgia, Athens, Georgia
 Jennifer Walton – Walton Greenhouses, Loogootee, Indiana
 John Wargowsky – Ohio Farm Bureau Federation Inc, Columbus, Ohio
 Nancy Wilkes – NJ Supply Ltd, Saint Charles, Missouri



OFA Resource Directory Arriving Soon

The OFA Resource Directory will be arriving soon to all active members. This valuable resource connects you to other floriculture professionals and companies across the world. In addition to the member listing, the Directory provides information about OFA's board of directors, committees, staff, membership benefits, publications, and partnerships.

OFA Member Decals Available

Show customers you're a member of the industry's leading association by proudly displaying your OFA membership window decal. To receive additional decals, contact the OFA office.

Attention Ohio Members

The 76th annual Ohio Safety Congress and Expo will take place at the Columbus Convention Center from March 28-30. The event, sponsored by the Ohio Bureau of Worker's Compensation (BWC), is free of charge to the public. For more information, visit www.ohiobwc.com.

www.ofa.org



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Address Service Requested

OFA Event Calendar

March 19, 2006	Memorial Tributes Mini-Show/Workshop - Garfield Heights, OH
March 25, 2006	Memorial Tributes Mini-Show/Workshop - Columbus, OH
March 26, 2006	Memorial Tributes Mini-Show/Workshop - Cincinnati, OH
March 28, 2006	OFA Container Garden Workshop - Akron, OH
March 29, 2006	OFA Container Garden Workshop - Columbus, OH
March 30, 2006	OFA Container Garden Workshop - Cincinnati, OH
April 2, 2006	Ohio Certified Florist Written Test - Columbus, OH
July 8-11, 2006	OFA Short Course - Columbus, OH
July 10, 2006	Ohio Certified Florist Written & Hands-On Tests - Columbus, OH
October 20-23, 2006	OFA Board & Committee Meetings - Louisville, KY

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