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BULLETIN

A Live Bug is not Always a Bad Bug! How to Add Biological Control Agents to Your Current Management Program

by Luis Cañas, Ph.D.

Have you heard the saying that a good bug is always a dead bug? Well, this is not always the case, because there are plenty of good insects found in every plant-growing system. These good insects help growers by killing some of the major pests attacking plants. In greenhouses, however, the number of good bugs that naturally occur might not be enough to reduce the pest populations to acceptable levels. An alternative to this is to add more natural enemies, also called biologicals or biological control agents, to those already present in the growing facilities. This approach is named "augmentation" biological control, because you augment the number of natural enemies by releasing them periodically.

In previous years, augmentation biological control has been successfully used in systems such as tomatoes grown in greenhouses and rose production areas as part of integrated management programs. Other systems have included poinsettias and bedding plants, where parasitoid wasps have been used against whiteflies and nematodes against fungus gnats.

The major drawbacks of using biological control agents are sometimes their price and the labor needed to release them. Nevertheless, in some instances, their overall price compares rather well to programs where only pesticides are used, because people do not need to

Continued on page 7

Your Garden Center Could Become a Holiday Tradition

by Mary Stowe

Oakland Nursery has become a tradition at Christmas for many of our customers. This is perhaps the ultimate goal – to be as much a part of your customers' holiday traditions as the Christmas tree you sell!

The more immediate goal, of course, is to generate more sales during the Christmas season, as well as to increase return customers during the other seasons. The philosophy of Paul Reiner, owner of Oakland Nursery, goes a bit further. He views the nursery's Christmas endeavors as an extension of goodwill toward the community – building and maintaining good public relations.

Here are a few strategies we use, which we continually fine-tune and adapt to achieve our goals:

Start with a big attraction to draw customers into the store.

Then give them an experience with lasting appeal – entertain your customers! For example, for more than 20 years, our primary attraction has been a themed fantasy display with animated characters, lights, music – and some years, even live goats, miniature horses, and donkeys. A portion of a roofed lathe is enclosed with

Continued on page 15

INSIDE this edition...

ofa Forum

Future of Extension... Challenges and Concerns Related to Extension Programming

by Raymond A. Cloyd, Ph.D.

The purpose of traditional Extension throughout the United States has been to link academia and clientele, which may include homeowners, professionals, or specialty groups, and to interpret and disseminate information in an understandable manner. This has been accomplished primarily through the efforts of Extension specialists and educators who attempt to address educational needs of clientele and also meet the research demands of commodity groups within a state. In general, this model has sufficiently served the needs of state clientele.

However, the ability of Extension specialists and educators to perform their duties is being affected by a number of factors such as the merging of related departments including horticulture, entomology, and plant pathology; budget cuts; declining operating funds; and inability to fill vacant positions. As a result, Extension specialists and educators are often advised to "work smarter" or "restructure," and do more with fewer resources. As an Extension specialist in ornamental entomology at the University of Illinois (Champaign-Urbana), I have observed changes that have and will continue to have a profound impact on Extension as it relates to the mission of land-grant universities. In this article, I describe three driving forces that are likely to, and in some cases already do, influence the way Extension specialists and educators conduct business. These are – accountability, regionalization of Extension, and impact of technology.

Accountability

The effectiveness of Extension specialists and educators is no longer based on the number of publications and presentations made, because university administrators have changed the evaluation process. Extension programs that include workshops and/or conferences must now demonstrate both short- and long-term impact and relevance. Impact may include economic and environmental benefits to clientele. In fact, Extension programs that fail to attract an audience or are unable to demonstrate impact are likely to be terminated, which may be especially problematic for Extension programs designed for smaller-sized or specialty groups.

Extension programs are based primarily on pre- and post-program impacts. These are determined by surveys or evaluations, which may be scrutinized by subject-independent review boards. Survey or evaluation questions have to be written to demonstrate quantitatively some type of impact on clientele, whether it is learning new technologies or providing relevant information to affect the decision-making process.

Program impact may be demonstrated by the number of times a publication (i.e. a fact sheet) is downloaded from the Internet or particular Web site. Documented testimonials, such as letters of support from clientele and changes in production practices, may also serve as indicators of program impact. Greenhouse management workshops conducted in Illinois during the summer include presentations from Extension specialists and industry

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personnel. A grower from one of the largest greenhouse operations in Illinois attended a workshop in which there was a discussion on pest management using biological control. Subsequently, this grower began using beneficial nematodes to manage fungus gnats on poinsettia. The use of this biological control strategy has resulted in a significant reduction in pesticide use. This case study is an example of an extremely useful demonstrable impact.

In addition to program impact, the accountability and success of Extension specialists and educators is increasingly being based on productivity, which is measured by grant dollars (particularly those with indirect costs) and peer-reviewed journal articles. However, it is important that college and departmental administrators consider the time required to make Extension presentations at workshops and conferences. This includes preparation time, travel time, the actual presentation, follow-up questions afterward, and even questions by phone or e-mail long after the presentation, which may serve as indicators of program impact. Preparation and documentation maintenance is essential to inform administrators and colleagues of the impact of delivering high-quality Extension programming.

Regionalization of Extension

With fewer resources allocated for Extension compared to 10 years ago, there is a need to re-evaluate and use existing human resources more efficiently. Downsizing in many states and regions has led to regionalization or a clustering of Extension programming. The concept of regionalization, or multi-state programming, involves the sharing of Extension expertise without regard to state boundaries. Regionalization may occur when horticultural programs are too small in a state to support the use of state or federal resources for a full-time Extension specialist. Regional programming may be most effective if adjacent states have a limited number of Extension specialists. The regionalization of Extension is not a new concept; it has existed for many years in areas of agriculture such as poultry science. Additionally, regional projects such as handbooks and guides have involved collaborations among Extension specialists and educators in the Pacific Northwest, Midwest, Southeast, and Northeast.

Although there are potential benefits to regionalization, there are concerns that regionalization will accelerate the trend of not refilling vacant positions. Clear communication among Extension administrators across state lines is critical if regional Extension programs are to effectively serve clientele. States need to address the following concerns and questions before getting involved in regionalized programming:

1. How do Extension specialists and educators justify traveling to another state? What will the home-state clientele think of "their" Extension specialist or educator traveling to another state? Will home-state clientele feel they are being neglected?

2. Which state(s) will provide funding for operational expenses? How can these expenses be shared? How will operational funds be allocated among states? Which state is responsible for monitoring regional programs?

3. Will regionalization lead to increased workloads that affect Extension and research programs?

4. How is impact and accountability determined? How do Extension specialists and educators receive credit or recognition from their home institution for out-of-state work? How will states deal with evaluation?

5. Will implementing regionalized or multi-state programs increase travel time, requiring Extension specialists to travel even longer hours, which may affect productivity?

Despite these issues and concerns, regionalization can lead to favorable collaborations with other specialists and educators across several disciplines. Extension entomologists, horticulturists, and plant pathologists in Illinois, Ohio, Tennessee, and Wisconsin have collaborated in the production of regional-based Extension publications concerning greenhouse pest management. For example, university personnel from Illinois, Indiana, and Wisconsin produced a manual on biological control strategies that can be used in greenhouses (*Biological Control of Insects and Other Pests of Greenhouse Crops*; North Central Regional Publication 581). Such regionally-based Extension publications that focus on a particular commodity, production system, or pest have also been produced in other regions of the United States.

Several states, including Oregon and Washington, have agreements that enable Extension specialists to cross state lines and provide educational programming in neighboring states. In fact, 36 states already rely on Extension entomologists from other states for recommendations related to certain types of pest management programs. Neighboring states will most likely continue this trend of utilizing Extension specialists and/or educators for commodity-based meetings, and they will provide support by covering expenses associated with travel, meals, and lodging; they will include honorariums as additional incentives.

The potential for success of regionalized Extension programs depends in large part on the support of clientele. Extension specialists and educators should listen to their clientele regarding problems that are relevant to the clients. In addition, clientele and university Extension professionals should decide collectively on a long-term (5- to 10-year) strategy to effectively meet the needs of clientele. There must be a strong commitment in sharing personnel and resources to implement effective multi-state programs. To enhance the success of multi-state Extension programs, it is important to identify common challenges for a geographical area and develop educational and research programs for that region.

Regionalization is already occurring informally through e-mail communication (listservs), telenetworking

Continued on page 4

Future of Extension...

Continued from page 3

(latitude bridge systems), and teleconferencing. In fact, the use of communication systems such as e-mail via digital distance diagnosis has already increased the likelihood of regional programming becoming a reality throughout the United States. With more people who have access to computer-based technology compared to 10 years ago, the prospects of Extension specialists and educators receiving requests through various modes of communication will most likely increase.

With universities facing budget constraints and fewer Extension specialists and educators in many states, it is probable that administration will contemplate the option of regionalizing Extension programs to maintain financial stability. Extension specialists should take a leadership role in addressing clientele needs within or out-of-state, rather than concentrate on administrative concerns. The development and implementation of multi-state regional programs will provide opportunities for multi-disciplinary Extension programming, thus maintaining the integrity of Extension to service clientele in a professional manner.

Impact of Technology

Rapid changes in communication and visual technology such as faxes, e-mail, and digital imaging have affected the time available to Extension specialists and educators and scheduling within a "typical" eight-hour day (is there such a "thing?"). It has also reduced the time required for communication. Furthermore, due to computer access by clientele and the public, Extension specialists and educators are now more accessible nationally and internationally than ever before.

Although face-to-face interactions are still popular among clientele, Extension programs are using more electronic formats to deliver information. In fact, for certain Extension programs, audio-visual computer conferencing has replaced face-to-face meetings, which has reduced the amount of required travel with individual clients. However, Web-based communication may sometimes require more time commitment per client than face-to-face presentations, primarily due to setting up and testing the electronic equipment prior to use and "breaking down" after completion of programming.

Web-based teaching or distance education, i.e. using satellite, saves travel time and costs. At the University of Illinois, interactive telenetworking has been used to teach insect identification and insect management courses. Using this technology, it was possible to educate more than 100 Extension personnel and master gardeners throughout the state in one hour without leaving the confines of the university. This eliminated the time and costs associated with traveling and avoided program redundancy – that is, giving the same program at several statewide meetings. This type of technology is being used more frequently throughout many regions of the United States. However, distance education also can end up generating an endless volume of e-mails from home-owners, professionals, or educators who typically require an immediate response to a particular problem.

Despite the trend toward providing information on Web sites, it is interesting to note that printed bulletins and fact sheets are still a preferred source of information, and presentations and workshops that actively engage attendees tend to be favored over mailed bulletins. However, because clientele concerns generally need to be addressed quickly and conferences and workshops may take months to schedule, the use of computer technology may be the preferred method of information delivery. Despite all the improvements in communication technology, Extension specialists and educators are not likely to benefit from them unless they learn how to use them. New technology is extremely useful for rapidly providing updated information to clientele, such as availability of new plant varieties, updates on new insects or diseases, and availability of new pest control materials.

The e-Extension initiative, an effort coordinated by the Extension Committee on Organization and Policy of the National Association of State Universities and Land-Grant Colleges, has developed an extensive, coordinated national Internet-based system. This electronic outreach delivery mechanism is designed so Extension specialists and educators can cooperatively develop and share educational information to more effectively serve new and current clientele. This system may prove invaluable to Extension specialists and educators in allocating more time to high-priority tasks as opposed to time spent on redundant tasks such as answering repetitive phone calls.

Extension specialists and educators need to take a proactive approach in dealing with the challenges to Extension and the needs of clientele. It is critical to demonstrate and document the impact of our programs and take advantage of multi-state programming by developing partnerships with other Extension specialists and educators. In addition, Extension specialists and educators must develop and conduct Extension programs using the newest technological innovations.

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The Hottest Holiday Trend: Poinsettias in a Rainbow of Colors

by Andrew Lee

A hue and cry over the colors of Christmas Past ... "Green and Red Are So Over, Today's Style Mavens Say" – this was the headline on the front page of the *Wall Street Journal* three years ago. The article depicted a 90,000-square-foot emporium in Lake Orion, Michigan, with a full-color, artificial 12-foot tree in the center of the store. Laced through its flame-retardant branches were more than 300 teardrop and berry-cluster-shaped bulbs in a distinctive color theme: red and purple. Purple? "People are really going for less traditional colors," said store manager Teresa Miller. "Red and green will always be needed, but it seems as though people want to be daring."

For reasons both cultural and aesthetic, people are rejecting red and green as Christmas's only official scheme. Although the ubiquitous duo has maintained a stronghold on the holiday for decades, it is increasingly being upstaged by gold, white, blue, and even pastels on occasion.

Behind the dimming of the red and green is a culture intent on making over almost everything, from faces to homes to entire lives. Style mavens, like Martha Stewart and others, have trained the public to be daring and to think outside the box regarding some of our traditional colors and how we think and plan for different holidays and events.

For nearly 150 years, red poinsettias have been the classic poinsettia plant in the United States. In 2004, about 75 percent of the 66 million poinsettias sold during the Christmas season were red.

Today, however, poinsettia lovers have many choices besides red. In addition to specialty cultivars that breeders have developed in white, pink, yellow, salmon, purple, and bi-colors, poinsettias can now be virtually any color imaginable thanks to poinsettia spray dye. This exciting new product has been developed for not only the wholesale grower, but it also can be used in retail florist and garden center operations.

Poinsettia spray dyes widen the color range of poinsettias, opening the market for an extended poinsettia season. With dyes (i.e. Gloeckner's *Fantasy Colors*™), the opportunity exists to broaden the poinsettia window – thus creating a whole new market potential for poinsettias. Besides using poinsettias for the Christmas holiday, think about some of the other possibilities such as Halloween, Thanksgiving, Hanukkah, New Year's, birthdays, anniversaries, and various promotions. Dye colors include orange, apricot, yellow, light yellow, blue, turquoise, plum, lilac, dark rose, and fuchsia. They work best on white, cream, light pink, apricot, and marble poinsettias, although red and pink plants can be dyed with darker colors. The dye has no detrimental effects on the shelf life of the plants. If anything, it seems to extend the plant's shelf life.

Fantasy Colors™ is a specialized dye. The definition of a dye is a substance (usually organic) which is designed to be absorbed by, made to react with, or deposited within a substrate to impart color to the substrate with some degree of permanence. Many people throughout the industry are using the words "painted poinsettias." There is nothing wrong with this, but I just want to make clear that *Fantasy Colors*™ is not really a paint, but a dye.

A dye can be a little messy, because it has great staining power; therefore, it is important to cover the area where the spraying will take place with some type of a drop cloth. In addition, the spraying procedure should be done in a well-ventilated and roof-covered area. Clothing and the surrounding area should be protected from overspray. Also, we recommend that growers and consumers do not water the plants from overhead, as the dye may run and could possibly stain clothing, carpet, etc. Once plants have been sprayed, water them at soil level or from the bottom of the pot. Finally, it is important to test the product on individual plants before using it for a mass application, as results may vary.

In addition to the dyes, we have formulated a special glue that can be sprayed on the bracts and leaves. You can then add any color of glitter to enhance the appearance of the plant. The glitter brings out the color of red bracts in particular; it also enhances the poinsettias that have been dyed, especially with the darker colors. This combination – new unique poinsettia colors and glitter – attracts attention, creates excitement, and most importantly, provides an opportunity to raise the price of poinsettias to a much-needed higher level. Poinsettias do not need to be a commodity or mainstream product anymore – you have an opportunity to create greater profits.

It's a Trendy Look

This bold new look for poinsettias is not necessarily for everybody. Our experience indicates that at first glance, you either like the look or you don't. There's also a small group out there that needs to look at it for a while, before it grows on them in a positive way. The point is that no one knows how long this hot trend will last, but consumers who like the look, women in particular, will pay top dollar for a well-dyed/painted and decorated poinsettia.

Continued on page 6

ofa Grower

Poinsettias in a Rainbow of Colors

Continued from page 5

Fantasy Colors™ was introduced to the marketplace at the 2004 OFA Short Course. The majority of the customers who tried the product for the first time were retail florists and garden centers. In most cases across the country, people were able to double their sales price at the retail level! Wholesale growers, on average, were able to get $2 more per 6-inch plant.

With the high cost of fuel and labor today, our industry needs to find more products that are unique and different, and not be afraid to raise the price to make a healthy profit. We know from experience that some consumers will pay top dollar for this product, thus it makes no sense to "leave money on the table."

This year, a large number of big box stores, along with more garden centers throughout the country, will be buying poinsettias to capitalize on this latest trend. From my perspective, it is critical – whether you are a small or large grower or a retail garden center, that you take your time and do a quality job with dying and decorating of the poinsettia crop for the coming year. Experience has shown that if you do a less-than-adequate job dying the poinsettias, consumers will view it as another cheapened product which will lead to discounted prices and lost revenues.

Many Marketing Options

There are a number of ways that poinsettias with dyes could be marketed to entice a new customer base and new profit centers.

Colored poinsettias present a wonderful opportunity for interior design. Consumers can now customize poinsettias to fit any décor or color scheme they have for the holiday season, matching dyed poinsettias with a particular pot cover, ribbon, or other add-ons. Think of the possibilities at malls, large office buildings, and universities. You could create a whole different color spectrum for the holiday season!

The most popular dye color is blue, followed by lilac. Many opportunities present itself for the Hanukkah holiday (a variety of promotions could be done with a menorah or Star of David) and other special occasions during the winter. Also, I think there is a great opportunity, especially at the garden center level, to advertise to consumers that your garden center could dye a poinsettia to color-coordinate with the homeowner's holiday theme.

At the retail level, an area also could be sectioned off, inviting consumers – especially children and families, to paint and personalize their own poinsettia. You could have some simple samples of decorated poinsettias made up ahead of time showing what can be done with the dyes. Then provide some 4-inch, 6-inch, and 8-inch poinsettias for the consumers to choose from and customize accordingly. While it is drying, they can shop in the store, then come back and add the glue and glitter for their own personalized poinsettia plant. We have done a number of experiments this past year, and this concept has worked well and created a fun atmosphere for entire families and retail employees. This concept spreads like wildfire throughout the community. Great public relations can be done with local newspapers and TV spots, promoting this idea.

For growers, there are opportunities galore to dye/paint poinsettias for a particular sports team, club, civic group, or special event promotion. How about a gift with a purchase? Think of what someone could do if they were to go to Ikea and put together a promotion with a 4-inch blue and yellow poinsettia program. Also, my daughter loves to shop at Claire's – a young ladies' accessory store, full of lots of glitter, makeup, belts, jewelry, etc. How putting a program together with your local Claire's or similar store to do some type of "gift with purchase?" With all of the neat colors you could create, along with the glitter, I think teenage girls would flock to the store.

Those are just a few thoughts that come to mind. I hope it is clear that poinsettias do not need to be a commodity or mainstream product anymore. This is something new, unique, and different. The possibilities are endless, so use your imagination and be creative. Good luck!

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ofa Grower

A Live Bug is not Always a Bad Bug!

Continued from page 1

wait to reenter areas (think about retail areas) and because it reduces the possibility of problems with insecticide resistance.

However, one of the main questions for those willing to include biological control agents into their management programs is "How do I start?" I think the best approach is to start small and become familiar with the natural enemies to be used and the type of care that they need (i.e. Can they be stored? Do they need to be released upon arrival? Do they come in cards or bottles?) But before considering adding natural enemies to your management program, several other questions need to be considered:

What pests do I have? When you use biological control agents, it is of foremost importance to know which pest you have. A lot of natural enemies are specific, meaning they would only attack a few species; therefore, misidentifying a pest might lead to a complete failure of the biological control agent, because it is being released against a pest it does not attack. If you are not completely sure which pest species are found in your area, it would be a good idea to take samples of them and send them to your Extension agent or pest diagnostic clinic. One example of such a place is the C. Wayne Ellett Plant and Pest Diagnostic Clinic at The Ohio State University (http://ppdc.osu.edu/). Remember that samples need to be prepared in accordance with the diagnostic center suggestions. Alternatively, there are very good resources to try to identify the pests yourself (Some sources are listed at the end of this article).

When do I usually have pest problems? Most growers would have a feeling for this and can tell when a pest would be appearing in their greenhouses. However, an active monitoring program (using sticky cards, etc.) and good records can save a lot of time and effort, and this will help to identify times when biological control agents can be released. For instance, if you always have problems with whiteflies during the middle of September, then you can begin contacting your biological control supplier a month in advance to make sure they can deliver the natural enemies at the right time. The use of sticky cards is also a very valuable tool to detect initial pest outbreaks, therefore helping time the biological control agent releases. Cards also can be helpful to evaluate the effectiveness of the releases.

Are natural enemies commercially available to control these pests? Are they effective? Currently, biological control agents are commercially available for most of the major greenhouse pests. But you can also call some of the suppliers of natural enemies to find out species availability. At the end of this article, I am listing a few suppliers. Additionally, you can go to the Association of Natural Biocontrol Producers Web site (www.anbp.org) to find more suppliers.

Answering the second question is trickier, although there has been quite a bit of research into using biological control agents for various pests in greenhouses. Several publications present some of these findings; one such publication is *Biocontrol in Protected Culture* by K.M. Heinz (full citation included at the end of this article). However, you need to keep in mind that not all of the natural enemies available commercially are very effective. For instance, wasps of the genus *Encarsia* or *Eretmocerus* have been shown to be very effective in controlling whiteflies; but praying mantis are not useful, and yet they are offered as biological control options by some suppliers.

Do I have information about the natural enemies available to control the pests in my greenhouse? Do I know their biology? When using biological control agents, it is very important to understand their biology. Therefore, it is a good idea to have information about their biology at hand before you start using them. There are various resources in print and online that provide information about biological control agent biology. Two examples include the book *Knowing and Recognizing the Biology of Glasshouse Pests and Their Natural Enemies* by Malais and Ravensberg (full citation and other sources at end of article) and the following site: www.nysaes.cornell.edu/ent/biocontrol/.

Are the pest management methods I am using compatible with these natural enemies? Am I using compatible pesticides? Usually the major constraint when trying to combine biological control with your current pest management tactics is selecting appropriate chemistries that would not harm the natural enemies or that would be compatible with them. Companies producing biological control agents have compiled information about some of the effects that various pesticides have on biological control agents (see information at end of article). The book *Biocontrol in Protected Culture* also includes some information about the compatibility of biological control agents and pesticides.

Continued on page 8

A Live Bug is not Always a Bad Bug!

Continued from page 7

How many modifications would I need to make to include natural enemies? Using biological control agents is very different than applying pesticides, and it requires preparation. The best thing to do is start in a small area so you can develop methods and practices that would allow for a successful program. In addition, workers doing the releases would need to be trained to handle the biological control agents appropriately. Key considerations include selecting areas where they will be released, method of release, and place for storage. For instance, if the biological control agents will be released on cards, instead of placing them on plants, fasten the cards on wooden stakes (similar to plant markers) to allow for easier positioning of the cards.

How expensive are natural enemies? Do they compare well to my current management methods? Can I combine them with my current control plans? Using biological control agents can be a little bit expensive when used alone, but they can be cost effective when used in combination with other management techniques. If used properly, natural enemies can be combined with selective pesticides. Pesticides such as neonicotinoids that are applied as drenches usually have less impact than those applied to the canopy. In addition, timing releases of biological control agents after the pesticide effect has worn off or a few days after a pesticide application can increase the chances of a successful combination of strategies.

How difficult is to release and handle biologicals? Can I store them? Is the company providing them reliable? Can they deliver them when I need them? This is extremely important, and this can be accomplished only by establishing a good relationship with your supplier. That's why it is very important that you start small, so you can assess how your supplier will handle your requests. Most companies are now also providing enough information about the proper way to release the natural enemies and storage instructions. Some of the product packages now have explicit instructions about how to store these living organisms properly.

At this point you must be asking yourself, if I need to know all this, why bother? It is too difficult, and I already have too many things in my mind. While it is true that using biological control requires a little bit more knowledge, in a lot of instances, such information is already available or just a phone call away. In the following paragraphs and in Table 1, I am adding some information about two greenhouse pests for which there are very good biological control options: whiteflies and spider mites.

Whitefly Biological Control

The two most common whiteflies found in greenhouses in the United States are the greenhouse whitefly, *Tiraleurodes vaporariorum*, and the silverleaf whitefly, *Bemisia argentifolii* (B. tabaci biotype B). Several of the most effective biological control agents include the wasps *Encarsia formosa* and *Eretmocerus eremicus* and the predatory beetles *Delphastus pusillus* and *Delphastus catalinae* (Table 1).

Encarsia formosa is used widely around the world to control the greenhouse whitefly on vegetables, but it is also used on ornamentals. This wasp kills whiteflies by ovipositing on them and by host feeding (this is when the wasp feeds from the nymphs without ovipositing on them). Previous research showed that *E. formosa* is not the best parasitoid to use against the silverleaf whitefly in poinsettias for continuous biological control, because it develops slower and some of the wasps never fully develop to adults. However, on programs where these wasps are combined with pesticides and only initial kill is needed, they might be useful. The other wasp, *Eretmocerus eremicus*, kills whiteflies in similar fashion than *E. formosa*, but it has been shown to be more effective than *E. formosa* for control of silverleaf whitefly on poinsettias.

Several vendors provide mixtures of these two wasps for biological control programs. Because of their cost, relying completely on these wasps to control populations of whiteflies might not be cost effective; however, some producers have successfully used them in combination with compatible pesticides and/or timed pesticide applications (i.e. the wasps are released after the pesticide effect has worn off). Some of the pesticides that show some compatibility with these wasps include Talus (buprofezin), Adept (diflubenzuron), and to some extent Distance (pyriproxyfen; this compound is harmful to parasitoid pupae). However, when the releases are properly timed, other insecticides might also be used. The predatory beetles *D. pusillus* and *D. catalinae* are better used in combination with wasp releases, because they avoid feeding on parasitized whiteflies and thus add to the whitefly mortality.

Spider Mite Biological Control

The most common spider mite found in ornamental plants is the twospotted spider mite, *Tetranychus urticae*. Some of the predators used against these mites include *Phytoseiulus persimilis*, *P. longipes*, and *Neoseiulus californicus* (Table 1). Predatory mites are among the cheapest biological control agents found on the market and are quite effective in reducing the populations of spider mites.

The highest cost associated with the use of predatory mites is the cost of labor needed to release them. The most

Table 1. List of examples of biological control agents used to control whiteflies and spider mites. The costs included are estimates only. Please contact the companies directly to determine current costs.

Pest	Natural Enemy		Conditions		Sale Information		
	Gender	Species	Rate	Temperature	Company	Cost	Presentation/Quantity
Whiteflies	*Encarsia*	*formosa*	1-5/10 ft²	64.4 to 86°F	Rincon-Vitova	$16.00	Strips = 10 units of 100 parasitized nymphs glued on perforated cards with hooks
						$8.00	Bulk (ml)/5,000 parasitized
					Koppert	$9.99	600 parasitic wasps in 10 cards
						$22.99	1,500 parasitic wasps in 50 cards
					Arbico	$18.95	1,000 eggs in perforated cards with hooks
	Eretmocerus	*californicus*	5-20/10 ft²	50 to 75°F night	Rincon-Vitova	$50.00	3,000 parasitized nymphs
				65 to 75°F day		$82.00	500/card, set of 10 = 5,000
		eremicus	1-5/10 ft²	77 to 84.2°F	Arbico	$54.10	3,000 parasitized nymphs
	Delphastus	*catalinae*	1-2/100 ft²	65 to 90°F	Rincon-Vitova	$38.00	100/bottle
						$105.00	1,000/bottle
		pusillus	1,000/1,500 ft²	45 to 100°F	Arbico	$34.25	1,000/bottle
	Chrysoperla	*sp*	1,000 eggs/200 ft²	>60°F	Arbico	$7.60	1,000 eggs
					Koppert	$27.99	500 larvae, small bags
						$46.99	1,000 larvae, large bottle
Spider Mites	*Phytoseiulus*	*longipes*	2,000-20,000/acre	55 to 105°F	Rincon-Vitova	$33.00	1,000/bottle
	Mesoseiulus						
	Neoseilus	*californicus*	1-4/plant	50 to 105°F	Rincon-Vitova	$33.00	1,000/bottle
			1-2/ft²			$72.00	5,000/bag
					Arbico	$45.95	1,000 units
	Metaseiulus	*occidentalis*	2-3/ft²	High	Arbico	$35.85	1,000 units
				66 to 80°F	Rincon-Vitova	$34.00	1,000/bottle
						$73.00	5,000/bag

common method of release is to directly sprinkle them on the plants at low doses. However, current research efforts include developing mechanized ways of releasing these predators. Using these mites at higher doses might not be cheap, but will provide short-term control. Because these predatory mites are also affected by miticides, it is difficult to combine these two tactics. However, if both the miticide applications and predatory mite releases are timed properly (i.e. wait until the effect of the miticide has worn off to release the predatory mites), it would be possible to combine biological control agents and the miticides. More research in this area is needed.

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Pest Diagnostic Center

C. Wayne Ellett Plant & Pest Diagnostic Clinic
The Ohio State University
110 Kottman Hall, 2021 Coffey Road
Columbus, Ohio 43210
614-292-5006
Fax: 614-292-4455
http://ppdc.osu.edu/

Identification

Malais, M. H. and W. J. Ravensberg. 2003. Knowing and recognizing the biology of glasshouse pests and their natural enemies. Reed Business Information, 288 p.

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Continued on page 10

A Live Bug is not Always a Bad Bug!

Continued from page 9

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Stanton G. and J. Sanderson. 1998. Ball Identification Guide to Greenhouse Pests and Beneficials. Ball Publishing, 256 p.

Biological Control Suppliers

Plant Products USA (Biobest distributor)
6299 Meadowsweet Ave NW
Canton, Ohio 44718
330-966-0234
Fax: 330-966-0234
sgraham@plantprod.com
http://www.plantprod.com

Koppert Biological Systems Inc – USA
28465 Beverly Road
Romulus, Michigan 48174
800-928-8827
Fax: 734-641-3793
http://www.koppert.nl/e021.shtml

Rincon-Vitova Insectaries Inc
PO Box 1555
Ventura, CA 93002-1555
or 3891 N Ventura Ave (rear)
Ventura, CA 93001-1243
805-643-5407; 800-248-2847
Fax: 805-643-6267
bugnet@rinconvitova.com
http://rinconvitova.com

ARBICO Organics
PO Box 8910
Tucson, AZ 85738-0910
520-825-9785; 800-827-2847
Fax: 520-825-2038
info@arbico.com
http://store.arbico-organics.com

Biological Control Agent Biology

Malais, M. H. and W. J. Ravensberg. 2003. Knowing and recognizing the biology of glasshouse pests and their natural enemies. Reed Business Information, 288 p.

Online:

http://www.nysaes.cornell.edu/ent/biocontrol/

http://www.ipm.ucdavis.edu/PMG/r280390111.html

Compatibility Between Biological Control Agents and Pesticides

http://www.biobest.be/ (and look for the side effect option)

http://www.koppert.nl/e0110.html

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Ask the Doctor

Stephen A. Carver, Ph.D.

In a blatant, unvarnished example of "bait-n-switch," I am going to postpone the discussion of the calibrachoa cutting dieback issue (mentioned in the July/August issue). Hold on to your thoughts and solutions, because we will come back to that problem in the next OFA Bulletin.

We recently received the following question from a nursery operation in Illinois, "I am looking for help with insect problems. I am working with a local high school greenhouse; this house is unique in that it is inside of a large building with artificial lighting for growth. They are using granular systemic Marathon for insect control. However, they are looking for something that is more effective against spider mites and is available in a systemic formulation. Is there any advice I can pass on?"

The simple answer to this question is "No." There are a number of excellent miticides for spider mite management, but none of them to our knowledge are systemic, like Marathon. A number of effective miticides must be used in a spray application. These include Akari (fenpyromimate), Avid (abamectin), Floramite (bifenazate), Judo (spiromesifen), Pylon (chlorfenapyr), Sanmite (pyridaben), Shuttle (acequinocyl), and TetraSan (etoxazole).

To give a more complete (and hopefully more helpful) answer, we need to ask some questions. These would include, but not be limited to:

- *How large is the greenhouse?*
- *What crops are being grown in the greenhouse? How much space is being devoted to their production?*
- *Which insect pests are present in the greenhouse? Which ones are of major concern?*
- *How often and how much Marathon is being applied and to which crops?*
- *How direct is the student involvement in the production of the crops? Are they in the greenhouse, working with the plants most or all school days?*
- *What is the source of the plant material? Are cuttings and plugs donated by or purchased from commercial growers, or are students using plugs sown or taking cuttings from stock plants maintained in the greenhouse?*

From the nature of the question and the use of Marathon granules, I'm assuming there is a desire to minimize students' pesticide exposure. Perhaps this is a time to reevaluate the school's entire pest management program. The apparently exclusive use of Marathon is a red flag. While it may help to minimize students' pesticide exposure compared to other effective but spray-applied materials, you run the great risk of marginalizing its effectiveness in the future because of resistance. Assuming that student pesticide exposure is the overriding concern, and depending on answers to a number of questions, a pest management program based on a combination of biological agents with insecticidal soaps and horticultural oils could be effective and instructive. It might also provide a ready-made case study for costing different pest management options and strategies.

In another article in this issue of the OFA Bulletin *("A Live Bug is not Always a Bad Bug! How to Add Biological Control Agents to Your Current Management Program"), Dr. Luis Canas lists some effective biological control agents for spider mites. He also lists questions and issues that will help in the design of an effective pest management program using biologicals.*

In recent issues of the OFA Bulletin, *Dr. Raymond Cloyd has provided additional considerations and strategies for implementing a successful pest management program that incorporates biologicals:*

- *Insect Growth Regulators: Are they Compatible With Biological Control Agents? January/February 2005, pp. 26-28.*
- *Biorational Pest Control Materials and Natural Enemies: Are They Compatible? May/June 2005, pp. 12-13, 15.*

Some additional resources include:

- *Greenhouse IPM With An Emphasis On Biocontrols, Pennsylvania Integrated Pest Management Program, Pennsylvania Department of Agriculture. CAT AGRS-96. www.cas.psu.edu*
- *Biological Control Of Insects And Other Pests Of Greenhouse Crops. North Central Regional Publication 581, University of Wisconsin, Madison, WI. www.ballpublishing.com*
- *Tips On Managing Floriculture Crops Problems. OFA Services, Inc., Columbus, OH. www.ballpublishing.com*

Assuming that biologicals are to be used, there is one last caveat. Because many biological agents are also insects or mites, the use of insecticides and miticides should be restricted or eliminated. "The Doctor" thanks Dr. Luis Canas and Dr. Raymond Cloyd for chemical and biological recommendations and for reviewing/editing this response.

Resistance Management: Mode of Action and Principles of Pesticide Rotation

by Raymond A. Cloyd, Ph.D.

Resistance management is a strategy often emphasized to preserve the effectiveness of currently available pesticides including insecticides, miticides, fungicides, and herbicides. Although the concept of resistance is usually associated with insects and mites, a number of plant pathogens, specifically fungi, have been shown to be resistant to fungicides. For example, certain strains of *Botrytis cinerea* (gray mold) are known to be resistant to fungicides in the class dicarboximide (Chipco 26019). Besides insects/mites and diseases, many weed species are tolerant to pre- and postemergent herbicides. This article will focus on resistance management as it relates to plant-feeding insects and mites, although avoiding resistance is just as important in disease and weed management.

Greenhouse managers should be aware of resistance and should implement resistance management strategies, such as rotating insecticides/miticides with different modes of action, when dealing with insects or mites in greenhouse production facilities. The reason for this is that insects and mites can evolve in response to various environmental and human disturbance factors. For example, more than 500 species of insects and mites have developed resistance to insecticides/miticides over the past 40 years. This is an average of 13 insect or mite species per year.

What is Resistance?

First of all, it is important to understand the concept of resistance and how it affects the management of insect and mite pests. Resistance is the genetic ability of some individuals in a pest population to survive an insecticide/miticide application, or a genetic modification that results in diminished sensitivity of an insect or mite population to a particular insecticide/miticide. The intensive pressure placed on insect/mite populations from frequent – or too many – applications of insecticides/miticides results in the amplification of already existing genetic traits and a higher number of resistant individuals. The selection of individuals in an insect or mite population to overcome this "burden" results in insect or mite populations able to tolerate applications of particular insecticides/miticides.

Simply put, resistance is the genetic ability of some individuals (insects and mites) in a population to survive an insecticide/miticide application. Resistance is an inherited trait. The gene(s) for resistance may already be present in the insect or mite population. Insecticide/miticide use favors the survival of these resistant individuals. In addition, surviving insects or mites can pass resistant genes on to their offspring.

The rate at which insects and mites may develop resistance to insecticides or miticides is influenced by a variety of factors. These are:

- Length of exposure to a single insecticide or miticide.
- Level of mortality (high vs. low).
- Presence or absence of refuge sites or hiding places.
- Relatedness of an insecticide or miticide to another one.
- Generation time (short vs. long).
- Number of young or offspring produced per generation.
- Mobility of individuals.

Insects and mites may develop resistance to insecticides/miticides via a number of mechanisms including metabolic, physical, physiological, behavioral, or natural.

Metabolic resistance: breakdown of the active ingredient by an insect or mite. When the insecticide or miticide enters the body, enzymes that detoxify or convert the material into a non-toxic form attack it. The insecticide is then excreted out with other waste products.

Physical resistance: a change in the cuticle (skin) that reduces or decreases penetration of the insecticide or miticide. For example, young mealybug crawlers don't have a protective covering, which is why they are more susceptible to insecticide applications. Mature mealybugs possess a white, waxy covering, which inhibits insecticide penetration into the body.

Physiological resistance: an insect or mite modifies the target site of the insecticide or miticide. This decreases sensitivity to the active ingredient at the physical point of attack, because the target site has been altered.

Behavioral resistance: insects or mites avoid contact with an insecticide or miticide by hiding in locations such as terminal growing points that are difficult for an insecticide/miticide to penetrate.

Natural resistance: general type of resistance in which the insect or mite, or life stage, is not susceptible to an insecticide/miticide. For example, in general, the eggs and pupae stages of most insects and mites are not negatively affected by contact or systemic insecticides/miticides.

Factors Affecting Resistance

Factors that may influence the rate of resistance development within an insect/mite population include general operational procedures, insect/mite biological characteristics, and greenhouse conditions. General operational procedures that may influence the rate of resistance include making insecticide/miticide applications on a frequent basis regardless of pest population dynamics, which can be determined by implementing a scouting program. This increases the selection pressure on insect

Continued on page 12

Resistance Management: Mode of Action and Principles of Pesticide Rotation

Continued from page 11

or mite populations, thus leading to the development of resistant individuals. Always using the highest label rate and/or using the same insecticide/miticide, or using insecticides/miticides with similar modes of activity for an extended period of time, also increases the selection pressure placed on pest populations.

Biological characteristics of insects and mites that may increase the rate of resistance include rapid development time (short generation time and rapid transfer of resistant genes), high reproductive rate (large number of offspring produced per generation), high mobility, and wide host range. Remember that resistant genes in insect or mite populations can be passed on to future generations or progeny. All of these biological characteristics may result in increased exposure to insecticide or miticide applications.

Greenhouse conditions that can lead to an increase in resistant individuals include environmental parameters (temperature and relative humidity) that are conducive for insect and mite development. The greenhouse generally encloses insect and mite pests and restricts the movement of susceptible individuals into the population. Therefore, resistant individuals are dominant and remain in the greenhouse and breed; while susceptible individuals from areas not treated with insecticides/miticides are unable to enter and breed with resistant insects or mites. Furthermore, intensive year-round production in greenhouses provides a continuous food supply for insects and mites; and this often results in frequent exposure to insecticide/miticide applications.

Resistance may also occur or develop due to the movement of insects/mites within and into greenhouses. There are three ways that immigration of insects/mites may result in resistance. First, insects or mites that migrate from other crops within the greenhouse or between greenhouses increase the likelihood that these insect/mite populations will be exposed to additional insecticide/miticide applications. Second, receiving plants with insects or mites that have been previously exposed to insecticide/miticide treatments may enhance resistance development, as a large percentage of these insects/mites may already possess resistant genes. Finally, insects or mites that enter the greenhouse from field or vegetable crops may have been exposed to agricultural insecticides/miticides that are similar to those used in greenhouses.

The rate of resistance development may depend on the season. The number of insecticide/miticide applications, based on the population dynamics of the insect or mite population, may vary throughout the year especially during fall/winter and spring/summer. The likelihood of resistance developing may increase during spring/summer, because this is when insect and mite populations are typically higher – thus requiring more frequent insecticide/miticide applications.

Managing Resistance

An understanding of resistance and the conditions that may enhance the ability of insects and mites to develop resistance to insecticides/miticides is important in sustaining proper insecticide/miticide stewardship programs. One of the primary management strategies greenhouse managers can implement, which will avoid or minimize problems related to resistance, is rotating insecticides and miticides with different modes of action.

Mode of action or mode of activity refers to how an insecticide or miticide affects the metabolic and physiological processes in an insect or mite. Greenhouse managers, to sustain successful integrated pest management programs and preserve the longevity of currently available insecticides/miticides, need to practice rotating insecticides/miticides to reduce the likelihood that plant-feeding insects and mites in greenhouses will develop resistance.

To reduce the possibility of insect and mite pests developing resistance, it is important to design a rotation program that involves insecticides and/or miticides with different modes of activity – not different chemical classes. The reason for this is that some chemical classes have similar modes of activity. For example, organophosphates and carbamates are in different chemical classes, but they have identical modes of activity. Both chemical classes block the action of acetylcholinesterace (AChE), an enzyme that deactivates acetylcholine (ACh), which allows nerve signals to stop and results in the total loss of nerve functions. So, using acephate (Orthene) for two spray applications during a generation and then switching to methiocarb (Mesurol) does not constitute a proper rotation scheme. Similarly, although pyridaben (Sanmite) and fenpyroximate (Akari) are in different chemical classes – pyridazinone and phenoxypyrazole respectively, they both work on the mitochondria electron transport system (responsible for energy production); so these materials should not be used in succession.

The chemical class, neonicotinoid (also referred to as chloronicotinyl) contains a number of systemic insecticides that are registered for use in commercial greenhouses, including imidacloprid (Marathon), thiamethoxam (Flagship), acetamiprid (TriStar), dinotefuran (Safari), and clothianidin (Celero). There are now five neonicotinoid insecticides available. The neonicotinoids have similar modes of activity and it is

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Table 1. Mode of action of insecticides and miticides used in greenhouse production systems.

Mode of Action	Activity	Pest Control Materials
Acetycholine Esterase Inhibitors	Inhibit the enzyme cholinesterase (ChE) from clearing the acetylcholine (ACh) transmitter. This prevents termination of nerve impulse transmission and results in an accumulation of acetylcholine, leading to hyperactivity, respiratory failure, exhaustion of metabolic energy, and death.	* Acephate (Orthene/Precise) * Chlorpyrifos (DuraGuard) * Methiocarb (Mesurol)
GABA-Gated Chloride Channel Blockers	Act on the gamma-aminobutyric acid (GABA) receptor by binding to the chloride channels, thus preventing chloride ions from entering neurons. This disrupts GABA activity, which leads to hyperexcitation, paralysis, and death.	* Endosulfan (Thiodan)
Sodium Channel Blockers	Destabilize nerve cell membranes by working on the sodium channels in the peripheral and central nervous system, slowing down or preventing closure. This results in stimulating nerve cells to produce repetitive discharges, eventually leading to paralysis and death.	* Bifenthrin (Talstar/Attain) * Cyfluthrin (Decathlon) * Fenpropathrin (Tame) * Fluvalinate (Mavrik) * Lambda-cyhalothrin (Scimitar) * Permethrin (Astro) * Resmethrin
Nicotinic Acetylcholine Receptor Disruptors	Act on the central nervous system, causing irreversible blockage of the post-synaptic nicotinergic acetylcholine receptors – leading to disruption of nerve transmission and uncontrolled firing of nerves. This results in rapid pulses from a steady influx of sodium (Na+), leading to hyperexitation, convulsions, paralysis, and death.	* Acetamiprid (TriStar) * Clothianidin (Celero) * Dinotefuran (Safari) * Imidacloprid (Marathon) * Thiamethoxam (Flagship)
Nicotinic Acetylcholine Receptor Agonist	Disrupts binding of acetylcholine at nicotinic acetylcholine receptors located at the post-synaptic cell junctures, and negatively affects the gamma-amino butyric acid (GABA) gated ion channels.	* Spinosad (Conserve)
GABA Chloride Channel Activators	Affect gamma-amino butyric acid (GABA)-dependent chloride ion (Cl-) channels by increasing membrane permeability to chloride ions, leading to inhibition of nerve transmission, paralysis, and death.	* Abamectin (Avid)
Juvenile Hormone Mimics	Arrest development by causing insects to remain in a young or immature stage, primarily by inhibiting metamorphosis (=change in form). As a result, insects are unable to complete their life cycle.	* Fenoxycarb (Preclude) * Kinoprene (Enstar II) * Pyriproxyfen (Distance)
Chitin Synthesis Inhibitors	Prevent the formation of chitin, which is an essential component of an insectís exoskeleton, causing the insect's cuticle to become thin and brittle. As a result, insects (and mites in the case of etoxazole) die while attempting to molt from one stage to the next.	* Buprofezin (Talus) * Diflubenzuron (Adept) * Etoxazole (TetraSan) * Novaluron (Pedestal)
Growth and Embryogenesis Inhibitors	Disrupt the formation of the embryo during development, or inhibit larval maturation. However, the specific mode of action and target site of activity are still not known.	* Clofentezine (Ovation) * Hexythiazox (Hexygon)
Selective Feeding Blockers	Inhibit feeding behavior of insects by interfering with neural regulation of fluid intake in the mouthparts.	* Flonicamid (Aria) * Pymetrozine (Endeavor)
Ecdysone Antagonist	Disrupts the molting process by inhibiting biosynthesis or metabolism of the molting hormone ecdysone.	* Cyromazine (Citation) * Tebufenozide (Confirm) * Azadirachtin (Azatin/Ornazin)[z]

Continued on page 14

Resistance Management: Mode of Action and Principles of Pesticide Rotation

Continued from page 13

Table 1. Mode of action of insecticides and miticides used in greenhouse production systems (cont'd.)

Mode of Action	Activity	Pest Control Materials
Disruptors of Insect Midgut Membranes	Bind to specific receptor sites on the gut epithelium, resulting in degradation of the gut lining and eventual starvation of the insect. Crystals release protein toxins (endotoxins) that bind to the mid-gut membrane receptor sites, creating pores or channels. This paralyzes the digestive system and ruptures the midgut cell walls, allowing ions to flow through the pores disrupting potassium (K+) and pH balances. The alkaline contents of the gut spill into the blood, resulting in gut paralysis and death.	* *Bacillus thuringiensis var. israelensis* (Gnatrol) * *Bacillus thuringiensis var. kurstaki* (Dipel)
Oxidative Phosphorylation Uncoupler	Uncouples oxidative phosphorylation, which is a major energy-producing step in cells, by disrupting the H+ gradient, which prevents the formation of adenosine tri-phosphate (ATP).	* Chlorfenapyr (Pylon)
Oxidative Phosphorylation Inhibitor	Inhibits oxidative phosphorylation at the site of dinitrophenol uncoupling, which disrupts the formation or synthesis of adenosine triphosphate (ATP).	* Fenbutatin-oxide (Vendex)
Mitochondria Electron Transport Inhibitors	Inhibit Complex (site) I electron transport, act on the NADH-CoQ reductase site, or bind to the Qo center of Complex III in the mitochondria, reducing energy production by preventing the synthesis of adenosine triphosphate (ATP).	* Acequinocyl (Shuttle) * Fenpyroximate (Akari) * Pyridaben (Sanmite)
Desiccation or Membrane Disruptors	Damage the waxy layer of the exoskeleton of soft-bodied insects and mites by altering the chitin so it cannot hold fluids, resulting in desiccation (drying up); or smother insects by covering the breathing pores (spiracles).	* Neem oil (Triact) * Paraffinic oil (SunSpray UltraFine Oil) * Potassium salts of fatty acids (Insecticidal Soap)
GABA-Gated Antagonist	Blocks or closes gamma-amino butyric acid (GABA)-activated chloride (Cl-) channels in the peripheral nervous system.	* Bifenazate (Floramite)
Lipid Biosynthesis Inhibitor	Blocks the production of lipids, which are a group of compounds made up of carbon and hydrogen including fatty acids, oils, and waxes. Disrupts cell membrane structures and reduces sources of energy.	* Spiromesifen (Judo)

* Mention of products does not constitute an endorsement, but only serves to provide an example for a specific purpose.
[z] In addition to acting as an insect growth regulator, azadirachtin acts a feeding deterrent/inhibitor, oviposition inhibitor, repellent, egg-laying deterrent, sterilant, and/or direct toxin.

important to not use them in succession, because this will increase the selection pressure on the target pest population and may potentially enhance the development of insecticide resistance. Use an insecticide with a different mode of activity either before or after using a neonicotinoid-based insecticide.

Another essential strategy is to rotate with insecticides and miticides that have non-specific or broad modes of activity. These include insect growth regulators, insecticidal soap, feeding inhibitors, horticultural oil, beneficial fungi, and bacteria. This will alleviate the possibility of insects and mites developing resistance. However, it is also important to rotate insect growth regulators with different modes of action.

It is important to rotate common names (active ingredient), not trade names. For example, both Azatin and Ornazin, despite having different trade names, contain the same active ingredient – azadirachtin.

In general, rotate different modes of activity every two to three weeks, or every two to three insect/mite generations. This depends upon the time of year, however, because temperature and season influence the duration of the life cycle. For example, high temperatures that typically occur in greenhouses during the summer months shorten the developmental time (egg to adult) of most of the major greenhouse insect and mite pests including aphids, thrips, twospotted spider mite (*Tetranychus urticae*), and whiteflies. This often leads

to overlapping generations with variable age structures (eggs, larvae, pupae, and/or adults) present at the same time. As a result, more frequent applications of insecticides or miticides are needed, and they must be rotated more often. In contrast, during the winter months, the developmental time of most greenhouse insect and mite pests is extended (due to the cooler temperatures and shorter daylengths), which means that insecticides and miticides may not need to be rotated as frequently.

The following are examples of insecticides or miticides that have dissimilar modes of activity and may be used in rotation schemes for aphids, thrips, twospotted spider mite, and whiteflies:

Aphids: Endeavor ➛ Marathon (spray application) ➛ Ultrafine Oil ➛ Orthene ➛ Insecticidal Soap

Thrips: Conserve ➛ Orthene ➛ Avid ➛ Mesurol ➛ Novaluron

Twospotted Spider Mite: Floramite ➛ Pylon ➛ Avid ➛ Akari (or Sanmite) ➛ TetraSan

Whiteflies: Marathon (spray application) ➛ Endeavor ➛ Distance ➛ Talstar ➛ Orthene

One continual problem greenhouse producers contend with is that insecticide or miticide labels currently don't explicitly state the mode of activity, so it may be difficult to access this information unless you directly contact the manufacturer. Table 1 (page 13 & 14) is a list of the major modes of activity (concentrating on insecticides and miticides) with detailed descriptions for each, along with the insecticides and miticides (common name and trade name) that may be categorized under each specific mode of activity. This information can be used by greenhouse managers to develop rotation programs that allow them to deal with insect and mite pests more effectively.

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Your Garden Center Could Become a Holiday Tradition

Continued from page 1

plywood to create a 1,000-square-foot weatherproof display. The fantasyland is designed and constructed by Oakland employees and is open for pure enjoyment during business hours. No merchandise sales are conducted inside the structure.

On weekends, Santa Claus is the star of the attraction. Photographs with Santa are available for a nominal fee (enough to cover film costs). Every child receives a simple gift and a coloring book featuring "Oakey," Oakland Nursery's "acorny" cartoon character.

Additional Attractions

Horse-drawn carriage rides with jingling sleigh bells along a decorated trail are offered free on weekends. Oakland's Columbus, Ohio site is situated on 10 acres, with only 3 acres used for sales during Christmas; so space is not a problem.

Another successful attraction for the whole family is an ice-sculpting show performed on-site on a couple major days of the season. The sculptor involves the children by teaching them how to carve with saws (with all the proper safety gear, of course) and by finding treasures frozen in his creations.

You too can use a unique activity to make your own garden center appealing to children and fun for the entire family. Hopefully, mom and dad will return next spring and bring the kids!

Setting the Stage for a Great Visit

Make the customers' visit comfortable, and they may stay longer and buy more. Imagine the delicious smells of chili and a wood-burning fire igniting the cold winter air. Imagine the customers' surprise and enjoyment in receiving a small cupful free. Other concessions are available at Oakland for sale from a seasonal vendor on-site.

Music added into the menu of attractions fortifies the real experience. From a small high school chorus singing or a solo musician playing holiday melodies, music polishes off the experience.

The Oakland store in Delaware (in a county bordering Columbus) offers similar attractions that are adapted for the location and market. A newly acquired third store (to open this October) in Dublin, a suburb of Columbus, has yet to evolve its niche in the Oakland holiday tradition.

Most of Oakland's seasonal merchandise promotes the traditional, "real" Christmas – cut, balled, and burlapped trees; fresh wreaths; garland and greens; poinsettias; and handcrafted grave blankets. Life-like trees, wreaths, garland, and decorators have increased emphasis in recent years, along with all the decorating necessities from tree stand to tree topper and seasonal home accents. One entire room at Oakland is transformed into a cheery and fragrant display of themed trees,

Continued on page 16

ofa Garden Center

Your Garden Center Could Become a Holiday Tradition

Continued from page 15

offering custom wreath decorating, custom hand-tied bows, and friendly service.

Even some of our Christmas tree out lots (a total of eight throughout the city) have become a holiday tradition for many of our customers – because these seasonal sites have returned to the same neighborhood, same location year after year. Customers are familiar and happy with our products and service. They expect and anticipate Oakland Nursery being there.

Service and Results

Service is a key element for success in all businesses. Oakland Nursery provides those extra services that help separate us from the mass merchants. For example, we offer fresh cuts on tree trunks, wrapping of trees, loading, tree delivery and set-up services, and advice/information about all of our holiday products.

Have our strategies worked? Yes, we see a great repeat business. We've become a Christmas tradition with many customers. And when I see a family strolling through the nursery in April, and I overhear their little boy say "but Daddy, where's Santa?," I know we're doing something right!

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Preparing for the Holiday Season

by Kathy Benken

This year, as in years past, we all pause, take a deep breath, and prepare ourselves for the holidays. It is known, by general consensus, as the second season. Second only to the double-whammy of spring openings and Mother's Day, it is a spiritually uplifting and financially rewarding season that tests all of us in one way or another by the time New Year's Day rolls around. How can you prepare? How do you reduce risks of delivery logjams or insufficient inventory, keep up your employees' morale, and maintain your sanity all at the same time?

Cruising into Customer Care

Think of your business as a cruise ship. You're embarking on your last big cruise of the season. As an owner or manager, you are in the most visible job on the ship – captain. Since you are ultimately responsible for the customers' happiness and satisfaction, you're also the cruise director. And, watching out for your employees during this hectic time is in your job description too, so you're also the ship's purser. You're wearing a lot of hats, and the ship's about to leave the dock, so let's get started. Don't forget your toothbrush – fresh breath will be a plus once we get under way!

Captain (The Buck Stops Here)

We know the holiday dates from one year to the next. And if you're an FTD or Teleflora florist, you'll know in advance what arrangements and containers are offered. Stay ahead of the curve by stocking containers that are similar to theirs. This allows you the flexibility to create something for a customer that is quite close to FTD or Teleflora offerings. At H.J. Benken, we have Benken's Designer's Choice – a product that allows us to control costs and offers our designers a chance to shine.

If you're the Captain, it can be lonely at the helm. You arrive in the dark, you leave in the dark, it's cold and snowy... Try to take care of yourself. Overwork and under-sleep, and you'll end up sick before the holidays even arrive. Eat well, make sure you get enough rest, consider a flu shot, and pay attention to your family.

Don't fall victim to what I call Christmas Cookie Syndrome. That's where you become so busy, so overbooked with invitations from special customers, that you have no time for your family. It's especially hard if you have young children. For me, it's baking the Christmas cookies with my kids and grandkids. It's something we all look forward to. But if I don't do the prep work on the business end and I don't make time for family, there will be no cookies. Michael and I are selective about how many invitations we accept; we try to eat and sleep regularly, and we reserve time for family.

Retail Florist

Cruise Director (Customer Care)

If you provide Christmas trees, wreaths, and roping for your customers, you probably ordered mid-summer. Look at spring sales to determine how much more you should order from last year. How many new customers did you have? If you made a positive impression, you probably convinced them that you'll do a great job during this season too.

Provide a reason for customers to stay and shop – schedule an open house; offer hot cider, coffee, and cookies. Bringing in live music or the local junior high choir on the weekends or one evening is nice. If you have room, host some sheep and a burro or a llama for the weeks before Christmas. Team up with a wine seller and present a wine tasting at your shop.

Line up the local Kiwanis or Lions Club to help with holiday deliveries. They enjoy the opportunity to raise money for their charitable pursuits and you have extra help! Even though it's a festive time, also be prepared to shift gears for a bereaved customer who needs to choose flowers for a funeral.

Ship's Purser (Employee Care)

December finds us more involved with customers: applying bows and gift wrapping, creating custom wreaths, discussing centerpieces, picking gifts, and more. With holiday pressures of their own, employees may find themselves near tears or ready to scream while assisting a demanding customer. Rather than somebody losing it with a valued customer or offending them, ask associates to pass the customer on to someone who might be fresher and better able to handle that customer. Employees can defuse the situation by saying something like, "You know, Mr. Crabtree, Donna is so much more knowledgeable than I am about these garden clogs – let me get her for you." Make sure employees know they can do this for each other.

Cross-train employees. They'll provide top-shelf customer service and have more flexibility. For example, if the retail manager wants to attend his child's Christmas pageant one afternoon, he can ask one of the cashiers to work for him restocking, pricing, and merchandising. He, in turn, works a register one evening for her so she can go to her husband's company party.

Little extras go a long way. Order pizza or a platter of lunchmeat and cheese. This shows employees that you care, and it keeps them on-site for lunch! At our place, if it snows, we might all stop what we're doing for a few minutes and go for a slide down the hill next to the greenhouses. This year, we're building a skating rink. A colleague, Linda Zoerb at LaCrosse Floral in Wisconsin, brings a masseuse into her shop for pick-me-up shoulder and neck massages.

Holiday Highlights

As stressful as it is, there are plenty of bright spots too. Just when we think there is nothing new under the sun to offer our customers, something appears – a new plant, a new color, new ways to buy, new ways to order. There are always new ways to say Thanks and Happy Holidays to customers and employees alike. While you're counting your blessings this fall and making those holiday plans, please remember those who have lost everything this year. Consider donating a percentage of your holiday sales to the American Red Cross.

At Benkens, we're grateful for the opportunity to do what we love every day, and the holidays are a great time to show off our style and wrap up another year of hard work. May your holidays be blessed as well.

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Greenhouse Technology to Meet the Next Energy Crisis

by William Swanekamp

Editor's Note: *This is the content of a presentation made by Bill Swanekamp at the 2005 OFA Short Course in July. He was part of a trio that addressed this issue, even before this fall's fateful hurricane season. For an audio CD of this presentation and others at the OFA Short Course, visit the OFA Web site at www.ofa.org.*

Fuel prices are going through the roof. We see it every day as we drive by all those gas stations with gas at $2.30 per gallon (nearly $3 by September) and when we receive winter oil deliveries at our homes. Our businesses are not immune to these upward trends, and in many cases they are impacted much more. There is one thing for sure about growing plants and flowers: they need heat and lots of it. When I tell my friends outside of our industry how much we spend a year on energy bills, they shudder. We, on the other hand, have grown used to and maybe even immune to these upward pressures. Could it be that we just don't want to think about it? Or maybe we think it will go away! There is one thing for sure; energy prices will continue to be high for some time to come. That being the case, what can we do to lower our energy costs?

What is behind all this?

Since 2001, oil and natural gas prices have doubled and tripled. If you haven't looked yet, the prices for the winter of 2006 are 44 percent more than 2005. That is an incredible increase. What factors are driving these increases? Number one is China. The global demand for oil and gas is going up dramatically. China alone requires 40 percent more energy for 2005 than in 2004. New reserves of oil and gas are limited and hard to get to. There are no new unknown massive oil fields begging to be found. Most of what is yet to be explored is deep under the sea or buried under many feet of snow and permafrost. China is so in need of energy that it just placed a bid on UNOCO Oil Company. Their bid was substantially higher than the other competitor.

In this country, we are just as dependent on foreign oil as we were in 1973, when the OPEC oil embargo occurred. This has developed because our country has had no clear energy policy for the past 10 years. Every day, the U.S. automakers roll out larger and larger SUVs, and we buy them up as fast as we can. Additionally, the major oil companies have invested very little in new refining capacity over the past 10 years. In fact, refinery capacity has gone down. This means that the refineries have to run at virtually 100 percent capacity to meet the demand. This of course drives up prices as long as the supply is restricted. Finally, we must mention the role of the commodities traders. Right now, there is more natural gas in storage for July than at any other period of time; yet the prices are at very high levels. We do not have a shortage of natural gas, and prices still are inflated. What is going on? Future trades are keeping prices up by speculating on futures. This artificially inflates the price of gas and does not allow the natural process of supply and demand to work its magic.

What can we do about it?

Double-poly with IR, heat curtains, heated floors, cogeneration, and waste heat all have a role to play in managing energy usage and costs. These are all excellent strategies and should be applied. But even more can be done.

To manage our energy costs, we first need to know them. Do you have a firm grip on your energy costs as a percentage of your gross sales? You should. This will reveal any long-term trends toward inefficiencies. At Kube Pak Corporation, we have seen our energy costs average 3.60 percent of our gross sales. Keep in mind, we produce plugs and rooted cuttings during the dead of the winter, and this will tend to increase our percentage substantially. But the trend over the past three years indicates that this percentage is going up (Table 1).

How to manage energy costs

One way to manage your energy costs is to invest in new burner equipment. (It is assumed that you are generating your heat from a boiler and not a hot air furnace to take advantage of the following suggestions.) Older boilers use what is called linkage control for maintaining the air/fuel mixture. This is important, since a poorly tuned boiler will use far more energy than one that is properly tuned. One limitation of linkage control is that it is very difficult to keep the settings accurate.

On the other hand, servo motor control is very precise and seldom gets out of calibration. The biggest advantage of servo control is when it is coupled with a

Table 1. The trend in Kube Pak's energy costs as a percentage of gross sales.

Year	%	per sq ft
2002	2.86%	$0.42
2003	4.87%	$0.75
2004	5.28%	$0.84
2005	3.70% through May. We anticipate more than 5% for the year.	

ofa Grower

computer to control all the capabilities of a burner. For example, *AutoFlame* makes a control package that, when coupled with a fully modulating burner, will increase your boiler efficiencies 10 percent to 20 percent. This is possible because the burner will modulate to fire at a rate sufficient to warm your greenhouse to the proper temperature. We recently installed six boilers equipped with *Limpsfield* burners and *AutoFlame* controls, and we've seen excellent fuel savings. Each boiler is capable of a 5-to-1 turn-down ratio. This means that if you have a boiler that produces 1 MBTU at maximum fire, then it can reduce its firing rate to burn 200,000 BTU, which is one-fifth of the maximum.

This is so important to our industry, since our energy demands vary greatly and often. There is nothing less efficient than a boiler that is not running. Your goal should be to have your boiler start heating at 5 p.m. and continue to run until sunrise the next day. If a boiler cycles on and off all night long, wasted heat is going up the stack during its off period. If you have a fully modulating burner, your boiler will match its input to the greenhouse's output or heat loss. With the servo motor control, fuel efficiency is maintained throughout its firing range – no wasted fuel up the stack, therefore lower energy bills.

In addition to these strategies, if you install at least two boilers, you can take advantage of what is called lead-lag. This is a situation where one boiler is the lead boiler and comes on first. The lag boiler only comes on when the first one cannot keep up. Why is this beneficial? By only running one boiler when the heating load is low, you maximize the efficiency of your heating plant. If you have a 5-to-1 turn-down ratio with one boiler, when you use the lead-lag option with two boilers, your turn-down ratio goes up to 10-to-1. This means even greater energy efficiencies and fuel savings.

Another way to manage your energy costs is to employ dual-fuel burners. This can be done using natural gas with oil, propane with oil, or natural gas with propane. What is the advantage here? If you use natural gas for your primary fuel, the local utility is probably charging you what is called a demand charge. This is calculated by the utility and is based on the number of Therms you use during a billing cycle and the number of days in the billing cycle. For example, if you use 60,000 Therms in a 30-day period, your demand charge is 60,000 divided by 30 = 2,000 Therms per day. The utility multiplies this number by $3.50. The result is $7,000. This amount is then charged to your account on top of the charge for the actual gas. This is then usually rolled over from month to month until a lower demand charge is realized. In some cases, the utility will continue to charge you for your peak demand charge over the next five peak heating months of November to March. It is very complicated, and you should check with your utility to see what their tariff allows.

The point is clear – if you can burn an alternative fuel when the utility requests, you can eliminate this demand charge. To accomplish this, we had to switch from a firm gas contract to an interruptible service. This means we had to be able to switch over to our alternative fuel, which is oil, in about eight hours. This year, we burned about 60,000 gallons of oil during interruption. In the case of Kube Pak, we saved more than $55,000 in demand charges in 2005 alone. Over a 10-year period, this savings is $550,000 – certainly not a number we would want to ignore.

Another possible strategy for saving on fuel is to pre-purchase your energy on the futures market. Although there can be considerable savings, the proper way to look at buying on the futures is that you guarantee a stable fuel price during the entire heating season and can therefore properly price your crops for the following year. The biggest downside to purchasing on the futures market is that there could be a substantial drop in the price of fuel at the time of your scheduled delivery, and you will not be able to take advantage of this situation. Typically, in the middle of winter, this very seldom happens. In fact, just the opposite happens: prices skyrocket during the months of December to March.

To buy one oil contract requires that you purchase 42,000 gallons of oil and take delivery of that oil in one month. This may not be practical for the small grower; but for the larger grower, this can be accomplished if you have sufficient storage capacity. During October 2003, we purchased a future contract on oil for delivery in February 2004. The price of the contract was $.94/gallon. When we took delivery of the oil, the market price was $1.15/gallon. We saved about $.20/gallon on 42,000 gallons. This is a savings of $8,400. The advantage of this system is evident. The most difficult part of the process is to decide when to purchase your contract. The tendency is to wait until the price is as low as possible; but in my experience, you seldom hit the market low. It is better to have a target range of price and lock in when you are comfortable.

When purchasing your natural gas needs for the winter months, you are really buying a futures contract from a

Continued on page 20

Greenhouse Technology to Meet the Next Energy Crisis

Continued from page 19

third-party vendor. It is important to lock in your price for the primary heating months (November to March) in the summer or early fall. Historically, natural gas spikes during the winter months and is considerably higher than what you can obtain from a yearly contract. The key to getting the best price is paying attention to the swings of the market. This means going on the Internet and tracking the daily NYMEX price of natural gas. Over time, you will become familiar with the current trends and can make an informed decision about when to buy.

What does the future hold?

It appears we are heading into a period of rising fuel prices and stagnant crop prices. This means we have to be ever more conscious of reducing our costs. We all can have a substantial impact on our fuel cost by following the suggestions outlined in this article. Can we survive during this unfavorable economic climate? Yes, but we need to be very careful of managing our energy costs properly. It might mean investing in a hot water heating system; although expensive, it offers the most in the way of energy savings. Get acquainted with your local utilities energy tariff. They may offer you incentives if you reduce your overall energy use. See if you can take advantage of interruptible gas service. Whatever you do, don't stand still! The rest of the world economy is moving forward, and the demand for energy is going to be greater and greater. Therefore, do all you can now to take advantage of the latest greenhouse technology to reduce your energy costs, and hopefully you will stay competitive.

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Buy In To Your Safety Program

You're a hard-working greenhouse grower who has a written safety program by the books. One day, you closely examine your employee injury rates and realize that the number of reportable incidents and near misses has gradually been on the rise. Your workers' compensation carrier has obviously noticed as well, because even though most of the injuries are minor, your premiums are higher than you would have expected, compared to a few years ago.

What Are You Doing Wrong?

There's a good chance that you're failing to pay close enough attention to your supervisors and whether or not they have bought in to your written safety program. A lack of supervisory buy-in – and a failure to lead by example – can doom even the most well-thought-out safety program.

"It's critical that you keep your entire management team involved, from your executive group down to your crew leaders. If management isn't on board and committed, the chances of your company's safety program succeeding are not very good," says Craig Albiston, safety director at Cornelius Nurseries, Inc. in Houston, Texas.

Attorney Steve Bernstein of Fisher & Phillips LLP in Atlanta, Georgia, whose firm represents employers in many OSHA-related disputes, adds "Any safety program is dependent on the frontline supervisor. Your supervisors are your first line of defense when it comes to avoiding dangerous situations and OSHA citations. If they don't buy in, your other employees won't buy in, because the supervisors set the example."

Barriers To Buy-In

There is any number of reasons why your supervisors may not be buying into your safety program. One may be that it isn't constantly being stressed by top management.

"Safety has to be pushed from the top," says Joe Bailey, human resources director at Bailey Nurseries in St. Paul, Minnesota, whose operation includes about 25 acres of greenhouses. "If the CEO takes it seriously, then there will be a trickle-down effect. The second most important 'buy-in' person has to be the head of production. If he believes in safety, he will get all of production in line with advice and support. One thing that doesn't work is ignoring supervisors or departments that don't care."

Another common obstacle to supervisory buy-in is that "supervisors may see safety as a hindrance to their goals of achieving certain quotas," Bernstein says. For example, supervisors in greenhouse operations are typically focused on production and making sure that the production goals they are being held to are met. They may view taking the time to conduct safety training or

ofa Safety

holding safety meetings as time that could better be spent in production.

But Jack Davis, human resources director at J. Frank Schmidt & Son in Boring, Oregon, says "When run properly, business success depends on three major contributors: production, morale, and safety. When safety is understood and practiced habitually, it doesn't take anything away from production or employee morale – it complements them."

Davis adds, "Safety programs developed, applied, and followed provide a healthy return on investment. This return includes increased profitability (lower workers' compensation costs), increased employee morale, and increased productivity. Workers not missing days and coworkers who aren't feeling the pressure to fill in for others will produce more. Time isn't lost taking injured workers to the hospital or doctor's appointments. Money isn't spent supporting workers with physical limitations. Management time is focused on growing more plants to sell – not on accident investigation and injury reports."

Other reasons why your supervisors may not be "buying in" to your safety program include:

• A failure to communicate safety to supervisors in the terms they understand best (such as framing it in terms of production, and spelling out the time that will be taken away from production if injuries occur).

• A failure to create an atmosphere where both supervisors and their crew members are comfortable reporting safety problems. "A safe workplace depends on full candor between supervisors, employees, and upper management," Bernstein says. "If you create an atmosphere that frowns upon disclosure, employees won't share safety problems with their supervisors. Prompt reporting and record keeping are important. You need to send a message all the way up and down the chain that there won't be any repercussions for reporting unsafe conditions."

• A failure by top management not to hold supervisors "accountable" for safety. Holding them accountable means making it clear that their safety performance will be part of their overall job performance reviews, and that you expect them to lead safety meetings, safety training sessions, and to document in writing any safety violations in their departments and resulting disciplinary actions.

Once you are certain that you're clearly communicating the importance of safety from the top, it's critical that you monitor your supervisors' safety performance. You can do this by walking around your operation and seeing for yourself whether safety practices are being followed.

In some instances, supervisors may balk at enforcing safety rules. Stress to them that part of their job as a supervisor is to take disciplinary action – even if it is a first time "verbal" warning – against any employee who violates safety rules. If it happens a second time and a worker is seriously injured or killed, tell them that it won't be just you they'll have to answer to – but likely OSHA and other investigators, as well.

"Implementing a safety program is not enough to improve safety," Davis says. "There must be clearly defined responsibility, authority, accountability, and follow-through. Any program, safety or otherwise, that doesn't include those four points is a program waiting to fail."

About the author: Barbara Mulhern is an agricultural/horticultural project consultant and freelance writer. For more information, contact bamulOO@aol.com. The checklist was prepared with the assistance of Joe Bailey, human resources director at Bailey Nurseries in St. Paul, Minn., and Attorney Steve Bernstein of Fisher & Phillips LLP in Atlanta, Ga.

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Oklahoma State University OSU

by Todd Cavins, Ph.D.

Floriculture was one of the first programs ever to be taught at Oklahoma A & M, which was founded in 1890 and later changed to Oklahoma State University (OSU) in 1957. For years, the floriculture program has quietly yet steadily been offering support to the state of Oklahoma and the rest of the U.S. horticulture industry.

The Department of Horticulture and Landscape Architecture boasts 180 undergraduate students and numerous graduate students. There are 20 faculty members on campus and one at an external research station. Currently, three faculty members account for a majority of the floriculture research, teaching, and Extension services; but support is offered from several others, including consumer Extension specialists, a human nutritionist, a physiologist, a postharvest physiologist, a pathologist, and an entomologist.

Teaching

Oklahoma State puts a tremendous effort into teaching, and the floriculture program is no exception. Degree options include horticulture with emphasis on floriculture, nursery production, pomology (fruit) or vegetable production, and public horticulture or turf management. In addition to horticulture, the department also offers degrees in nationally accredited landscape contracting and landscape architecture programs.

Nationally recognized instructor Dr. Doug Needham teaches principles of horticulture, greenhouse management, and floral design classes. Needham advises students with interests in floriculture, floral design, and public garden management, and he serves as the floral design team coach. Needham is a leader in the international teaching and student exchange program between three American universities (Oklahoma State, Purdue, and Alabama A & M) and four European Community universities (HORTECUS). The program has not only fostered teaching and student exchanges, but also international cooperative research and Extension efforts.

Dr. Todd Cavins joined the Oklahoma State faculty two years ago, and he teaches commercial flower production and marketing and plant nutrition (graduate level). Cavins also works with undergraduate students conducting research and internship projects. He advises students specializing in floriculture, greenhouse management, and landscape contracting. A multi-institutional project with Arkansas, Louisiana State, and Mississippi State universities involving curriculum development that uses DVD-based virtual field trips and student evaluation research is another major project for Cavins.

The faculty in the Department of Horticulture and Landscape Architecture understand the benefits of internships – how they enhance students' learning experiences on campus and provide direction on career choices. Therefore, all students are required to complete a three-month, full-time internship; and many students choose to complete more than one internship. Coupled with the hands-on classes in which students are responsible for the production of various crops, the education students receive at Oklahoma State helps to prepare them for quick transitions into their careers.

In addition to class work and internships, students gain invaluable experiences from student clubs and organizations. Three major clubs with a floriculture interest at OSU are Hort Club, PLANET, and Pi Alpha Xi. Club activities include production of plant material and a two-day sale in the spring that has allowed students to raise more than $20,000 each year for the past several years. The students associated with floral design competitions also hold an annual poinsettia sale that is the talk of campus and surrounding communities. The proceeds fund scholarships, educational field trips, and travel and expenses for conferences and competitions, as well as charitable work.

Research

Todd Cavins serves as the primary floriculture researcher with the support of Tina Johnson, senior agriculturalist. Major projects include plant growth regulator development, silicon for improving horticultural traits, and silicon use for disease management. Other efforts include bedding plant and poinsettia trials as well as retail tracking/consumer preference studies with local retailers.

A close relationship with several companies that produce plant growth regulators has been critical to producing research that is pertinent to the floriculture industry. Those relationships have led to label expansion on multiple products, as well as several new products that will be introduced soon.

Silicon research is a major focus of the Oklahoma State floriculture research program. Sophia Kamenidou just completed her master's degree investigating silicon sources, concentrations, and effects under Cavins' direction. Kamenidou's efforts have produced promising results of how this non-essential, yet beneficial nutrient can help the floriculture industry. Results include stronger and thicker stems, reduced transpiration, and biotic stress reduction.

Disease suppression is one of the biotic stress reduction benefits. Kamenidou and Cavins are joining forces with Steve Marek from the Department of Entomology and Plant Pathology at OSU. Kamenidou will be pursuing her Ph.D. under the direction of Drs. Cavins and Marek,

Academic Update

further investigating silicon's potential use as a disease-suppressive nutrient supplement.

Cooperative efforts with Proven Winners and Benary Seeds make fall and spring bedding plant trials possible. Tina Johnson is now coordinating these trials, which provide great information to regional growers, retailers, and consumers. Oklahoma's notorious heat and unpredictable weather make it an ideal proving ground that tests the limits of many plants. An estimated 6,000+ consumers and several hundred industry professionals visit these trials each year, which are nestled next to the Oklahoma Gardening studio garden at the Oklahoma State University Botanical Garden.

Extension

Dr. Mike Schnelle heads up the floriculture Extension program. Schnelle is very active visiting growers and solving production, pest, and disease issues with the support of the Disease and Insect Diagnostic Lab at Oklahoma State. One issue Schnelle works on extensively with growers is prevention/management strategies of *Phytopthora ramorum*.

In conjunction with the Oklahoma Greenhouse Growers' Association (OGGA), as well as support from numerous faculty members throughout OSU, many educational and social events are held throughout the year. This includes an annual short course designed to serve growers at all levels, from novices to seasoned professionals.

Conferences cosponsored with other organizations are also held on a regular basis. Recently, OGGA joined forces with OFA to offer a grower seminar targeting information on automation for small- and medium-sized growers. OGGA also has an annual trade show (with 120 booths) and convention that partners them with the Oklahoma Nursery and Landscape Association.

Doug Needham not only teaches as mentioned previously, but he also serves an Extension role. He works with Oklahoma's youth and their leaders through programs such as Oklahoma Ag in the Classroom, 4-H Round Up, 4-H state fairs, and FFA career development events. These activities serve as a recruiting tool for the department to help attract interested students as well as expose the general public to our industry.

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Oklahoma's horticulture industry is privileged to have one of the few statewide arboretum systems. This system was signed into law in 1991, and it is headquartered at the OSU Botanical Garden in Stillwater. The OSU Botanical Garden is a 100-acre complex with thousands of plant species on display. It is used for Extension, teaching, and research activities.

One of the hidden treasures in the horticulture industry is the Oklahoma Gardening studio garden at the Botanical Garden. The studio garden is a 3-acre garden with multiple themes that hosts the weekly Oklahoma Gardening television show. The show has 150,000+ viewers per week.

Our Future

The Department of Horticulture and Landscape Architecture at Oklahoma State University is dedicated to educating students and supporting the industry through research and Extension. OSU's support of this dedication includes new teaching greenhouse facilities in the next two years, as well as expansion of departmental computing labs to continue providing excellent instruction. Progressive and cooperative efforts are also generating exciting results in our research and Extension programs.

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Motivation & Teamwork

by Bernie Erven, Ph.D.

Note: *This is the content of a presentation made by Dr. Erven at the 2005 OFA Short Course. For a recording of this session or other information, visit the OFA Web site at www.ofa.org.*

Motivation is the inner force that drives employee behavior. Motivating employees is one of an employer's most important challenges, and no simple recipe ensures motivated employees. Most employees prefer to be motivated, but motivation is complex. Employee motivation is easiest by creating a team, or a partnership in which the employer and employee both have certain well-understood responsibilities. The emphasis should be on employees' state of mind and what employers and employees can do together, rather than what employers should do to or for their employees.

Some Basic Truths

Employees may be motivated about a lot of other things, but not about their jobs. Not all performance problems are caused by an overall lack of motivation; sometimes an employee simply doesn't know how to do the job he or she has been assigned. Then, the problem is training, not motivation.

Resistance to changes that you want to make is quite apart from motivation. In fact, your most highly motivated employees may be most skeptical of the changes you want to make – because they think things are working as is. They like things the way they are, so they resist change; but that doesn't speak to their motivation.

In a small business, it can be hard to keep a motivated employee motivated, because you may not be able to move then "up" in your organization or keep them challenged. However, the reverse is also true – an unmotivated employee can become motivated. Also, motivation is not about money – you cannot buy motivation.

Satisfying Needs

1. Your employees have needs that they desire to satisfy, which in turn
2. Leads to actions that will fulfill their needs, which in turn
3. Leads to rewards from you and satisfaction from doing the job, which in turn
4. Reinforces their actions and causes the actions to be repeated.

For example, some people need compliments from you, and they thrive when you reassure them they're doing an excellent job; and the more they'll continue to do. However, your ability to sort out other people's needs is very limited, and this is very difficult to do. So you should depend on teamwork to get things done.

Teamwork between Employers and Employees

Synergy – the whole is greater than the sum of its parts. Teamwork generates synergy, and successful teams are usually based on synergy. Teamwork means cooperation and working together for a common goal, not separation and blaming the other person when things don't work well.

Self-motivation is an employee's most important contribution to the team. This self-motivation commits the employee to making the partnership with the employer a success. The most important part of management is hiring the right people, who are motivated and qualified for the job.

Employees have other important responsibilities. They need to:

- search for a job and work environment that fit their knowledge, skills, abilities, needs, and interests.
- be willing to learn.
- commit to the employer's mission, core values, and goals.
- communicate their needs, concerns, and ideas to the leader.
- listen to the leader's point of view.

You need to establish a reputation that these are the type of employees you're looking for, and you need to communicate these expectations to the employees so they are equipped to do their part.

A Pause for Reflection: The employee plays a critical role in a team approach to motivation. The employee has responsibilities and opportunities, way beyond coming to work on time, being nice to customers, and taking care of the plants. However, no matter what the employer does, the employee can assure his or her own lack of motivation (i.e. if he has already made up his mind not to be motivated).

A Theory about Motivation

Let's describe this using Herzberg's two-factor theory of motivation, which says that an employee's motivation on the job is actually derived from two things – the need to eliminate dissatisfiers in the workplace and the desire to increase the items that do motivate the employee. This is a common-sense approach to motivate your employees; powerful, yet simple enough to use.

You want to hire self-motivated people who will continue to accomplish, and you want to remove the things that dissatisfy them and provide them with some motivators. The leader has primary responsibility for both dissatisfiers and motivators. Dissatisfiers prevent motivators from working. Motivators influence job satisfaction and lead to motivation. Therefore, there should

Interior Plantscape

be two things on your agenda – what is dissatisfying and what is a motivator to each of your workers.

Types of dissatisfiers include: economics (i.e. unfair wages), security (i.e. repeated threat of being fired), social (i.e. irritating coworkers), status (i.e. no job title), and working conditions (i.e. lack of supplies, equipment prone to breakdowns). Dissatisfiers are important and they are taken personally, not lightly. However, it is the employer's job to work on fixing these dissatisfiers. Employees can't change these on their own.

There are also a number of motivational factors:
- Challenging work
- Access to information
- Increasing responsibility
- Involvement in decision-making
- Feeling of personal accomplishment
- Recognition for doing good work
- Feeling important to the business

This list doesn't fit everyone equally. You need to look for the factors you can provide that are good for each employee and the business as a whole. Removing dissatisfiers is not enough; you have to add the motivators. Figure 1 illustrates how different levels of dissatisfiers and motivators affect total satisfaction and motivation level.

There also is no perfect job. You have to help your employees understand this. Some employee wants are not true dissatisfiers (i.e. wanting to work outside versus inside).

How Effective is Your Employer-Employee Teamwork?

The basic question is what's the employee bringing to the table, and am I doing my part? There are three steps to answer this question: 1) check the employee's contributions, 2) check the dissatisfiers that are present, and 3) check the motivators that are present.

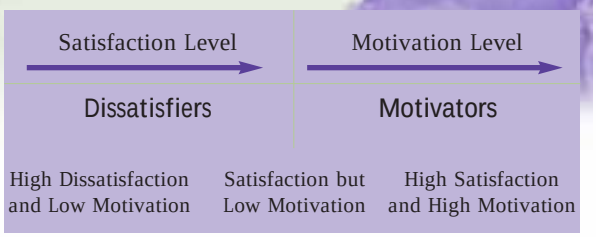
Step 1. Check the employee's contributions that are present in your current relationship:
- The employee is self-motivated.
- The employee's job fits his or her knowledge, skills, abilities, needs, and interests.
- The employee is willing to learn.
- The employee is committee to our mission, values, and goals.
- The employee communicates his or her needs, concerns, and ideas to me.
- The employee listens to my points of view.
- The employee is committed to making our motivation partnership work.

Step 2. Check the dissatisfiers that are present:
- Economic factors such as unfair wages and unsatisfactory housing.
- Irritation with other employees.
- Young or inexperienced employees not respected or listened to.
- Status problems including no job titles and lack of other symbols of rank and position.
- Working conditions such as inadequate heat, light, ventilation and equipment; unfair sharing of work; unreliable equipment; and unreasonable hours of work per day and week.

Step 3. Check the motivators that are present:
- Challenging work
- Access to information
- Increasing responsibility
- Involvement in decision making
- Feelings of personal accomplishment
- Recognition for good ideas, hard work, and caring about the family
- Sense of importance to the business

The more employee contributions and motivators and the fewer dissatisfiers that are present, the better you are doing at maintaining this partnership. Employee contributions and motivators not checked and dissatisfiers checked suggest how you and your employees can improve teamwork.

Figure 1. Diagram representing satisfaction and motivational levels.



The Key Points Again

Employee motivation is easiest through teamwork that includes both employees and the employers. Employees bring self-motivation to the team. The employer removes dissatisfiers and provides motivators. Both employers and employees need to do things in the context of the partnership.

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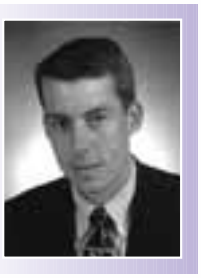
Quarantine 37: An Update



by Lin Schmale – Senior Director of Government Relations, Society of American Florists
& Craig Regelbrugge – Senior Director of Government Relations, American Nursery & Landscape Association

Much of the plant material available for sale in a garden center or floral shop each spring is the result of importation of "plants for planting:" seed-propagated annuals and perennials, and vegetatively-propagated annuals and perennials. The U.S. Department of Agriculture's (USDA) Quarantine 37 ("Q-37") regulations cover "plants for planting" – including much more than just "plants in growing media." Q-37 also governs seed, cuttings, bare roots, and bulbs – components which are an integral part of the way we do business today. The Q-37 regulations are due for revision, and USDA has started the revision process. The Society of American Florists (SAF) and the American Nursery & Landscape Association (ANLA), have focused on Q-37 as a major priority for decades. What's the current status? And what do growers need to know to participate?

Obviously, the Q-37 regulations are of huge importance to our industry. Practical experience in recent years has demonstrated the alarming degree to which American resources are at risk of potentially devastating new plant pest introductions. The United States currently relies heavily on limited visual inspection as the main – or often only – way of detecting and preventing the establishment of serious new pests and noxious weeds. The weaknesses have been exacerbated as the Department of Homeland Security has taken over many of the former border functions of USDA.

However, plant introduction and improvement have also offered enormous benefits to Americans. Most of our food and fiber crop plants have been introduced from other continents, as are many of the nursery and floriculture crops that enhance our economy and the quality of our environments and lives. The United States is an international leader in the development and commercialization of new and improved plant varieties, yet other countries also maintain valued positions as sources of new germplasm, or the improved products of skilled breeding efforts.

Now, APHIS (Animal and Plant Health Inspection Service) has embarked upon the ambitious task of revising the current Q-37 regulations, which were first put into place more than 50 years ago – when horticulture and international trade were very different from the world of today. Over the past year, APHIS has published an "Advanced Notice of Proposed Rulemaking" (ANPR), held a public meeting, and met with many industry groups to discuss the concepts on which it should focus in revising the Q-37 regulations. SAF and ANLA have played an active role in this process and will continue to do so. We believe that a "vision for change" must precede specific proposals for change.

The challenge for APHIS – and for us – is to modernize the framework of applicable regulations in a manner that allows the United States to maximize the benefits of plant introduction and trade while minimizing the risks of inadvertent introduction of pests or noxious weeds. What would a successful modernization look like? In our comments to APHIS, we have suggested these maxims as a vision for success:

- A modernized Q-37 should provide effective protection of the U.S. agricultural and horticultural industries by accommodating safe international trade in "plants for planting."
- Q-37 should be based on the best-available scientific information, modern and relevant pest risk analysis, and the best-available and affordable risk-reduction measures.
- Q-37's requirements should be clear, easily understood, transparent, evenly applied, and consistently enforced. New commercial-volume trade (new taxa and/or new source areas) should be directed as much as possible into channels that minimize pest risk, e.g. micropropagation/in vitro; seed; and cuttings or young plants produced in recognized clean stock programs overseen by appropriate regulatory agencies. This point is particularly important: we may already import taxa, for example, from Europe; but importing those same plants from China might pose entirely different risks. It is not just the plant – it's the pathway as well, which must be assessed.
- Introduction of new plant germplasm should be accommodated in a manner that encourages legal importation and discourages smuggling or transshipment through countries with lesser safeguards or underdeveloped regulatory capacity.
- Q-37 should embrace an array of novel approaches to achieving phytosanitary security rather than relying solely on "command and control" regulatory schemes. APHIS should consider approaches such as industry codes of conduct, quality assurance programs, and certification or accreditation of organizations, companies or individuals that demonstrate the capacity and commitment to fulfill the requirements necessary for phytosanitary security. Any approach must seek to maximize use of existing knowledge and practices, and avoid "one-size-fits-all" mandates.
- APHIS should begin Q-37 revision efforts by focusing on the areas of most significant or unknown risk, then proceeding in a logical incremental fashion toward a complete modernization of the regulatory framework for importation of plants for planting.

APHIS is now preparing a "white paper" on its vision for changing Q-37. That paper will be shared with industry groups before APHIS begins its actual rulemaking. Again, SAF and ANLA will work together

ofa Legislative Update

and with APHIS to help make sure our industry knows what's being planned and has input into the process before draft regulations are published, which begins the formal process. We believe several major points are particularly important.

1. Collecting Data on Current Plant Importation

APHIS' ability to effectively manage pest risk associated with the "plants for planting" pathway is contingent upon the agency's ability to develop and manage leading-edge information resources. Toward this end, APHIS must begin to consistently require basic information on all plant imports (typically on the phytosanitary certificate).

2. Establishing a New "Not Allowed Pending Risk Evaluation" Category

The agency describes two options for establishing such a new category. Under the first option, taxa which have been or are being imported in "significant amounts" might be grandfathered under the assumption that risks are better understood, or even that pests associated with such plants for planting have probably already become established in the United States over time. The second option would exclude taxa, pending risk evaluation and approval when qualified or bona fide information other than a pest risk analysis (PRA) provided evidence that the plant could introduce a quarantine pest into the United States, or that the plant itself could be a quarantine pest or noxious weed.

We believe these two options are not necessarily mutually exclusive. As outlined earlier, commercial volume trade and germplasm acquisition are two distinct categories – and distinct approaches must be developed for each. APHIS should take full advantage of information it may already have to build a risk matrix of the "plants for planting" pathway involving commercial trade. Germplasm acquisition can readily be addressed through some kind of permitting system, post-entry quarantine, etc.

We believe the more important and urgent question is how to manage plant health risks associated with new and evolving trade patterns. Broadly restricting imports of plants for planting without a transparent risk-based reason to do so will put the agency in a precarious position vis-à-vis international trade rules. However, a majority of our industry supports the basic premise that proposals to import new taxa from new geographic sources should necessitate some kind of risk analysis or other control mechanism (clean stock program, etc.) prior to approval. Instead of such a prohibition being total, perhaps the agency could evaluate the comparative risk of methods for handling plants for planting, and then create incentives intended to channel trade into generally lower-risk categories. Many in industry and regulatory circles have suggested that seed and tissue-culture plantlets would represent lower risk than unrooted cuttings, and unrooted cuttings lower risk than plants with roots, and bare-root plants lower risk than plants established in growing media. While a basic understanding of potential pest risk should be developed as a precursor to any import activity, the agency should consider regulatory strategies that favor lower-risk trade patterns.

3. Programs to Reduce Risk of Pest Entry and Establishment

APHIS is discussing existing and potential programs (clean stock and best management practice programs) to reduce the risk of entry and establishment of regulated pests. Clean stock programs offer potential for managing pest risk at the place of production, rather than relying on port-of-entry inspection to detect pests and pathogens which may be minute, hidden, or even latent. The *Ralstonia* program is a good example of a certification program that incorporates clean stock program elements. In that case, industry, researchers, and regulators collaborated to develop a system of production and monitoring safeguards that should allow for the importation of consistently pathogen-free *Pelargonium* cuttings from various countries.

However, clean stock programs can be expensive to establish, maintain and monitor, so adequate thought must be put into their design and oversight. If pursued too quickly or broadly, they could lead to a false sense of security; and failure will undermine the credibility of this important tool. Clean stock programs must also be built on existing industry-proven practices and knowledge, rather than seeking to impose a "one-size-fits-all" mentality on all clean stock programs.

Eventually, these programs may evolve so they can be relied upon to consistently deliver broader phytosanitary security. It might be helpful to establish voluntary pilot programs in certain instances, which could provide experience and serve as models. In the near term, we also encourage a smorgasbord of other risk-management measures – including encouraging importation of plants in lower-risk forms and use of postentry evaluation procedures in certain cases.

4. Combining Existing Regulations Governing Importation of Plants for Planting

There is broad industry support – voiced loudly and clearly by the ANLA/SAF task force – for actions that will improve stakeholders' ability to review, comprehend,

Continued on page 28

Quarantine 37: An Update

Continued from page 27

and comply with the regulations. It would appear to make sense to consolidate all regulations applying to importation of plants for planting. APHIS should carefully review what actually constitutes "plants for planting" and handle other materials (i.e. cut flowers or other plant material not destined for establishment in the environment) in separate regulations.

5. Reevaluating Restricted or Prohibited Taxa

Taxa that are already restricted or prohibited under Q-37 are treated in this manner due to specific pest risk identified in the past. As the agency decides how to prioritize its Q-37 reform activities, the existing presumption of risk suggests that current restrictions or prohibitions should remain in place and be subject to review and reconsideration as the agency completes higher-priority reforms.

The associations see value in careful coordination with Canada on this issue. While the United States and Canada enjoy an open and productive trading environment in most types of nursery and greenhouse plants, there are some significant inconsistencies in the two countries' entry requirements for plants for planting from other countries. These discrepancies suggest an inconsistent view of pest risk; perhaps in some cases, one country has conducted a modern risk analysis for a type of plant, while the other has not. Regardless of the basis for these discrepancies, the practical reality is that this situation encourages smuggling or "back door entry" where a plant enthusiast may bring a plant into Canada, possibly hold or propagate it for a period of time, and then export it to the United States under the appearance that the material is a "product of Canada." The reverse may also be true. Areas of inconsistent regulation – especially between the United States and Canada – should be a priority for review.

A review of postentry quarantine (PEQ) programs is also in order. We believe PEQ is a useful way to facilitate entry of plants for planting, while maintaining vigilance for pests of concern. However, it is an ineffective strategy for many types of pests. APHIS should work with a team of regulatory and industry representatives to consider how to revamp PEQ. Such a team should consider minimum performance standards for facility design and management, minimum standards for PEQ regulatory oversight, funding options, and establishment of limits on the quantity of material that may be entered through PEQ programs.

6. Other Issues

Evaluating New Plant Introductions for Potential Invasiveness. *The Safeguarding Review* and other analyses have pointed out that the present Q-37 generally allows plant varieties new to North America to be imported without a specific assessment of their potential to become noxious weeds. Many view this as a regulatory loophole. The Safeguarding Review and the National Invasive Species Management Plan produced by the National Invasive Species Council have called for the development and testing of screening tools for intentional new species introductions, including plants.

The agency must carefully consider how to approach this task. There will be no easy answers. It bears emphasizing that germplasm from abroad is foundational to the existence and success of American agriculture and horticulture, and that most intentional plant introductions have offered many benefits and few negative impacts. The challenge for APHIS lies in determining how to effectively regulate in this area while minimizing – on the basis of risk – the volume of material that must be assessed.

Stakeholder Collaboration. The "plants for planting" pathway is highly complex, diverse, and dynamic. The agency must understand the pathway well to design and implement effective regulatory strategies. We believe a meaningful dialogue with stakeholders is a necessary step in moving forward. We expect that APHIS may be planning one or more inclusive stakeholder meetings, and these will be important for general input.

We are continuing to help organize opportunities for dialogue with the regulated industry, to help APHIS and non-APHIS partners such as the state plant regulatory officials further their understanding of the industry.

CONCLUSION

ANLA and SAF believe the rationale is strong for initiating a major reform of Quarantine 37. It is important that APHIS take affirmative, justified, and transparent steps to improve the biological integrity and safeguarding efficacy of the quarantine. However, it must proceed in a way that avoids conflict with U.S. obligations under international trade agreements, and limits as fully as practical any negative impacts on established patterns of commerce. We believe the revision will take time and must be done incrementally. In the interim, we encourage growers to think carefully about these issues and to participate with us as this important process moves forward.

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OFA Membership & Financial Reports

as of 8/31/05

Association Category	Ohio	Out of State	International	Total
Active Grower (B,C,D)	300	1,051	86	1,437
Active: Non-grower (A)	269	654	108	1,031
Associate (AS)	202	503	25	730
Honorary Members (H) & reciprocal agreement (RA)	8	20		28
Total	**779 (24%)**	**2,228 (69%)**	**219 (7%)**	**3,226**

Domestic Members			
Alaska	2	Mississippi	7
Alabama	15	Montana	14
Arizona	5	North Carolina	53
Arkansas	5	North Dakota	3
California	150	Nebraska	12
Colorado	41	New Hampshire	28
Connecticut	41	New Jersey	64
District of Columbia	2	New Mexico	3
Delaware	5	New York	158
Florida	116	Ohio	779
Georgia	40	Oklahoma	14
Hawaii	12	Oregon	42
Iowa	36	Pennsylvania	178
Idaho	8	Rhode Island	10
Illinois	198	South Carolina	20
Indiana	109	South Dakota	9
Kansas	18	Tennessee	20
Kentucky	58	Texas	62
Louisiana	8	Utah	10
Massachusetts	51	Virginia	52
Maryland	40	Vermont	4
Maine	10	Washington	420
Michigan	234	West Virginia	28
Minnesota	69	Wisconsin	84
Missouri	39	Wyoming	1
		Total	**3,007**

International Members			
Argentina	1	Japan	9
Australia	5	Malaysia	2
Canada	147	Mexico	1
China	3	Mongolia	1
Costa Rica	1	Netherlands	15
Denmark	2	New Zealand	1
France	2	Singapore	2
Germany	6	South Africa	1
Guadaloupe	1	South Korea	2
India	1	Switzerland	1
Indonesia	1	Taiwan	1
Ireland	1	Thailand	1
Israel	2	UK/England	5
Italy	4		
		Total	**219**

OHIO FLORISTS' ASSOCIATION INC. AND SUBSIDIARY

Consolidated Statements of Activities for the Year Ended December 31, 2004.

Revenues:	
Short course and trade show	$2,039,650
Dues	273,509
Publications and advertising	98,153
Short Course sponsorship	44,675
Workers' Compensation program	30,435
Publication advertising – Tips	11,800
Investment income (loss)	46,365
Miscellaneous	16,218
Total revenues	**$2,560,805**
Expenses:	
Short course and trade show	826,582
Personnel costs	765,572
Contributions	28,982
Professional fees	35,291
Depreciation	46,742
Communications	50,007
Publication costs	86,463
Office equipment leases	35,760
Computer equipment maintenance	37,856
Building maintenance and taxes	70,253
Administrative meetings/functions	72,161
Public relations	9,247
Travel	27,724
Credit card processing fees	8,181
Postage	12,264
Office supplies	19,006
Telephone	13,419
Insurance	8,457
Total expenses	**$2,153,967**
Increase in Net Assets	**$406,838**
Net assets – beginning of year	$410,666
Net assets – end of year	$817,504

• Audited financial statements are available upon request. This document was transcribed from the Consolidated Financial Statements with the independent auditor's report of December 31, 2004.

ofa News

OFA Recognizes Two New Ohio Certified Florists, Offers Next Test in October

OFA congratulates Rita Hoagland, OCF, of Seiferts Flower Mill in North Canton, and Dave Woessner, OCF, of Tri-Rivers Career Center in Marion, for passing the Ohio Certified Florist (OCF) test in July.

A self-study certification program, the OCF program provides recognition for a standardized, professional level of knowledge and expertise in the retail florist industry. To become an OCF, individuals must pass both the written and hands-on portions of an exam. The written portion topics include: product identification, care and handling, floral design, display and visual merchandising, and sales and customer service. Participants must demonstrate the practical application of their knowledge by designing three arrangements. The OCF designation is a three-year award; it is also renewable by earning continuing education points.

OFA offers at least one OCF exam each year. The annual exam is held in Columbus, Ohio on the Monday of the OFA Short Course. Dates and times of this and other exams will be posted on the OFA Web site. The next OCF testing is scheduled for October 30, 2005 at the OFA office, Columbus, Ohio. For more details about the program and testing, visit www.ofa.org (under the Events tab).

Other Ohio Certified Florists include: Polly Agle, Hazel's in Springfield; Gary Anderson, The Ohio State University – ATI in Wooster; Kathy Benken, HJ Benken Florist & Greenhouse in Cincinnati; Diane Green, DeHoff FGL Inc in Louisville; Mary Linda Horn, ML Floral Designs in Ostrander; Melinda Howells in Columbus; Sandy Ossenschmidt, HJ Benken Florist & Greenhouse in Cincinnati; and Florence Willeman, Four County Career Center in Archbold.

The Basics on Water, Media, & Nutrition Workshop

Dr. Brian Whipker, North Carolina State University, and Dr. James Gibson, West Florida Research & Education Center – presenters

November 10 – Lansing, Michigan, in conjunction with the Michigan Growers Expo

Roots are the foundation of bedding plant quality. In this interactive seminar, you will learn the basics of how media, water, and nutrition combine to affect crop vigor and timing. Learn how to test nutritional content of your media using the PourThru technique, as well as manipulate your crop through nutrition, pH monitoring, and control. Understanding, interpreting, and correcting alkalinity and soluble sales issues will be included. All participants will receive a copy of the PourThru Manual. Co-sponsored by Berger Horticultural Products, Michigan Peat Co., and Branch-Smith Publishing.

Pest-B-Gone Workshop

Dr. Raymond A. Cloyd, University of Illinois, and Dr. Karen Rane, Purdue University – presenters

November 11 – Chicago, Illinois

This is the "ultimate" workshop on pest management in greenhouses – offering a holistic approach to dealing with insects, mites, and diseases. Cloyd and Rane will discuss identification of each, as well as biology and life cycles of the major pests, so appropriate management tactics can be used. The most up-to-date cultural, physical, chemical, and biological strategies will be addressed. The workshop will include laboratory identification exercises. Co-sponsored by SePRO Corp., Syngenta Professional Products, and Branch-Smith Publishing.

OFA Member Benefits

- Research Abstracts: OFA is now providing a link on the OFA Web site (www.ofa.org, Members-Only Access area) to the abstracts of research articles published in the three journals of the American Society of Horticultural Science. This research covers the entire range of crop production issues important to growers. These listings will also give authors, publication and issue, and a hot link to the ASHS Web site, where you can read a summary of the papers and more.
- OFA members receive a 20 percent discount on all *OFA Tips...* books, now available through the Ball Bookshelf, as well as a discount on all Ball Publishing titles. Visit www.ofa.org or www.ballbookshelf.com for more information. Proof of OFA membership is required. Your ID number is listed on your *OFA Bulletin* label. You will also need to use the special code "OFAMBR" to receive the discount.
- The *APPI Savings Solution Program* can reduce the costs of a company's energy, utility, and telecommunications services – including electricity, natural gas, water, recycling, waste removal, freight, credit card processing, and voice and data communications. APPI, an independent utility consulting firm, is compensated only when it delivers savings and/or refunds to OFA members. To get started, APPI will perform a free audit of your company's energy, utility, and telecommunications bills. For more information, call 800-520-6685, visit www.appienergy.com, or contact OFA.
- Ohio-based OFA members can participate in the OFA worker's compensation group rating program. This program is administered by Compensation Consultants Inc. (CCI). For more information or a no-cost, no-obligation quote, contact Cathy Bennett at CCI – 800-837-3200, ext. 7106; cathy.bennett@ccitpa.com, or www.cciworkerscomp.com.
- *Florists' Review* magazine is available to OFA members for a reduced fee. Sign up through OFA and save nearly 30 percent on the subscription cost to *Florists' Review*.

Retiring Board Members Comment on Their Service

OFA greatly appreciates the tremendous amount of time, thought, and input that our Board of Directors members give to the Association each year. Board members serve a three-year term, and five members roll off the board each year as new members begin terms. These are a few comments from two retiring board members:

"For the past 30 years, I have personally and professionally benefited from my membership and involvement in OFA. In the past three years, I have had the privilege and honor to serve on the board of OFA. The floriculture industry is well served by this fine organization." – Mike Berns, Berns Garden Center, Middletown, Ohio

"It seems my three years on the Board came and went in a heartbeat. Yet, I do recognize that as a Board, we made some very meaty decisions, which have made an impact on the organization and the industry. Serving on the OFA Board of Directors is a serious task, and I hope the membership reflects carefully on whom they select to represent them and appreciates the job that they do. The Board, together with the staff and the committee members, truly represents a large segment of the industry, and the potential for the future of what we as an organization can become is only limited by our imagination and the charge from our membership." – Marvin Miller, Ball Horticultural Co, West Chicago, Illinois

OFA Board Votes on New Committee Structure

In an effort to maintain a member-driven focus as well as an efficient and effective committee structure, the OFA Board of Directors directed the Constitution & Bylaws Committee to review and recommend necessary revisions to the current OFA committee structure and descriptions.

At its July 2005 meeting, the Board adopted the committee's recommendation with an implementation date of January 1, 2006. All current committee chairs and members will remain in place until December 31, 2005. More information will be available later this fall.

America in Bloom (AIB) – 2005 Winners Recognized

Winners of the fourth annual America in Bloom contest were announced in September at the AIB Symposium and Awards Program held in Cleveland, Ohio. The event was hosted by 18 northeast Ohio communities, which have participated in AIB since its inception.

AIB is a national campaign and contest that promotes enhancing communities through beautification. "Planting pride in our communities" is the main goal. In a friendly competition, communities are matched by population and evaluated on their efforts related to floral displays, urban forestry, landscaped areas, turf and groundcover, tidiness, environmental awareness, heritage conservation, and community involvement.

Nearly 50 communities from all regions of the country participated in 2005, and judges visited the communities this summer. AIB's 2005 population category winners are:
5,000 or less – Lewes, Delaware;
5,001-10,000 – Meredith, New Hampshire;
10,001-15,000 – Loveland, Ohio;
15,001-20,000 – Newburyport, Massachusetts;
20,001-50,000 – Hudson, Ohio;
50,001-100,000 – Kettering, Ohio;
100,001-300,000 – Rockford, Illinois;
300,001 and greater – Grand Central Partnership – New York City; and
University Campus – Brigham Young University.

Eight special awards were presented to communities that received high marks out of all contestants in all population categories. These include:

- Ball Horticultural Co. Floral Displays Award – University of Arkansas-Fort Smith;
- Yoder Brothers Heritage Preservation Award – Eureka Springs, Arkansas;
- Project Evergreen Landscaped Areas Award – Westlake, Ohio;
- American Horticultural Society Community Involvement Award – Logan, Ohio;
- The Scotts Co. Turf & Groundcover Areas Award – Ocala, Florida;
- Gardens Alive! Environmental Awareness Award – St. Paul, Minnesota;
- Planting Pride Magazine Tidiness Award – Bartlett, Tennessee; and
- Urban Forestry Award – Riverside, California.

As a founding steward of America in Bloom and administrator of the AIB contest, OFA is excited to be involved with these communities as they beautify their cities while encouraging community involvement, patriotism, and civic pride. Communities can register to enter the 2006 competition at www.americainbloom.org.

ofa News

Update Your Library with *OFA Tips...* Books

Plan ahead for winter and order some new reading material now! The two newest publications are now available via the Ball Bookshelf (www.ballbookshelf.com). *Tips on Operating a Profitable Greenhouse Business* addresses how growers can manage their operations more cost-effectively and increase their profit margins – working smarter in today's marketplace. Printing of the book was partially sponsored by J.R. Peters Inc. The goal of *Identification of Insects and Related Pests of Horticultural Plants* is to help greenhouse growers, interior plantscapers, pest management scouts, and others identify and manage the major insect, mite, and associated pests of greenhouse crops. Printing of the book was partially sponsored by OHP Inc., Cleary Chemical Corp., SePRO Corp., and Dramm Corp.

OFA Event Calendar

October 21-24	OFA Board & Committee Meetings – Indianapolis, IN
October 30	Ohio Certified Florist (OCF) Testing – OFA office, Columbus, OH
November 10	The Basics on Water, Media & Nutrition Workshop - in conjunction with Michigan Growers Expo, Lansing, MI – Drs. Brian Whipker & James Gibson
November 11	Pest-B-Gone Workshop - Chicago, IL – Drs. Raymond Cloyd & Karen Rane

Remember to circulate the *OFA Bulletin* among your staff members. This information is designed to be valuable for all areas of your business.

www.ofa.org

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