

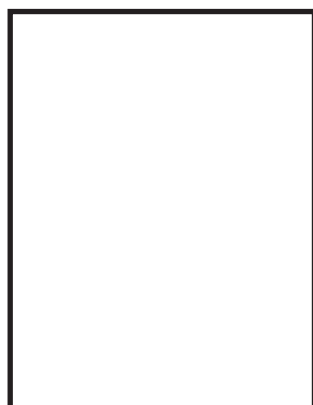


Bulletin

The Information Source for the Floriculture Industry Since 1929

CIRCULATE

10 Ways to Make Pest Control Materials Work Better



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Pest control materials are an integral component of any greenhouse pest management program. When they “fail,” resistance is often blamed. This may be the case in some circumstances, but there are also other factors that may lead to poor performance of pest control materials in controlling target pests such as plant-feeding insects or mites. These factors range from application techniques to water quality issues. For simplicity, any reference to a pest control material will pertain to insecticides and/or miticides.

There are at least 10 reasons why a specific pest control material does not perform to grower expectations. This article will address the

ways greenhouse growers can make pest control materials work better.

1. PEST IDENTIFICATION

It is important to properly identify a pest prior to selecting any pest control material, whether it be an insect or mite, especially since many of the newer pest control materials are selective in the range of pests they control. For example, some only control one group of pests (i.e. mites) whereas others may kill two to three different types of insects. In order to identify a given pest, growers

should have several reference publications that contain adequate photos, so it is possible to identify the pest in question. Another option is to send samples to a state Extension entomologist or plant diagnostic clinic. Once a given pest has been correctly identified, then the appropriate pest control material can be applied (see Figure 1, page 6).

2. COVERAGE

Thorough, uniform spray coverage is essential for controlling many greenhouse

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MOTIVATING STAFF TOWARD IMPROVED PERFORMANCE

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Business owners and managers often ask for tips on how they can motivate their staffs to reach higher levels of achievement, bring more enthusiasm to their work, or become more participative in company-related events or activities. My answer always begins the same way, “You can’t motivate people. People must motivate themselves.” The questioner’s response is often one of surprise. And for those of us who are still working on our “control issues,” my response is one that must be grappled with. The follow-up question is usually, “Are you saying that I don’t have any control over this?” The response to this question is, “No, you can’t control a person’s level of motivation, but you can affect it.” The affect can be positive or negative, and is directly related to work environment and relationships.

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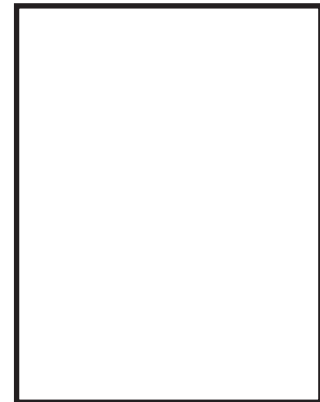
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THE CHALLENGES OF GREENHOUSE TECHNOLOGY

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Most of us have participated in grower tours at one time or another in our careers. Seeing how other growers operate their greenhouses always provides a realistic learning experience. The golden rule of attending conferences, "if you only learn one thing your time is well spent" rule, is an order of magnitude more true when it comes to seeing what other growers are doing. Better yet, hearing the owner or grower explain how and why certain things are done etches the sights indelibly in our minds. Over the years, my father and I have stepped into many greenhouses together. At most of the ranges, we've seen things that cause us to glance at each other silently and nod subtly. That's all it takes to agree that there's another project to tackle when we return home.

The next statement may get me into trouble. The most impressive things we see are more often than not associated with the larger greenhouse ranges we visit on the tours. Admit it, the first time you saw ebb and flow bench irrigation in a multi-acre greenhouse range with holding tanks located below the production area in a "greenhouse basement," you turned and looked at your travel partner with your jaw hitting the concrete floor. How about computer controlled ... everything? Can you remember the impressive size of the operation? What about movable benches, the Dutch tray system that brings the plants to a central work area? Neat, huh?

Let me temper the somewhat troublesome statement from above with further detail. The most memorable things we see at small operations are often scaled-down versions of the impressive technologies seen at the large operations. This list of memories is just as sharp as the list of all the big stuff. There are tons of small operations whose owners are genuine inventors – the Thomas Jeffersons and Benjamin Franklins of everyday floriculture. How many can you remember? How many pieces of automation equipment have you seen modified to better fit the needs of a small operation? Sometimes it's a tweaking of a conveyor belt, an adjustment to a computer program, or the addition of extra plumbing and solenoid valves that makes a big-time system adaptable to a small setting. How many unpainted, ugly contraptions can you recall that provided a valuable function in the operation? Talk about round-

table discussion topics; there aren't enough tables to accommodate the ingenuity we've seen.

TRICKLE-DOWN CONCEPT

Our system of invention, improvement, and mass distribution of equipment and systems to make us more productive actually works pretty well. Small businesses rarely have the financial resources to jump in at the invention stage because it's simply too expensive. Large operations, however, lead the way by playing the role of researcher and developer. When they envision the potential payback of a piece of equipment that may reduce their labor costs or increase the energy efficiency of the range, they find a way to invest in and help fine-tune the technology. Once they work the wrinkles out and show that the technology provides a payback, others jump in and the trickle-down concept shifts into gear. The key is that word "potential." Our large growers are the trailblazers, gambling on the concept before it's been proven. We all owe a debt of gratitude to them because much of the technology we use in our small ranges started as "what if" thoughts in their operations.

Last winter, I wrote a *Bulletin* article on open-roof greenhouses. In researching the topic, I interviewed a handful of growers from around the country, large and small, wholesale and retail. The message was refreshing – open-roof structures are being built regardless of business type and size. This technology didn't need much trickling to make sense to small growers. It is, however, the exception instead of the rule.

CAN WE DO BETTER?

Now for the fun part. Last year, I had the opportunity to take a step back into the academic community through a part-time appointment at The Ohio State University (OSU). The appointment allowed me to interact with the floriculture faculty at OSU and encouraged development of collaborative relationships with floriculturists at other universities as well as plenty of interaction with growers. One of the very exciting objectives we're developing for my second year of the appointment is anchored in the topic of this article.

Until or unless we choose a different project title, for the time being, allow me to describe our Trickle-Down Technology Program. A task force of university floriculturists, agricultural engineers, product manufacturers, distributors, and growers will be assembled in the near future. The group will be charged with identifying appropriate greenhouse technologies to "fast track" for trickling down to scales beneficial to small growers.

The premise to the program is this. Our free enterprise system of economics does provide for natural adaptation of new technology; however, in the current business climate that is changing at a frantic pace, new technologies are needed more than ever by small growers to maintain their competitiveness. Modifications that adapt technology to small scales are not happening quickly enough for many growers.

One needs to look no further than to new cultivar introductions to validate the escalating rate of change in our green-



houses. A couple of decades ago, new cultivars commonly experienced 10-year profitable life cycles. Today, growers are faced with the challenge of learning how to grow new items very quickly because they often become outdated

in as few as three years, sometimes even fewer. There is a lot of pressure to learn to grow new items quickly to be able to get in and get out while they can contribute profitably to the operation's product mix.

Let's return to the greenhouse range itself for further illustration. I can speak to this point in my own operation. Typical of many family-run greenhouse ranges, mine was built one greenhouse at a time over many years. The result is an inefficient range of 20 freestanding houses that is a monumental headache to try and automate. I sometimes feel that we've personally kept manufacturers of irrigation time clocks, unit heaters, and solenoid valves in business because of the head shaking duplication from house to house.

It doesn't take much to get me going about the challenges of maintaining a decentralized heating system. When a winter alarm sounds, my father and I still have that frantic, five minutes of scampering from house to house to find the unit heater that's decided to take a break. There's a gray hair on my head for every time ...

TECHNOLOGY'S FOR EVERYONE

Anyone who's heard Lloyd Traven speak about greenhouse technology for small growers will agree – technology is NOT just for large operations. Lloyd runs a 20,000-square-foot range in eastern Pennsylvania – all wholesale. He's invested in automation technology and computer systems for environment, irrigation, scheduling, and inventory control. He winds every square foot up as tightly as he can and doesn't bother growing items that can be found in the marketplace at dime-a-dozen prices.

Whenever I fall into the trap of thinking that technology is just for the big guys, I make myself think of Lloyd and growers like him around the country who make the effort to really understand what a system will and will not do for their businesses. I tip my hat to this group of entrepreneurs.

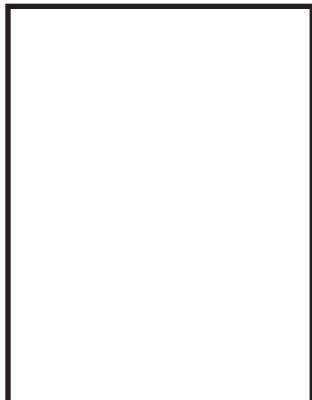
The Trickle-Down Technology Program will provide a thoughtful nudge to certain pieces of equipment and systems. Our vision is for the task force to interface from the differing perspectives of growers, manufacturers, engineers, and distributors to select the most promising technologies to bring to small growers. The goal of this program is simple ... help growers NOW. The measurement of success will mirror the goal in simplicity by carrying the battle cry "what has the program done for growers lately."

Along the way, having a group such as this working together will undoubtedly make a contribution not only to small growers, but also to the entire growing community, regardless of size. I invite those of you who are interested in working on this project to contact me. There's a ton of exciting work for us to tackle together.

OFA

LETTER FROM WASHINGTON

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For you Washington-watchers, here's an update from the nation's capitol on issues of importance to the floral industry.

As an opening caveat, however, I relay a recent conversation with a valued friend and industry leader. "I think the recovery of the stock market will be heavily influenced by election-year politics," I incautiously said. "For example, recovery will depend on the market response to Congressional hearings and attempts to use the corporate accounting scandals for political advantage between now and November."

"Ha!" my friend pounced. "Spoken like a true Washingtonian! You Washingtonians think the universe revolves around Washington D.C. Here's what will drive the market's recovery – it's the ability of companies to do business and make money for their shareholders!"

I couldn't agree more, of course. So while trying to avoid that "inside-the-Beltway" interpretation of the world, here are some issues here in Washington that could be important to your business and its bottom line.

RESEARCH FUNDING

The Floriculture and Nursery Research Initiative is the industry's effort to win more U.S. Department of Agriculture (USDA) research dollars to address the needs of the floral and nursery industry. Initiative partners SAF and the American Nursery and Landscape Association (ANLA), strongly supported as well by OFA, have succeeded in leading this effort to a steady increase since it was first formally presented to Congress in 1998.

Federal funds help leverage the industry's private efforts to improve flowers and plants for consumers through long-term research projects. Industry members contribute to private foundations that fund between \$1 million and \$3 million in research each year. However, the Initiative partnership, involving the floral and nursery industry, the federal government, and universities, can accomplish even more.

At press time, the House Appropriations Committee had approved a budget that would maintain funding for the Initiative at last year's level of \$5.5 million. But the budget originally proposed by the president contained deep cuts that would have eliminated many important projects – and the House budget restored those cuts, a good accomplishment in tight budgetary times. On the Senate side, the Appropriations Committee actually approved an increase for the Initiative, which would bring it to a new high of \$6.25 million. The differ-

ences between the two bills must be resolved in conference, and then approved by the president, before the end of this fiscal year on September 30.

The Initiative funding is being used in several important areas. Genetic research focuses on improving post harvest quality and on discovering distinctive genetic markers for precise identification of cultivars. Integrated pest management is another main thrust. Other studies target thrips, nematodes, whitefly, Botrytis, viruses, and poinsettia scab, and work toward improved root health in flower crops. The industry's environmental stewardship is being improved through studies on irrigation and fertilization management to minimize run-off. Improved spray technology for chemicals, work toward developing sustainable production methods and technologies that growers can use to reduce or eliminate run-off, the impact of using recycled water in greenhouse production, and robotics for use in nursery production are all among projects being funded by the Initiative.

HOMELAND SECURITY

By the time you read this, Congress may have passed legislation creating a new Department of Homeland Security. The proposals creating that new department have all proposed transferring all or part of the Animal and Plant Health Inspection Service (APHIS) to the new department. APHIS, now in the Department of Agriculture, is the lead agency charged with protecting U.S. agriculture and the environment from imported plant and animal pests and diseases. It does things like maintain a force of border inspectors. However, the border inspection activities are only one part of a continuum of safeguarding activities – APHIS is also in charge of the Quarantine-37 regulation, which governs the shipping of plant materials into the United States. For example, APHIS is currently doing risk assessments on Mexico's request to relax the Q-37 regulation to allow 10 genera of plants established in growing media to enter the United States from Mexico.

SAF and ANLA joined hands to testify before both the House and the Senate agriculture committees on the proposal to move APHIS, saying, "We concur with other agricultural organizations, and with the state departments of agriculture, in our concern that this move might dilute or even subvert the agricultural focus of APHIS, while failing to contribute to increased homeland security."

Nonetheless, it appears at this writing that at least the border inspection functions of APHIS – the functions and personnel dealing with imports and entry inspections – will be transferred to the new department. It is unclear how this move will impact other issues and functions of APHIS that are very important to floral and nursery growers.

IMMIGRATION POLICY

The effort to reform the H-2A guest worker program continues, although greatly impacted by the events of September 11. SAF continues its work with ANLA, the American Farm Bureau, and other agricultural groups. The goal is not only to get a workable guest worker program, but also to address the fact that well over half of today's agricultural workers are probably illegal aliens. The bipartisan efforts supported by the Agriculture Coalition for Immigration Reform (ACIR) would also

give illegal workers currently in the United States an opportunity to earn the right to work here legally.

The issue is presently deadlocked over a couple of relatively minor issues – and opposition from both the far left and the far right of the political spectrum. This effort is a long-term one, and whether or not Congress will be willing to act this year remains to be seen. However, it is an issue that is becoming more and more important to growers and their businesses, and continued efforts to resolve it will be necessary.

MINIMUM WAGE INCREASES: ALWAYS IN AN ELECTION YEAR?

Speculation continues over whether a minimum wage bill will be considered this Congressional session. Senate leaders have said they would consider an agenda that includes small-business tax breaks linked with a minimum wage increase. The details, of course, remain to be worked out. Senator Ted Kennedy (D-Mass.) has sponsored a minimum wage bill that would increase the federal wage in three phases from its current \$5.15 an hour to \$6.65 an hour. It could surface suddenly, and depending upon the ability to link it with the right combination of tax breaks, it could pass.

Estate tax repeal remains another component in the big tax reform picture. Last year, Congress repealed the estate tax over a 10-year phase-out period, ending in 2010. But that repeal contained a sunset provision. The sunset provision will reinstate the full estate tax in 2011, unless Congress passes

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permanent repeal. Estate tax repeal has moved from being a “no-chance” issue to becoming an issue that has a very good chance of permanent passage – because of the great support of grassroots letters and activities from businesses, growers, and families all across America, including the floral industry. The fight isn’t over – but it looks a lot more promising than it did a few years ago.

AND THERE IS MORE...

Ergonomics ... pesticide renewals ... worker re-entry intervals after pesticide application in greenhouses ... terrorism insurance and its impact on the economy ... all of these are issues waiting to be addressed.

You may not be biting your nails and lying awake nights wondering what’s happening in Washington on any or all of these issues, and you should not be. My friend is right – it’s the ability of your business to make money and to continue to grow and sell flowers and plants that make it survive. And if we, here inside the Beltway, can just help your business to do that, we’ll all have moved toward a better economy. **OFA**

How to Maximize Your Holiday Promotion

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Christmas is that one time each year when a business can attract shoppers who would otherwise walk past the store. For most people, holiday shopping is a chore, and retailers who can successfully promote their business will attract more customers at this festive time and, more importantly, generate more sales.

PLAN SPECIAL HOLIDAY PROMOTIONS

Christmas is a competitive time in the retail industry. Retailers need to do something different in terms of customer service, even entertainment, to attract the customer. Your promotion can be varied and exciting, and include for example:

- Network promotions with the local retailers, i.e. health shop and a gym.
- Take up a local charity cause over the holiday period and be seen promoting it.
- Have a party for senior citizens and young toddlers (but not at the same time).
- Organize special customer events during the lead up to the holidays.
- Have added value promotions.
- Have a holiday suggestion box where customers can offer their ideas.
- Send holiday cards to your regular customers, and put a handwritten thank you note in the card.

CREATE ATMOSPHERE

Focus on all the senses to make an impact on the Christmas customer:

Taste – offer them refreshments and samples of holiday goodies

Fragrance – use Christmas spices

Noise – have carols sung in the store. Ideally, get your team together during the day to sing carols to your customers. Or employ wandering minstrels during peak periods.

Touch – provide seasonal products and items that your customers can touch, such as Christmas trees, ornaments, and large cuddly toys.

BUILD HOLIDAY DISPLAYS

For many of us, one of the magical moments of Christmas as children was going to town to look at the window displays and holiday lights during this festive period.

Depending on your circumstances as a retailer, holiday displays can be real winners. Your display can be animated, fun, zany, interesting, unusual, newsworthy, educational, or magical. Whatever you do, “dare to be different.”

MAKE THE HOLIDAYS SPECIAL FOR CUSTOMERS

Jurek Leon, of Terrific Trading, provides a host of ideas to help retailers get the most out of the holiday trading period. Among his tips on improving customer service during this time are:

I’ll make you glad to talk with me:

- Make everyone feel special.
- Remember, every customer is different; treat each as an individual.
- If you see someone without a smile, give them one of yours.
- Occupy the children.
- Occupy husbands/boyfriends.

Welcome your customers:

• At peak times, have a specially designated person welcome your customers. Make sure they are clearly

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10 WAYS TO MAKE PEST CONTROL MATERIALS WORK BETTER

Continued from page 1

pests. Greenhouse growers should determine the location of pests, then direct spray applications to those plant parts to obtain maximum coverage and increase the effectiveness of pest control materials. Because most pest control materials have contact activity, it is important that sprays get to leaf undersides where a majority of the life stages (eggs, young, and adults) of pests, including spider mites and whiteflies, are normally located (Figure 2). However, some pest control materials have what is called translaminar, or local, systemic activity. These materials penetrate leaf tissues and form a reservoir of active ingredient within the leaf. This provides residual activity against piercing-sucking insects and mites.

It is more appropriate to make spray applications when applicators are not tired to avoid poor coverage problems. Applications should never be performed during the heat of the day when discomfort can lead to reduced spray coverage. In addition, this may lead to plant injury (phytotoxicity) and possible heat exhaustion to the appli-

cator due to the protective clothing and equipment required. It is important to understand the biology of insect and mite pests so greenhouse growers will know where certain life stages are located.

3. TIMING OF APPLICATION

If applications of pest control materials are made when insect or mite populations are high, then it takes longer to lower the numbers and more frequent applications will be needed, especially when dealing with overlapping generations. In addition, pests may have already developed into resistant stages, may already be causing plant injury, or may be in locations that are difficult to reach with sprays (i.e. unopened flower buds). It is more appropriate to make applications when pest numbers are low.

Pest control materials should be applied in the early morning or late afternoon because this is when whiteflies, thrips, and other insects are active. If applied when insect or mite pests are less active, pest control material efficacy may be reduced, particularly contact materials.

Pest control materials applied during hot, dry, sunny days may result in rapid drying and less residual activity, reducing their effectiveness.

Applying horticultural oils during cloudy weather may result in phytotoxicity because the material doesn't dry up. Evening applications of pest control materials may promote disease development. Promoting drying via heating, venting, and using horizontal airflow fans may alleviate this potential problem.

4. WATER QUALITY

Water quality, including pH, can influence the effectiveness of pest control materials. High pH levels can cause certain pest control materials to break down (alkaline hydrolysis). Carbamate and organophosphate insecticides are most sensitive to alkaline hydrolysis with carbamates degrading faster than organophosphates. A pH above 8.0 can reduce the effectiveness of the soil-bacterium *Bacillus thuringiensis* (Gnatrol). Also, a high pH solution may influence the dissolving process (i.e. length of time) of pest control materials formulated as water-soluble packets.

Several pest control materials recommend a particular pH range on their

labels. For example, the Ornazin (azadirachtin) label states the pest control material "will break down in spray tank mixtures that have pH values exceeding 7.0. Recommend pH range between 5.5 and 6.5." The label for Closure (bendiocarb), which is no longer available, mentioned that "if water pH is >8.0, add buffering agent to adjust water pH to 7.0 or less. The activity of Closure 76WP at pH 8.0 or greater may be reduced."

To minimize alkaline hydrolysis, the pH spray solution should be between 4.0 and 7.0. Degradation normally occurs above a pH of 7.5 for many pest control materials. To counteract pH problems, a buffering agent may be added to the spray solution. In addition, pest control materials should be applied as soon as possible after mixing. Some additional ways to avoid pH problems include 1) check the product label for precautions when using high pH water, 2) regularly check water pH, and 3) avoid leaving pesticide solutions in spray tanks for extended time periods

5. MODE OF ACTION & ROTATION

In order to prolong the longevity of pest control materials, it is important to



Figure 1. What is this? (Oxalis seed.) This resembles a whitefly pupae or scale. So the problem is not insect related. Weed control is important in greenhouses, because weeds provide refuge for insects and mites.



Figure 2. Many insects and mite pests reside underneath leaves, so spray applications need to reach leaf undersides.

rotate modes of action to avoid insect and mite populations becoming resistant. Failure to rotate pest control materials with different modes of activity may result in resistance and reduced pest control. The key is to rotate modes of activity, not chemical classes, because some chemical classes have very similar modes of activity.

For example, both the organophosphates and carbamates, despite being different chemical classes, have identical modes of activity (acetylcholinesterase inhibitors). So using acephate (Orthene), an organophosphate, for several sprays and then switching to methiocarb (Mesuro), a carbamate, is not a proper rotation scheme. Similarly, chlorinated hydrocarbons and pyrethroids

have the same mode of activity (affect nerve cell transmission). In this case, using dicofol (Kelthane), a chlorinated hydrocarbon, then switching to bifenthrin (Talstar), a pyrethroid, would not be a proper rotation scheme.

Rotating different modes of activity reduces the selection pressure placed on an insect or mite population and avoids exposing several generations of the pest population to the same mode of activity. This prolongs the usefulness of available pest control materials. Most conventional pest control materials have a site-specific mode of activity, whereas biorational pest control materials, including insect growth regulators, insecticidal soap, horticultural oil, neem oil, and beneficial fungi and

bacteria, have broad-site or multiple-site activity (Table 1, page 8). Insects and mites are more likely to develop resistance faster to pest control materials with a site-specific mode of activity than those pest control materials with a broad or multiple-site mode of activity.

6. APPLICATION TECHNIQUE & FORMULATION

Aerosols and fine sprays are effective in controlling flying adults whereas high-volume sprays are preferred for controlling sedentary or immobile stages and pests inhabiting the growing medium. If an aerosol is used to control pests that are located in the growing medium, underneath leaves, or deep within the crop canopy, this may result in inadequate control because the droplet size is too fine. Aerosols and fumigants should be used for adults, and drenches or "sprenches" should be used for the larval stages of insects located in the growing medium such as fungus gnats and shoreflies. Low-volume applications work well when plants are small, but may not provide sufficient coverage when the crop canopy closes. These conditions may warrant the use of a high-volume application.

7. TARGET PEST STAGE

Pest control material failure will most likely occur if

the vulnerable stage or stages of the target insect or mite pest are not present. Generally, the immature or young stages are more susceptible than older life stages to conventional or biorational pest control materials. Most contact or systemic pest control materials do not affect the egg and pupal stage of many pests (Figure 3).

For example, adequate control will probably not occur if western flower thrips egg and pupae are the predominant stages present during an application. Young that emerge from eggs and adults that emerge from pupae will not be exposed to pest control materials for several days following an application. This is especially critical with short residual pest control materials, resulting in additional sprays likely being necessary. Targeting the early development stages may reduce the number of applications of pest control materials required and, as a result, reduce the amount of selection pressure placed on an insect or mite population (Figure 4).

Proper scouting using colored sticky cards and/or visual inspections can help detect the vulnerable pest stages present. A pest control material can then be applied accordingly (Figure 5). Proper knowledge of pest



Figure 3. The pupal stage of many insects is highly tolerant of both contact and systemic pest control material applications.



Figure 4. Inspecting plants regularly will determine if the susceptible stage (i.e. larvae and adults) of an insect or mite is present, so applications can be made accordingly.



Figure 5. Placing colored sticky cards among the crop will track the population dynamics of a pest and help to time applications of pest control materials.

Continued on page 8

10 WAYS TO MAKE PEST CONTROL MATERIALS WORK BETTER

Continued from page 7

Table 1. Chemical class and mode of action of insecticides/miticides registered for use in greenhouses.

Insecticide/Miticide Active Ingredient (Trade Name)	Chemical Class	Mode of Action
Acephate (Orthene)	Organophosphate	Specific
Chlorpyrifos (Duraguard)	Organophosphate	Specific
Diazinon (Knox Out)	Organophosphate	Specific
Dichlorvos (Vapona)	Organophosphate	Specific
Naled (Dibrom)	Organophosphate	Specific
Sulfotepp (Dithio/Plantfume)	Organophosphate	Specific
Methiocarb (Mesurol)	Carbamate	Specific
Bifenthrin (Talstar/Attain)	Pyrethroid	Specific
Cyfluthrin (Decathlon)	Pyrethroid	Specific
Fenpropathrin (Tame)	Pyrethroid	Specific
Fluvalinate (Mavrik)	Pyrethroid	Specific
Lambda-cyhalothrin (Scimitar)	Pyrethroid	Specific
Permethrin (Astro)	Pyrethroid	Specific
Chlorpyrifos + Cyflutrin (Duraplex)	Organophosphate + Pyrethroid	Specific
Dicofol (Kelthane)	Organochlorine	Specific
Endosulfan (Endosulfan/Thiodan)	Organochlorine	Specific
Abamectin (Avid)	Macrocyclic Lactone	Specific
Imidacloprid (Marathon)	Chloronicotinyl	Specific
Azadirachtin (Azatin/Ornazin)	Insect Growth Regulator	Broad
Cyromazine (Citation)	Insect Growth Regulator	Broad
Diflubenzuron (Adept)	Insect Growth Regulator	Broad
Fenoxycarb (Precision/Preclude)	Insect Growth Regulator	Broad
Kinoprene (Enstar II)	Insect Growth Regulator	Broad
Pyriproxyfen (Distance)	Insect Growth Regulator	Broad
Tebufenozide (Confirm)	Insect Growth Regulator	Broad
Potassium salts of fatty acids (M-Pede/Insecticidal Soap)	Soap	Broad
Cinnamaldehyde (Cinnamite)	Oil	Broad
Neem oil	Oil	Broad
Paraffinic oil (UltraFine Oil)	Oil	Broad
Soybean oil (Golden Natur'L Spray Oil)	Oil	Broad
<i>Beauveria bassiana</i> (Botanigard/Naturalis)	Microbial	Broad
Spinosad (Conserve)	Microbial	Broad
<i>Bacillus thuringiensis kurstaki</i> (Dipel)	Microbial	Broad
<i>Bacillus thuringiensis israelensis</i> (Gnatrol)	Microbial	Broad
Nicotine (Fulex/Plant Products)	Botanical	Specific
Pyrethrin (Pyrenone/Pyrethrum)	Botanical	Specific
Fenpyroximate (Akari)	Phenyl Pyrazole	Specific
Pymetrozine (Endeavor)	Pyridine Azomethine	Broad
Bifenazate (Floramite)	Carbazate	Specific
Hexythiazox (Hexygon)	Carboxamide	Specific
Clofentezine (Ovation)	Tetrazine	Specific
Chlorfenapyr (Pylon)	Pyrrole	Specific
Pyridaben (Sanmite)	Pyridazinone	Specific
Fenbutatin-oxide (Vendex)	Organo-Tin Compound	Specific

biology will help growers in understanding what pest stages are susceptible to pest control materials.

8. LABEL RATE

Always follow the recommended manufacturer label rates. Exceeding the label rate may cause phytotoxicity to a crop and result in economic losses. Applying less than the recommended label rate may result in inadequate pest control. Following the label rate will help ensure success in managing pests. When a range of rates are provided on a label (i.e. 6 to 12 fluid ounces/100 gallons of water) it is best to use the low (6 fluid ounces) or middle (10 fluid ounces) rates initially. Constantly using the highest label rate of a pest control material may result in limited options when this rate fails. Using higher label rates may increase the selection pressure on the pest population, resulting in resistance developing quicker. In fact, the lower label rate may be just as effective as the highest label rate. In the long-term, this extends the longevity of any pest control material.

9. SHELF LIFE

Pest control materials don't carry a lifetime warranty. They must be used within a specified time period (approximately three to five years depending on the formulation). Many pest control materials break down when exposed to continuous cycles of heat (over 100°F) and cold (below freezing) over a period of time. This then reduces the effectiveness of pest control materials. Liquid formulations, if not used for an extended period of time (more than four years), may eventually separate into layers or settle out and form precipitates in the bottom of containers. This makes it difficult to get the active ingredient or carrier back into a suspension that is suitable for use.

Proper storage of pest control materials will help preserve shelf life. Insulated pesticide storage chambers are ideal for protecting pest control materials from environmental conditions. In general, the proper storage conditions for many pest control materials are temperatures between 60 and

OFA Grower

70°F and a relative humidity between 40 percent and 60 percent.

10. FREQUENCY OF APPLICATION

As previously mentioned, most insecticides only kill the young (larvae or immature) and adult stages of insects or mites, having no direct effect on the eggs and pupae. As a result, repeat applications are necessary to kill stages that were missed with previous applications, such as larvae or immatures that were in the egg stage and adults that were in the pupae stage. This is especially important when there are many overlapping generations. In some cases, two to three spray applications within a 7- to 10-day interval may be needed when populations are high and there are overlapping generations.

Frequency of application may depend on the season. During cooler temperatures,

the insect or mite life cycle (egg to adult) is extended in contrast to warmer temperatures. This may influence the number of applications needed in order to treat susceptible stages.

A common problem is that spray intervals are too long, which often leads to inadequate pest control. However, when insecticidal soaps and/or horticultural oils are applied at frequent intervals, this may result in phytotoxicity to a given crop.

It is apparent that improper performance of pest control materials may not necessarily be due to the pest control material itself, but may be due to one or a combination of factors. If greenhouse growers use pest control materials accordingly and avoid the problems presented above, they will improve the chances of obtaining sufficient control of insect and mite pests. **OFA**

MOTIVATING STAFF TOWARD IMPROVED PERFORMANCE

Continued from page 1

DE-MYTHING STAFF MOTIVATION

There are many myths about what motivates individuals. Let's begin by looking at some of the common myths relating to staff motivation. Many people still believe staff is motivated by:

Individuals – Though individuals can lend support and feedback, they can't get a person to do something they're not willing and ready to do. I'm sure everyone has experienced the frustration of trying to convince an individual to do something that seemed so obviously right. However, the person refused to budge or follow well-meaning advice.

Money, Job Security, Prestige – Sure, most of us appreciate an increase in pay or job security, and prestige can enhance one's social standing. Though some may accept these as temporary motivators, their motivating factor is usually short-term. After the initial thrill wears off, individuals are still left with examining basic emotional and spiritual needs. Take those who have received large amounts of cash from winning the lottery or other game of chance. Initially, they are ecstatic. They

OFA Management

plan purchases, make investments, and think they now have it made. Then, after the hoopla has subsided and the spending frenzy has ended, they must begin to have a "normal" life. Personal happiness, relationships, and spirituality are now reviewed, and many find they are not happy with what they see.

Fear – If you think you can motivate people by instilling fear, think again. Yes, for the short-term, fear can keep people doing what is directed. But keep in mind that all the while they are being fearful, they are planning to be vengeful. Companies who manage with fear as a motivator will find they may gain by keeping people working, but they are probably losing via staff-designed divisive methods. The goal: get back at management.

THE SAME THINGS THAT MOTIVATE YOU WILL MOTIVATE OTHERS

Uh, I don't think so. Rarely are any two people motivated by exactly the same things. Those who have or work with children can well understand this. One child might be motivated to clean

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MOTIVATING STAFF TOWARD IMPROVED PERFORMANCE

Continued from page 9

her room by the thought of spending the day at an amusement park. Another child may have no desire to go to an amusement park, and would find a day alone (without her siblings) a great motivator. Never assume that one size fits all.

HIGH LEVELS OF SATISFACTION

Yes, loving your job is important to reaching higher levels of achievement, but it isn't all we need to be motivated. As I hope you are seeing, motivation is multi-faceted, and can't be wrapped up in a nice package, tied with a ribbon, and presented as a gift. Discovering what motivates people requires time, energy, and relationship building.

BASIC PRINCIPLES

The phrase "All roads lead to Rome" is very appropriate when considering one of the basic principles related to staff motivation. This phrase refers to the fact that all the roads leading out of Rome had a marker at every mile indicating the distance to Rome from that point. No matter which road you traveled on, you'd always know how far you were from Rome. Rome was the reference point. Owners and managers are Rome. The success of their staff and business is directly related to the distance/relationship between themselves and the people they manage. All roads lead to you. Motivating others begins with motivating self. To lead, you must first understand your followers.

In the book *Whale Done! The Power of Positive Relationships*, Ken Blanchard, et al, suggest that to understand killer whales, you must jump into the water with them and show them that you mean no harm. By interacting with staff and building meaningful relationships, opportunities to show and share are created. From these opportunities, relationships are built and levels of understanding and awareness are heightened.

WHAT YOU DO VS. WHAT YOU SAY

Saying that everyone deserves the opportunity to grow and prosper is easy. Creating the environment for this to happen is something else altogether. Too often organizations say the right words, but do the wrong things. Make sure your organization is not just giving lip service to the concept of providing an environment for growth and improvement. How can you know if you're offering what people need to be successful? Ask them. Allow staff to have a voice in the development of policies, procedures, benefits, and organizational change. Shouldn't those who'll be affected by the proposed changes have a voice? What if those affected by the proposed plan don't think it's the big idea you think it is? What if they have a better idea? How would you know about that better idea if you never ask for input?

MIRROR, MIRROR ON THE WALL

This isn't about "Who's the fairest?" Instead we're going back to Rome, and another phrase relating to Rome. "When in Rome, do as the Romans do." This phrase relates to dropping the ways customary to you and your place of residency, and instead, living as those with whom you are visiting. This suggestion is made to visitors as an aide to helping others feel comfortable with the visitor. By exhibiting behavior that is familiar to the residents, the visitor helps them become

comfortable with him. In modern times, we've taken this a step further and suggest the body language of those with whom we converse be mirrored. It's thought that subtle (this is the key word) mirroring makes others feel comfortable.

Listening is also a key element here. There is a form of listening that stimulates conversation and reinforces understanding. Active listening is a structured form of listening and responding that focuses the attention on the speaker. The listener must take care to attend to the speaker fully, and then repeats, in the listener's own words, what he or she thinks the speaker has said." The listener doesn't have to agree with the speaker; he or she simply states what the speaker said. This enables the speaker to find out whether the listener really understood. If the listener did not, the speaker can explain some more.

Active listening has several benefits. First, it forces people to listen attentively to others. Second, it avoids misunderstandings, as people have to confirm that they really understand what another person has said. Third, it tends to open people up, to get them to say more.

Finally, remember to apply the 80/20 rule in every conversation. Listen 80 percent of the time and speak 20 percent. You'll be surprised at what you haven't been hearing.

FLATTERY WILL GET YOU EVERYWHERE

Public and private praise can work wonders toward motivating individuals. Some people are adverse to public praise, so know the personality type you're working with prior to showing public appreciation for an individual contribution. Whether the praise is public or private, be certain it is timely. Flattery or praise offered far after the conclusion of a project or the doing of a good deed has lost its immediacy and its golden glow. Procrastination about praising is a definite spirit killer. Timing is everything.

Ken Blanchard has often espoused the philosophy of catching employees doing something right, and accenting the positive. When we praise and positively reinforce "right" actions, we set the example for others. Everyone wants to be told they're doing a great job or that their contributions matter. When we conspicuously praise and reinforce positive behaviors, others see the benefits and strive for the same recognition. In so doing, higher levels of achievement and personal growth become aspirations. Keep in mind that recognition and praise isn't a one-time thing. One dose of praise doesn't last forever. It must not only be timely, but on going and relevant.

WANT MORE INFORMATION?

For additional information about motivation, read *Motivating Without Money: Cashless Ways to Stimulate Maximum Results, Raise Morale, and Reduce Turnover With Your Telephone Sales and Service Personnel* by Dave Worman, and *Motivating at Work: Empowering Employees to Give Their Best (A Fifty-Minute Series Book)* by Twyla Dell, Michael G. Crisp (Editor).

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OFA

Retail Marketing of Herbs for Today's Gardener

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With today's trends of gardening, maintaining healthy lifestyles, and home entertaining, fresh herbs are quickly becoming a staple in every garden and home.

English Gardens, a family-owned chain of five upscale nursery/garden center and floral stores in metro Detroit, has achieved success selling fresh herbs to local gardeners.

Herbs are an important part of English Gardens' live goods sales. They're the link between the annual, vegetable, and perennial departments throughout the busy spring- and summer-selling seasons. They are also a part of the year-round indoor plant department.

Despite a cool start to the Midwest spring season, herb sales have increased above many other categories of live goods. Current sales show a 22 percent increase over 2001, with English Gardens' newest store located in Royal Oak experiencing a 33 percent increase in herb sales.

An early spring coupon offering a free herb with any purchase helped get sales off to a great start. Multiple purchases are common at this time of year, and an emphasis on tie-in products, such as plant markers, terra cotta planters, and soil mixes, make this a successful promotion.

Each of English Gardens' five stores has different layout requirements for the bedding/perennial sales area. But in each location, the herbs are an important destination for shoppers.

One of the key aspects of making an attractive and attention-getting presentation was the addition of the "Herb Herbert" merchandising program. The program centers on the fictional character, Herb Herbert, a smiling, white-haired man with extensive herb knowledge (Figure 1). The program originated in the late 1990s from an Australian marketing company and quickly caught the eye of one of English Gardens' suppliers, Corso's Perennials of Sandusky, Ohio.

The Herb Herbert program is an excellent tool to present herbs to customers in an attractive, informative, and fun way. Colorful tags and header cards, complete with the smiling Herb Herbert stand-up cut-out attracts customers to his friendly smile (Figure 2).

The entire package identifies and presents five categories of uses for herbs – kitchen, fragrance, culinary, medicinal, and repellent (Figure 3). The color-coded label identifies the herb category and describes the plant's characteristics and uses. The Herb Herbert display has a plastic weather-proof box to hold color-coded brochures for each herb category.

Plants are sold in 4-inch terra cotta-colored pots, as well as some 5-inch pots and 8-inch combination planters, which contain three plants from the special use category. Sizes retail from \$2.99 to \$12.99. A quantity discount is offered.

English Gardens carries more than 75 varieties of



Figure 1. Herb Herbert is a fictional character, but appeals to customers as a friendly guide to helping them grow herbs on their own.



Figure 2. The Herb Herbert tags and header cards draw attention to herbs in the garden center.



Figure 3. The Herb Herbert merchandising program features five categories of herb uses.

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RETAIL MARKETING OF HERBS FOR TODAY'S GARDENER

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herbs during the spring. Weekly deliveries to our stores are critical to maintaining fresh product and fast turns.

In addition to the Herb Herbert program, English Gardens also finds success in larger sized rosemary, trained as conical or topiary forms, in 1-, 2-, or 5-gallon containers.

ENGLISH GARDENS' TOP SELLING HERBS:

Basil Tarragon

Rosemary Sage
Thyme Dill
Parsley Chives
Oregano Mint

KEYS TO SUCCESS:

1. Keep top-selling herbs in stock.
2. Fresh, frequent shipments of product.
3. Make displays easily accessible off the ground on layered benches and protected from windy areas.



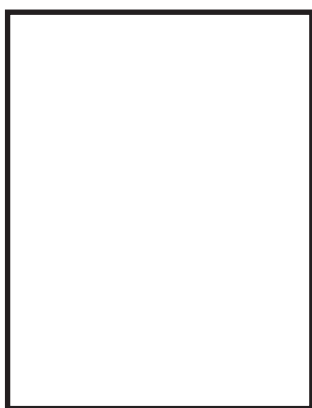
4. Thorough morning watering, with selective touch-up watering as necessary on hot or windy days.

5. Clean, well-maintained display areas free of debris or empty trays.

English Gardens operates five metro Detroit retail stores in the cities of: Clinton Township, Dearborn Heights, Eastpointe, Royal Oak, and West Bloomfield. Founded in 1954, English Gardens is

southeastern Michigan's largest independent garden center, and ranks among the top nursery and garden centers in the United States. The family-owned business offers top quality garden products, flowering and tropical plants, fresh-cut and silk flowers, landscape design and installation, as well as the area's largest selection of Christmas trees and decorations. **OFA**

Living Life With Conviction



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Editor's note: Rosemarie Rossetti was a speaker at the 2002 OFA Short Course.

Life is like a roller coaster. There are hills to climb and hills to coast. Your image of your life is critically important to your success. We are in control of many of the circumstances around us,

but there are other circumstances beyond our control.

We all go through setbacks, changes, disappointments, crises, and tragedies. We need to be able to triumph over tragedy. As I have struggled after a major life-changing injury, I have learned that if I want things to change, I have to make the changes.

Adjusting to life after a crisis seems insurmountable. To meet with success, there is no substitute for hard work, dedication, commitment, a determined spirit, and a firm belief that you can accomplish your goals. There are no shortcuts to meaningful accomplishments.

You can transform your life from a state of total frustration and hopelessness to an impassioned state of determination. Realize that tough times never last, tough people do.

Often, we disable ourselves with self-limiting

beliefs. We don't realize our true potential.

We have within us an inexhaustible reserve of potential that we have never even come close to realizing. Within us is a reserve of energy, courage, intelligence, ability, and creativity that we have barely explored.

Living with conviction involves a vision of your future; seeing hope rather than hopelessness. It is important that we not focus on self pity. Self pity leads to self neglect.

When you find yourself thinking negative, self-defeating thoughts, change the thoughts. Like changing a radio station, turn the dial from thoughts of depression to those of hope and success.

Examine the meaning for your life and focus on your main goal. For me, my main goal is getting my life back. I want to regain function and resume my career

and all the activities that I so much enjoyed before I was injured. I need to remind myself each day to work at my goals. Forward progress moves me closer to my goals each day.

As I monitor my goals and accomplishments, I keep track of my progress. I set new personal best records. As I repeat the activity, I try to smash my previous record, overcome limitations, and break through my own barriers.

Often we get caught in the everyday patterns of our lives. We sometimes take the easy route and then realize we are not making progress. Our goals are temporarily forgotten or ignored.

Living with conviction means living with passion – knowing that every day is precious. We need to productively utilize the hours and moments that can otherwise tick away. **OFA**

STRUCTURAL CHECKLIST FOR BUILDING A GREENHOUSE

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Greenhouse structures continue to evolve, sometimes with minor changes and other times with major changes, such as the open-roof system. Making a good investment decision on a new greenhouse structure requires sorting out the many options and deciding what is best for your operation. Decisions include type of ventilation system, material for main and secondary structural frames, type of glazing, and associated equipment. After making the decision on the type of greenhouse, make sure you receive a greenhouse that will stand up under the design loads for your location and use.

VENTILATION

Greenhouses are either mechanically or naturally ventilated. Mechanically ventilated houses require openings for fans, inlets, and optional evaporative pads. Most greenhouses will accept mechanical ventilation. Naturally ventilated greenhouses have options for wind and buoyancy to create the air exchange and movement through the greenhouse. The locations of the openings play a critical role in the air movement. Consider the local climate in selecting a ventilation approach. Summer production in areas of high temperatures and sunlight may require evaporative pad cooling in a mechanically ventilated greenhouse. While a greenhouse with limited natural ventilation openings will work well in a cool, cloudy environment, it will be too hot in a warm, sunny climate.

When looking at natural ventilation systems, consider how the opening design and location affects the ventilation and the light distribution at the plant level. The wind and buoyancy cause the air exchange and air movement through the plant canopy. The amount of air exchange and air movement through the plant canopy is improved with inlets that open into the prevailing wind direction and outlets that open in the opposite direction. Sidewall openings will increase the air movement through and above the plant canopy. Open-roof systems increase the variability of light energy across the growing area. Some areas will have direct sunlight, and others will be in the shade of the structure. Evaluate the effect the variability will have on plant growth and quality for your operation.

With a mechanically ventilated greenhouse, the fans, air inlets, internal air circulation, and controls are very important. The system must be designed for the local conditions. Design information is available in the Engineering Practice "ASAE

EP406.3 Heating, Ventilating, and Cooling Greenhouses." Information on obtaining the Engineering Practice is available on the Internet at www.ASAE.org.

STRUCTURE & GLAZING

The greenhouse structure and glazing have major effects on light energy to the plants, heat loss, and ventilation and heating costs. Single-layer glazing systems allow more light energy into the plant area with a higher energy loss than double-layer glass. Many wide-panel systems have less supporting roof structure that reduces the shading of the plant growing area. If light energy is critical, high light transmission materials are very important. When light is not as critical, the energy savings from the double-layer glazing can be the most economical. Materials that diffuse the light will increase the uniformity of light on the plant growing area. Materials that reduce the infrared light transmission also reduce the heating costs.

The material used in the supporting structure of main frames and sub-frames is the next decision. Galvanized steel and aluminum are the most common materials. These have lower maintenance than other materials such as painted steel or wood.

LOADS

The greenhouse structure must transfer the loads from the points of loading to the earth. The loads are transferred through the glazing materials through the sub-frames and main frames to the footers. The footers transfer the loads to the earth. Design the structure and footer for the loads and soil condition at the specific sites. Proper specification of the design loads will ensure that the greenhouse will stand up without excessive costs for over design. The loads are categorized by the source of the load and the length of time the load will be acting on the structure. The common loads are:

Dead Load – The weight of the structure, permanent equipment, and plants that will be there for more than 30 days.

Live Load – The loads from working on the structure or plant loads shorter than 30 days. An example is working on the roof.

Snow Load – The load from snow accumulation on the roof.

Wind Load – The load from wind blowing against the structure.

Hurricane Load – Special design requirements for buildings in hurricane areas. This should be considered in all greenhouses and is required whenever a greenhouse requires a building permit.

Seismic or Earthquake Load – Loads created during an earthquake. This should be considered in all greenhouses and is required whenever a greenhouse requires a permit.

Specific values for the design load vary with location. Detailed design loads are available in the Engineering Practice "ASAE EP460 Commercial Greenhouse Design and Layout" which is available on the Internet at www.ASAE.org. The National Greenhouse Manufacturers Association also has design standards. Information is available on the Internet at www.ngma.com. For greenhouses that are exempt from local building codes, these design loads provide a good guide. When a building permit is required, the design loads identified

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STRUCTURAL CHECKLIST FOR BUILDING A GREENHOUSE

Continued from page 13

in the local building code must be met. The local code authority normally requires detailed structural plans stamped by a licensed engineer as part of the plan submittal package. The manufacturer should be able to provide the design loads for each specific greenhouse.

The size of structural members to carry a load varies with the material type and the strength. For example, steel is available in different strengths. A smaller, higher strength steel member can be designed to carry the same load as a larger, lower strength member. Some manufacturers are using the same structural members for multiple purposes. An example is using a support for a traveling boom as a hot water heating pipe. The multiple-use approach reduces the number of overhead structural members that shade the crop. These multiple-use members must be designed for all the loads they carry.

Whenever a change is made in the growing practices, evaluate the effect of the design load on the structure. Adding a hanging basket conveyor system and hanging baskets from the roof framing structure increases the design dead load. This load is considered dead load because it will be there for more than 30 days. Adding a spray boom from the structure also increases the load.

The size of the main supporting structure is directly related to the spacing of support columns and sidewalls. Select a spacing that will allow for maximum growing area and ease of working with the plants based on your production system. The extra cost from a larger column spacing may be justified by increased efficiency of space use.



THE FOUNDATION

A properly designed greenhouse must be placed on a properly designed foundation and footer system. The footer needs to be large enough to keep the greenhouse from settling and should keep the greenhouse anchored against reasonable winds. Design the footer size based on the pressure that the soil can support. These pressures range from less than 1,000 pounds per square foot (psf) to 10,000 psf. In general, a design based on a 2,000 psf soil pressure can be used without soil tests. When a higher soil design pressure is used, a site soil test and analysis by a soils engineer is desirable. The weight of the footer, foundation, and weight of soil on the footer need to be high enough to resist the wind uplift. Since the greenhouse structure is very light, the design of the footer and foundation to resist wind loads is very critical.

SUMMARY

Make your investment in a new greenhouse a wise investment. Select the ventilation system to meet the needs for the types of plants and location. Select the glazing system considering the light needs of the plants compared to the energy savings. Consider the tradeoff of initial costs and maintenance costs when selecting the structural materials. Make sure the support columns and mainframe spacing will allow for efficient space use. Purchase a structure that will carry the appropriate loads for your location and then provide a solid foundation and footing under the structure. **OFA**

HOW TO MAXIMIZE YOUR HOLIDAY PROMOTION

Continued from page 5

identifiable by your customers, perhaps with a sash over their shoulder.

Cater to the elderly:

- Provide chairs at strategic places for your elderly customers.
- Provide cold drinking water and other refreshments.

Assist male shoppers:

Male customers are less comfortable and confident about trends, sizes, colors, and fragrances. Think about how you can assist them to feel more assured.

Take Photos:

Hire a photographer to photograph families and friends in front of a festive backdrop.

Provide gift-wrapping:

- Provide gift-wrapping

as an inclusive service. You can pre-wrap gifts for customers who want to buy in a hurry, or you could do on-the-spot wrapping where the customers can choose their own paper and ribbon and then enjoy seeing it wrapped professionally.

- Make sure you have trained wrappers.
- The service cheers up customers, and it's great for males since it provides a complete package.
- Train your wrappers to smile and talk as they wrap.
- Select volume merchandise and pre-wrap 30 to 40 percent. This can be as simple as a ribbon around the goods.
- Take steps to ensure long wrapping lines are avoided at the busy times.

Make it easy:

- Do not have customers waiting to be served.
- Provide different service options – gift vouchers, phone orders. Many professional people often do not have time to shop, so provide a service where they can phone back and place an order which can be delivered to their home or office.

• Have an area dedicated just for children (no adults allowed) with someone to help them select gifts for brother, sister, parents, and grandparents.

• Have a holiday catalogue from which children can buy presents for their family. There could be a \$2 page, \$5 page, \$10 page, and a \$20 page.

Keep people informed:

- Today's customers are hungry for information. Provide holiday oriented "tip sheets" for customers.

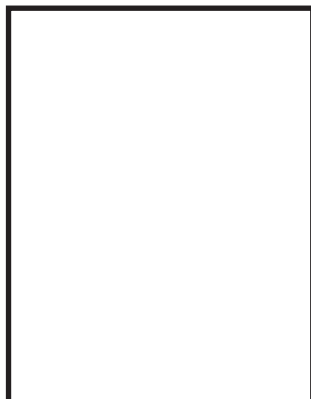
MANAGEMENT MEMO

The first step to a profitable holiday is to determine what attracts customers to your business and to promote that aspect heavily. Your promotion should center on different or unusual products, perhaps free gift-wrapping.

The second step is to determine what promotional strategy will attract people to your shop. Some retailers base their promotion strategy around the image of Christmas. A common example is the 'Christmas Ham,' which is no different than the ham offered throughout the rest of the year – but the word Christmas attracts customers.

The way you promote your message will also influence the number of customers you attract. Perhaps you can advertise in the media, decorate your store, have a point-of-sale display, or use face-to-face selling. **OFA**

Postproduction Care & Handling



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INTRODUCTION

Postharvest care and handling is most often associated with extending the vase life of cut flowers, but the shelf life of flowering potted plants and bedding plants is often influenced by the same factors. Since these plants are not harvested from the mother plant, but shipped in soil, this phase of the distribution chain is often referred to as the postproduction phase rather than postharvest. The factors influencing the shelf life of a crop begin during production. Plants are at their highest quality just before shipping and must be handled properly by shippers, retailers, and consumers to maintain this quality and maximize shelf life.

The easiest way to ensure that a high quality crop reaches your customer is to grow varieties that are more resistant to the adverse effects of shipping or retail displays, including darkness, high temperatures, and ethy-

lene damage. Unfortunately, detailed postproduction information is not available for all species, and there is considerable variability between species and cultivars. If the postproduction shelf life of your crops is not known, in-house evaluations can be conducted to determine the best varieties for long distance shipping or more adverse retail environments. Communicating with your customers about which varieties arrive in the best condition and hold up best in gardens or low-light interior environments will help you select the best varieties for different markets.

Losses can be as great as 30 percent due to improper postproduction care and handling of floriculture crops. It is in everyone's best interest to be aware of how to improve shelf life and decrease postproduction losses.

HOW CAN GROWERS INCORPORATE POST-PRODUCTION LONGEVITY INTO PRODUCTION CYCLES?

Postproduction quality starts with the grower. While the quality of a plant can rapidly deteriorate in postproduction environments, a poor quality plant will never improve. Disease- and pest-free plants that have been properly irrigated and fertilized will be most likely to retain blooms and have a longer shelf life.

Hardening off or toning a crop during the final phase of the production cycle is a practice that prepares the plant for a different environment and will result in increased shelf life during shipping and in retail or consumer environments that may not be ideal. During most of the production cycle growing conditions are opti-

mized to produce a crop that matures and flowers rapidly. High fertility, high light intensity, warm temperatures, and consistent moisture optimize photosynthesis and allow the plant to produce carbohydrates, which it uses as food or energy. The higher the carbohydrate reserves in a plant when it leaves the greenhouse, the better its chance of survival under less-than-ideal postproduction environments. Toning your crops requires little time. It also results in money savings by reducing input of heating, water, and fertilizer, and it results in increased repeat sales due to the enhanced shelf or display life of the product.

TEMPERATURE

Temperature may be the most important environmental factor influencing postproduction longevity. During most of the production cycle, temperatures for potted and bedding plant production are warm. This results in earlier flowering and less time on the bench. Reducing the temperature during the final two to three weeks of production is part of the toning process and results in increased shelf life. This temperature reduction enhances flower color and decreases respiration, a process that uses up the plant's energy reserves. The result is a better-looking product with enhanced ability to withstand stress. While reducing temperatures during the day is effective, decreases in night temperature have more influence on shelf life. Reducing temperatures at night decreases respiration and carbohydrate use without affecting photosynthesis, the process that produces carbohydrates. Most bedding plants tend to be toned at 50 to 55°F night

temperatures, with the more tender plants toned at 58 to 62°F. Some heat-loving plants like impatiens do not respond to temperature decreases with increased shelf life.

FERTILIZATION

High levels of fertilization encourage lush, soft growth that is more susceptible to mechanical damage and water and temperature stress during shipping and handling. The toning process reduces fertilization by about 50 percent at the visible bud stage to encourage harder growth. During this fertilization, not more than 40 percent of the total nitrogen should be from ammonium, while some plants respond best to 100 percent nitrate. The display life of some potted plants (i.e. mums and azaleas) is increased by terminating fertilization during the last three weeks of production. Terminating fertilization is not recommended for bedding plants because they have such small soil volumes and little nutrient reserves.

It is not recommended under any circumstances to increase fertilization before shipping. This encourages soft growth and can result in increased damage from salt buildup if the plants dry out during shipping or in the retail environment. While some plants will not respond to fertility toning with increased shelf life and resistance to stress, none to date have been reported to have a decrease in shelf life as a result of this practice.

IRRIGATION

Reducing the frequency of irrigation near the end of production also results in an increase in shelf life. While plants are maintained

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POSTPRODUCTION CARE AND HANDLING

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uniformly wet during most of the production cycle, these plants are less able to recover from postproduction water stress. Allowing them to dry down, but not experience prolonged wilting prior to shipping, creates a harder plant more resistant to stress. Using larger pot sizes and different media choices are other ways growers can influence how plants will survive postproduction water stress.

LIGHT

Plants destined for low-light interior environments may benefit from reducing the light intensity by shading during the last phase of production. While this is a valuable practice for acclimating foliage plants, it can reduce the quality of flowering potted plants. Poor flower color development results when flowers open under sub-optimal light. Lower light levels also result in decreased photosynthesis and reduced carbohydrate reserves.

With flowering plants, it is more important to continue the higher light intensities during production to build up carbohydrates so these plants can survive better in postproduction environments with low-light conditions. Bedding plants that are destined for sunny garden locations also exhibit decreased shelf life when light intensity is reduced during production.

OTHER PRACTICES THAT AFFECT POSTPRODUCTION SHELF LIFE

Many producers use growth regulators to create a

more uniform and compact plant with enhanced visual quality and simplified shipping requirements. The use of growth regulators during production also has a positive impact on postproduction shelf life. Plant growth regulators like Cycocel and Bonzi increase chlorophyll content, which increases photosynthesis and results in a plant with higher carbohydrate levels. This plant is less susceptible to postproduction stresses. The compact stature of the plant also makes it less susceptible to mechanical damage during shipping and handling and reduces water loss from the plant.

HOW CAN SHIPPERS MINIMIZE POST-PRODUCTION LOSSES?

The keys to minimizing postproduction losses during shipping are to optimize the temperature and minimize the duration. Shipping represents a less-than-ideal growing environment; plants are subjected to increased stress from high temperature, low light, and increased exposure to ethylene gas. Toning during the last stages of production helps plants survive these stresses with minimal damage.

In a warm, dark environment, no photosynthesis is occurring, but respiration rates are high. During long periods of shipping, plants can use up all the carbohydrate reserves they built up during production and will be very short-lived on the retail shelf. Lower shipping temperatures of 40 to 60°F (depending on the

plant species) reduce growth and respiration. If the shipment includes chilling sensitive species like African violets, they must be maintained warmer than 50°F. Extended periods in the dark also cause plants to stretch, leaves to yellow, and buds and flowers to abscise (shatter).

In confined spaces with little ventilation, ethylene gas can also accumulate. Ethylene is produced by all plants, but higher levels are produced by senescing (dying) leaves and flowers. At higher temperatures, the effects of ethylene are more severe. Symptoms of ethylene damage include wilting of flowers, yellowing of leaves, abscission of flowers, buds, or leaves, flower abortion, and epinasty (curving of petioles or bracts). The detrimental effects of ethylene during shipping can be reduced by ventilating trucks, decreasing shipping temperatures, and removing sources of ethylene (i.e. dying, diseased or insect-infested plant material). If flowering plants must be shipped for long distances, plants should be selected that are less mature, because fully open flowers are much more sensitive to ethylene than buds.

HOW CAN RETAILERS MINIMIZE POST-PRODUCTION LOSSES?

Retail displays vary greatly from benches in a climate-controlled greenhouse to tiered racks in a parking lot. Regardless of the environment, it is the retail manager's responsibility to optimize the environment to maintain the quality of the plants arriving in their establishment. One of the most

important issues again is temperature. High temperatures will increase respiration, increase sensitivity to ethylene, and decrease shelf life. Temperatures can be hard to control in many display areas during the summer months, but adequate shade and ventilation help reduce temperatures. In retail displays, it is recommended that plants be provided with 50 percent to 60 percent shade. Tiered displays should be avoided because those plants on the bottom shelves may receive 80 percent to 90 percent shade and will have significantly reduced shelf lives. Plants also must receive adequate but gentle watering, using an application method which does not damage the plants. Proper ventilation helps reduce temperatures and also decreases the accumulation of ethylene that may result from dying plant materials and car exhaust.

CONCLUSION

To maintain the best quality plants and ensure customer satisfaction, postproduction issues must be addressed at all stages of the distribution chain. Toning plants during production by reducing temperature, fertilizer, and irrigation can have a significant impact on improving shelf life and requires little additional effort. During distribution and handling, maintaining low temperatures, and reducing ethylene exposure have the greatest impact on postproduction quality. If everyone follows these practices, we can significantly reduce the industry's current postproduction losses.

OFA

Tips on Designing, Growing, and Marketing Mixed Baskets and Containers



OFA Services Inc. has just released *Tips on Designing, Growing, and Marketing Mixed Baskets and Containers*. This book is an excellent "how to" publication intended to serve as a practical working guide for growers as they refine their mixed container programs. The book is priced at \$32 or an OFA member-discounted price of \$22. Shipping and handling is \$5. Ohio residents must include 5.75% sales tax.

Terri Starman of Texas A & M University and Kathy Pufahl of Beds and Borders on Long Island, New York teamed up to write the sections on the principles of color and basic container design concepts. Plenty of full-color pictures of mixed containers are included to illustrate the principles they describe. Peter Konjoian of Konjoian's Floriculture Education Services in Andover, Massachusetts wrote sections on production, scheduling, and marketing.

The popularity of this topic is closely tied to the explosion of new crop species and cultivars being introduced by breeding companies worldwide. Growers are continually searching for and experimenting with new combinations of plants to use in mixed container programs. The crop category has grown to become a complicated program in any size greenhouse operation, one that growers find overwhelming if not planned and organized well. The book was written to provide tips on how to manage the crop effectively and profitably.

Tips on Designing, Growing, and Marketing Mixed Baskets and Containers

Please complete the form below and pay by check or money order (U.S. funds only), VISA, or MasterCard. Make checks payable to O.F.A. Services Inc. **U.S. residents, please include a delivery address for U.P.S. shipments.**

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2002 OFA Short Course Trade Show – The 2002 Trade Show was sold out several weeks before the Short Course. A total of 571 companies exhibited from around the globe and all segments of the industry, including 90 companies from 12 countries outside the United States.

PRODUCT DONATIONS FOR DECORATIONS AND RETAIL PROGRAM (CONTINUED)

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OFA News



2002 OFA Short Course – Jim Wilson, one of the best-known faces and voices among TV gardeners, gave the keynote address and entertained the audience with stories and highlights of his career as a garden writer.

WINNER NAMED IN OFA SHORT COURSE JOHN DEERE GATOR™ GIVEAWAY

Carl Brehob of Carl Brehob & Son, Indianapolis, Indiana, was the 2002 John Deere Gator™ winner at the OFA Short Course.

Sponsored this year by *Greenhouse Grower*® magazine; Medallion® Fungicide; Proven Selections™; Rough Brothers, Inc.; and S&G Flowers, the John Deere Gator Giveaway is a chance for growers and distributors in the greenhouse industry to update their equipment and, at the same time, raise money for the Floriculture Industry Research and Scholarship Trust (FIRST). This year, the Gator Giveaway raised nearly \$3,500 for FIRST, money that will be used to fund floriculture research, as well as provide scholarships for floriculture students.

For more information on other activities at Short Course that raised money for FIRST, visit the FIRST web site at: www.firstinloriculture.org.

OFA

DESIGN CONTEST WINNERS ANNOUNCED

The America the Beautiful Design Contest, sponsored by Teleflora®, was held in conjunction with the retail design program during the Short Course.

The Designer of the Year was Corey Lonsert, of Arleen's Flowers, Bellefontaine, Ohio. Lonsert obtained the most cumulative points from all three design categories and won the design-off, held in front of an audience of more than 200.

The three design categories were: Amber Waves of Grain, Purple Mountain Majesties, and Fruited Plain.

The People's Choice Award was presented to Matt Garrett, of Lagniappe Inc., Columbus, Ohio.

OFA

*OFA Mission Statement
To support and promote floriculture
professionals through lifelong learning,
career enhancement, and public awareness.*



OFA GROWER OUTREACH SEMINARS PARTNERING FOR PROFITABILITY

October 23, 2002 – Worcester, Massachusetts
*Offered in conjunction with the New England
Greenhouse Conference*

November 6, 2002 – Lansing, Michigan
Offered in conjunction with the Michigan Greenhouse Expo

November 15, 2002 – Richmond, Virginia
At Griffin Greenhouse and Nursery Supplies

OFA's fourth annual regional seminar tour will tackle the topic of profitability in the greenhouse. These all-day seminars will cover in detail three important areas: cost accounting, revenue calculation, and profit determination.

Growers will learn how to use these numbers to determine how to maximize profits in their production facilities. The central question for the day will be "How to determine what crops, sizes, and quality to produce in order to maximize the bottomline."

The speakers will be Jim Faust, Clemson University, and Peter Konjoian, The Ohio State University. Bridget Behe, Michigan State University will assist with the seminar at the Michigan Greenhouse Expo.

Complete details will be available to OFA members soon and will be posted on the OFA web site at: www.ofa.org.

OFA

OFA TO PURSUE NEW IMAGE IN NEAR FUTURE

During the 2002 Short Course, the OFA Board voted to "re-package" OFA's external image to "OFA – an Association of Floriculture Professionals." According to executive director, John R. Holmes, CAE, "This re-packaging is a direct result of OFA President Joe Boarini's committee challenge to consider what OFA is about and whether the name reflects it. The resounding response was that the name was not reflective of the national nature of our professional floriculture membership."

Currently, OFA's membership encompasses a full spectrum of professionals working in some aspect of the floriculture industry. "With 77 percent of OFA's membership from outside of the state Ohio, it seemed the name was not truly representative of our national scope," added Holmes.

"By adopting this new image, or packaging," said Boarini, "OFA can maintain its core branding yet create new marketing opportunities." The corporate name will legally remain the Ohio Florists' Association, Inc., but the new brand and tag line will be used for external and marketing purposes. Boarini added, "This seems an appropriate way to stay tied to OFA's heritage, yet create a bridge to the future."

"OFA – an Association of Floriculture Professionals" will debut January 1, 2003.

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