

# BULLETIN

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## The Zero-Energy Greenhouse: From Research Objective to Reality

by Joep van den Bosch

Since the beginning of horticulture, growers have desired to create a subtropical microclimate where plants would grow no matter what the outside conditions happened to be. Today's greenhouses in all forms and shapes provide these basic requirements for growing plants. Every type of greenhouse, whether single- or double-layered polycarbonate, glass covered, quonset-styled, multi-tunnel, open roof, natural or forced ventilated, has its advantages and disadvantages. However, the current energy prices and the negative effect on the bottom line of most greenhouse operations are forcing us to rethink the greenhouse concept and operation.

To maintain the North American greenhouse sector in the future, it is evident to all that we need to become less energy-dependent or even better, reach the net zero consumption level in energy for heating and electricity. A lot of energy-efficient technologies have already been developed. Many years of horticultural research have been done to develop growing strategies that utilize less energy. In general, however, today's greenhouse operations are not utilizing the available technology and knowledge to their full potential.

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## Programming for Profitability: The Physiology of Flowering Perennials

by Paul Pilon

Perennial growers are well aware of the importance of providing plants in bloom to the marketplace. "They must be in bloom" or "green is not a color" are two things those supplying mass merchandisers hear all the time. Whether you are producing perennials for mass merchandisers or you own or supply independent garden centers or retail sites, it is impossible to deny that color sells! With the majority of plant purchases being made on impulse, color, i.e. selling plants in flower, is quite often the difference between plants selling and not selling.

*Forcing* is the term commonly used by greenhouse growers to describe the process of inducing flowering. Perennials, like annuals and potted plants, can be forced to bloom any time of the year, whether it is their natural blooming season or not, provided the requirements for flowering have been properly delivered. Growers manipulate flowering to satisfy commercial expectations and to take advantage of impulse purchasing by delivering more "flower power" at the retail site (Figure 1, page 10).

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## OFA Mission Statement

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

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## OFA Bulletin

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# ofa Forum

## Why 90 Percent of Small Businesses Fail

by Bob & Susan Negen



Here's a statistic that should make everyone sit up and take notice. Dunn and Bradstreet recently did a study and determined that "90 percent of small businesses that fail do so because of a lack of skills and knowledge on the part of the owner." They didn't go belly up because of the competitors' lower prices, a poor location, or a bad national economy – they failed because the owners didn't have the knowledge and skills to properly run their businesses!

Most people are naturally good at one or two parts of their business. And naturally, that's where they focus most of their time and attention. It's easier and more fun to do the things you're good at. In my early years as founder of the Mackinaw Kite Company, a small chain of kite and toy stores, I fell into the same trap. My brother and I were masters at selling and promoting our business. Each year sales grew, but profits were, well ... disappointing.

We wondered how we could be working so hard, selling so much, and still not managing to get ahead. Quite simply, we

didn't take the time or effort to learn the set of skills we lacked. Our expense planning was sloppy, our operational standards were low, and our inventory management non-existent. Pretty soon I decided I'd better acquire those skills or suffer the unhappy consequences.

As a consultant, I'm always amazed, but never surprised, to hear business owners saying things like, "I don't get marketing," or "I'm just not a computer person," or "Inventory management is too tedious for me." Hey, I've been there myself! What they're really saying, however, is that they're too lazy or not interested enough to learn the essential skills of being a successful businessperson. These business owners are plenty smart, they just choose not to learn.

### You're the Boss Now...

People in some occupations are forced to learn a complete set of skills before they hang out a shingle - CPAs, teachers, doctors, and realtors to name just a few. And in many businesses, continuous professional education is required. Not true for store owners. Open your doors and away you go! You're the boss now, and there's no one forcing you to learn, so frequently you don't.

I've identified 10 basic building blocks for long-term retail success:

- excellent customer service
- intelligent buying and inventory management
- customer-focused marketing
- systematic employee management
- efficient store operations
- managing with financial information
- effective staff training
- strategic merchandising and visual display
- long-range planning
- disciplined, professional leadership

To be successful, you have to learn to do all of these things – even the things you





don't like to do, find it difficult to do, or don't know how to do now.

### Are You a Natural?

Harvard University did a study and found that only 10 percent of us are what they called "natural learners." Naturally curious individuals constantly seek out new information. So, that means that 90 percent of us aren't natural learners. I can humbly put myself in that category. Take a close, objective look at yourself. Which category do you fall? How many workshops have you attended this year? How many business books and magazines are on your bedside table? Have you taken a class to learn that new computer program?

Now, if you put the two statistics I've mentioned together – 90 percent of businesses that fail do so because of a lack of skills and knowledge on the part of the owner, and 90 percent of us are not natural learners – there's only one conclusion to draw. Those of us in the 90 percent category had better become learners, whether it's natural or not! If learning isn't a natural trait, it must become a conscious choice. Your business clearly depends on it.

I challenge you all to become learners. Be a learner and be successful on purpose. Forget the "hope method" of business management. Being good at one or two parts of your business and ignoring the rest, hoping it won't really matter, won't bring you the rewarding, profitable, successful business you envisioned the first day you opened your doors.

### Take It One Step at a Time

Lifelong learning is an evolutionary, not a revolutionary, process. You don't need to learn everything at once, but you do need to constantly and consistently add to your knowledge base and skill set. Take some time and think about the skills you need to acquire to become a better businessperson. Go ahead and scribble them here in the margins if you want to. Pick the one that you think will have the biggest impact on your business. For me at the Mackinaw Kite Company, it was inventory management. I knew we'd never be more profitable until we had a better handle on our inventory.

Now think about one small thing you can do today to get the learning process going. Do some research on the web, read an article on the subject, sign up for a class, or call a colleague that has the skill you lack. Make a conscious choice and be a learner!

If you know there are some critical retail skills you need, check the great business building resources on our web site at [www.whizbangtraining.com](http://www.whizbangtraining.com). You'll find nuts and bolts strategies that mean the difference between big-time retail success and barely squeaking by.

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

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## Irrigation Automation: Current Technology

by Stephanie Burnett & Marc van Iersel

**Editor's Note:** This is the first of two articles by Stephanie Burnett and Marc van Iersel about irrigation automation.

Many growers are interested in expanding automation in their greenhouses to reduce labor costs. One option for growers is to automate irrigation. If you are considering automating any portion of your greenhouse, automating irrigation is the place to begin since hand watering is incredibly labor intensive. Investments in irrigation automation generally pay for themselves faster than any other form of greenhouse automation. In addition to saving money on labor, irrigation automation may reduce water waste, leaching, and run-off. Since many growers are facing legislation regarding water use

and run-off, now may be a good time to consider saving time, money, and hassle by automating irrigation.

Over a series of two *OFA Bulletin* articles, we will discuss irrigation automation. This first article is geared toward newcomers. We will provide an overview of current irrigation technology, explain the pros and cons of several irrigation systems, and provide common sense tips to growers who may be considering stepping up to the next level in automated irrigation. In the next article, we will provide a view of exciting advances that you will see in automation irrigation in the future.

All irrigation systems are broadly classified as "open" or "closed." In open systems, excess water leaving the pot is not reused. Fertility recommendations for open systems are extensive and detailed for many crops. In closed



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## Irrigation Automation

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systems, leachate is recaptured and used to irrigate plants again. The benefit of closed systems is that all water, fertilizer, and substrate-applied pesticides won't leave your system. Unfortunately, that also means that all fertilizer, substrate-applied pesticides, and possibly disease organisms remain in your system to be reapplied to the plants. Much current research in closed systems is focusing on this potential dilemma. However, in practice, it seems that this has not been a problem for many commercial greenhouse growers thus far.

Most, but not all, closed irrigation systems apply water from the bottom up, not overhead, and there is no leaching of excess fertilizer. Applied fertilizer can build up in the substrate, so monitoring fertility is key in closed systems. Plants tend to require approximately half the typical recommended rates for open, overhead irrigation systems. Hence, it is easy to unintentionally over fertilize plants. There are precise fertilizer recommendations for sub-irrigating some major crops, recommendations are not available for many crops. If you cannot find fertilizer guidelines for the crops you grow, start with approximately half the fertilizer concentration that you would use in open irrigation systems.



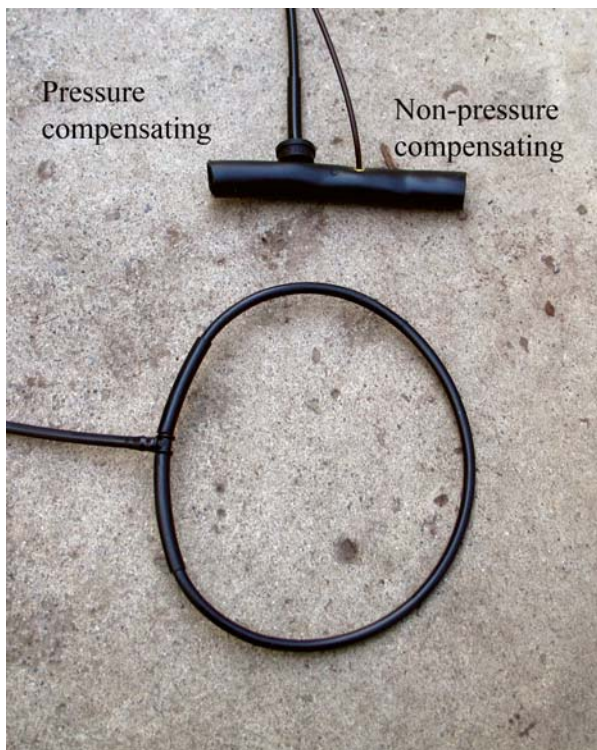
**Figure 1.** Drip irrigation systems.

## Open Systems

### Drip Irrigation (Micro Irrigation)

For any growers who are just beginning to consider automating irrigation, drip irrigation may be the place to start if growing pot crops. With drip irrigation (Figures 1 and 2), the growing media in each container receives small volumes of water via nozzles, drip rings, spray stakes, or emitters. The overall volume of irrigation applied is less compared to hand watering, and since water is applied directly to pots, less water and fertilizer are wasted. If the cost of irrigation automation seems prohibitive (25 cents to 50 cents per square foot), consider that drip irrigation pays for itself in 1.5 to 2 years when compared to hand watering. It may be automated using a single solenoid valve, or multiple valves for stations with differing irrigation needs. Solenoid valves may be switched on manually for relatively small operations. However, we suggest investing in a slightly more expensive (prices start at approximately \$200) sequential timer which can control multiple zones, especially if you have widely varying irrigation requirements for your greenhouse crops. This type of timer provides you with more scheduling flexibility; you may program up to 40 different stations.

The two main technical problems with drip systems are clogging of nozzles and water pressure. Drip irrigation systems, especially individual emitters, are easily clogged with salts or particulate matter. Common clogging



**Figure 2.** Drip rings with (top) and without (bottom) pressure compensating emitters.



materials or organisms include sand, silt, carbonates, heavy metals, bacteria, and algae (i.e., slimes). If your water is relatively pure and clean, you may only need to install a simple in-line filter to remove large particles. However, you should make sure that you test your irrigation water before switching to drip irrigation. If carbonates, slime molds, or heavy metals are present, you may need a more extensive filtration system.

Water pressure from the water main is the driving force for water delivery to each individual pot. You may consider installing a pressure reducer to prevent soil from being blasted out of pots with excessively high pressure water supplies. The pressure regulator should be in-line after the filter because the water pressure will drop slightly as irrigation water is filtered. As water travels farther from the source, pressure drops. Hence, pots farther from the main water line may receive less water. To avoid this problem, consider investing a little extra money for pressure-compensating emitters. These emitters will add approximately 10 cents to 40 cents per pot to the price of the drip system. They regulate the amount of water entering each pot or a small group of pots so that no matter where your pots are located in the greenhouse, they should receive the same quantity of water. And, even after you have taken these steps, periodically scout your greenhouse for dry pots to ensure that you don't have clogged, aging, or otherwise malfunctioning nozzles. Drip systems often are an excellent choice for potted plants, but are not practical for bedding plants, because of the large amount of drippers that would be needed to water plants in cell packs.

### Boom Irrigation

Boom irrigation systems are typically open but may be closed. Irrigation is overhead by a motor-powered boom that moves over a large section of a greenhouse. The speed at which the boom moves determines the quantity of irrigation. Growers may program booms so that they irrigate separate zones (and different crops) at different rates. However, this system is only efficient if plants are not spaced, such as when growing plugs or bedding plants in cell packs.

Many plug growers use booms to irrigate via "zero-leach" irrigation. Basically, they water plants with small irrigation volumes very frequently throughout the day and use much less water compared to hand watering. One advantage of boom irrigation is that growers may fertilize, apply growth regulators, or even spray pesticides all using the same boom system. The cost of boom irrigation systems varies from 35 cents to 40 cents per square foot depending on the size of a greenhouse.

Although many people associate irrigation booms with large greenhouses, they can be used successfully in small greenhouses as well.

### Capillary Mats

To irrigate using capillary mats, all you need is a commercially available absorbent (capillary) mat. Plants are placed on top of the mat and the mat is kept moist. Since the mat is wet, water moves into the substrate via capillary action as the substrate dries. The capillary mat can be kept wet with a drip line or by manually adding to the capillary mat as necessary. Capillary mat systems are cheap and easy to install. In most cases it is possible to retrofit existing benches.

Although this system sounds like an inexpensive alternative to growing plants on ebb and flow or flood floor tables, there are some drawbacks that should be mentioned. First, since the mat is always wet, roots tend to grow into the capillary mat. When you remove the plants for sale, you may end up removing some roots when you pull the plants away from the mat. Second, since capillary mats are continually wet, they may attract fungus gnats. Algae also can become a serious problem, since capillary mats provide ideal conditions for algal growth. Algae may be suppressed by placing a thin layer of perforated black plastic (frequently included with capillary mats) over the top of the mat. Covered mats would also not need to be re-moistened as frequently as bare mats, because there is less evaporation from the mats. Finally, capillary mats have a limited life span. Unlike the other technologies, you will perpetually be investing in your irrigation system or spending a great deal of time cleaning mats between crop cycles.

In most cases capillary mats are open systems; if excess water is applied to the mats, this water will run off. However, capillary mats can be easily converted to closed system. This can be done in different ways: you can collect the run off from the mats and reapply it, or you can place the mats in watertight trays. The trays don't last forever and will need to be replaced as holes and cracks form in the tray. Capillary mat systems are especially useful for crops whose foliage is susceptible to damage when wetted, like African violets. Since the plants are grown on top of a wet mat, the humidity in the crop will be higher than with other irrigation systems. Whether this is a pro or a con depends on your particular situation. In the Southeast, we generally don't need any more humidity, while this may not be an issue in the Western United States.

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# Irrigation Automation

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## Closed Systems

### Ebb and Flow

In an ebb and flow system (Figures 3 and 4), irrigation water containing approximately half the normal amount of fertilizer is pumped onto water tight trays that sit on greenhouse benches. The water is allowed to remain on the trays for approximately 15 minutes for each irrigation cycle. Irrigation water is absorbed by the substrate via capillary action. The bonus is the amount of water used in each irrigation cycle is reduced, because there is no leaching, and any excess water drains back into the holding tank. Foliar diseases may be reduced because the foliage remains dry, and fertility may be cut in half. Ebb and flow costs \$4.50 to \$9 per square foot (cost varies depending on the type of bench), so there is a higher initial investment than with drip irrigation. However, sub-irrigation normally results in more uniform plants and less disease. Plus, all closed systems are zero run-off, so you don't have to worry about what may be leaving your property in leachate.

If you are considering installing ebb and flow irrigation, here are some practical considerations. First, think about what type of benches you would like. It is often possible to retrofit existing benches to ebb and flow. If installing ebb and flow from scratch, you need to choose between stationary or rolling benches, like Dutch

trays. Either approach can work just fine, so the choice depends largely on personal preference and the desire to automate other production practices. For example, movable Dutch trays are preferred by many growers who have a high degree of automation throughout the greenhouse. Regardless of the bench type you choose, they must be level or plants won't be uniformly irrigated.

Second, you should carefully monitor fertility levels. EC often increases over time in ebb-flow systems, and excess fertilizer is not leached out. Instead, fertilizer salts often accumulate in the uppermost layer of growing media. This generally is not a problem, since there are few roots in the uppermost layer of soil. However, in some species, these soluble salts can damage the stem of the plant right at the surface of the growing media. We have seen ornamental peppers die from this, but the plants received excess fertilizer to begin with. In most cases the accumulation of salts in the top layer of the growing media doesn't cause serious problems.

Ebb and flow benches contain water tight trays, which sometimes are made of plastics that degrade in light. To increase the longevity of ebb and flow benches, you may consider lining trays with water permeable black materials such as ground cover fabric. This will also act as a filter and limit the amount of dirt that drains back to the holding tank.



Figure 3. Ebb and flow benches.



Figure 4. Ebb and flow benches.



## Flood Floor

Flood floor systems work on the same concept as ebb and flow benches. However, instead of having a tray that is flooded with fertilizer and water, an entire concrete slab is flooded. Flood floor systems are relatively uncommon because of the high initial cost (\$5.50 to \$7.50 per square foot) of installation. Also, it may be cumbersome to handle plants on the floor, so high maintenance plants may be difficult to manage on flood floors. However, unlike some of the systems discussed, flood floors last an incredibly long time and often with fairly little maintenance. Also, benches are not required in the greenhouse, and flood floors allow for very efficient space utilization. The choice between ebb and flow and flood floors depends largely on how these systems fit in with the rest of your production practices, such as getting plants ready for shipping.

There are many different irrigation systems available, and if you are interested in automating your irrigation system, you need to think carefully about which system will work best in your particular situation. There is not a single solution that works best for everyone. Even with automated irrigation systems, there is still the question of how often you should irrigate and how much water needs to be applied. In the next issue, we will discuss how irrigation control is likely to change in the future.

There are several new technologies available or under development that will change the way irrigation is controlled and that will make irrigation systems much more efficient.

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## The Zero-Energy Greenhouse: From Research Objective to Reality

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### Zero-Energy Greenhouse Concept

To communicate the potential of many “green” energy technologies, Priva has introduced the Zero-Energy Greenhouse concept. The Zero-Energy Greenhouse is defined as a greenhouse production facility that generates as much energy as it consumes. All necessary elements and ideas to improve the energy efficiency to the objective of zero net energy consumption can be bundled in this Zero-Energy Greenhouse concept.

The Zero-Energy Greenhouse contains many different elements that are working together to maximize the effectiveness of all of them. The elements can be bundled in the following three groups:

- Maximize the greenhouse as solar energy collector and minimize the greenhouse energy losses through the cover and ventilation.
- Optimize environmental control and improve the energy efficiency per unit production.
- Integrate alternative and renewable energy resources with existing sources in one energy management system.

### Greenhouse as a solar energy collector

Within the basic principle, every greenhouse construction functions as a collector of solar energy. Even in the Northern United States and Canada, the amount of solar energy collected annually by our greenhouses exceeds the energy demand for growing crops year-round. However, the timing is off. Most of the energy is collected during the day but is needed at night. Most of it is collected during the summer but is needed in the winter.

While the greenhouse collects solar energy, a lot of energy is lost through the greenhouse cover, through cooling and dehumidification, through evaporation by plants, and a smaller amount through the soil. Figure 1 (page 8) shows a calculated example of the annual energy flow in a typical greenhouse.

### Greenhouse Cover Material

The majority of today’s U.S. greenhouses are polyethylene houses. The principle advantage of the

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polyhouse is a lower investment cost compared to a glasshouse, and it is more energy efficient than a single layer glasshouse.

The disadvantages of a polyhouse are, however, significant. The lower light transmission of polyethylene and polycarbonate means less solar energy collected and less light for winter growing. The polyhouse has a high IR transmission, which means more energy loss through infrared radiation. Compared with the condensation ability of glass, polyhouses require significantly more energy for dehumidification as well.

The Zero-Energy Greenhouse has to combine the high light transmission, low IR transmission, and condensation ability of glasshouses with the energy efficiency of multi-layer polyhouses. Based on today's technology, the longevity of a modern glasshouse with high light transmission with double top curtains and side curtain systems comes closest to the energy efficiency objectives. Ongoing research and development will provide new cover material and greenhouse construction options to further enhance the energy efficiency. The new ETFE membrane and the Lexan ZigZag polycarbonate are promising new examples of innovative greenhouse covers.

## Advances in Environmental Control

Today's high cost of energy already justifies the investment in integrated environmental control systems. Compared to thermostat or step-controlled greenhouses, significant energy savings (up to 20 percent) are possible by active measurement and integrated control of heating, cooling, and ventilation. One central controller prevents the opening of vents when the heating is still on. It maximizes the use of solar energy and avoids using energy for dehumidification (Figure 2).

The Zero-Energy Greenhouse comes with an advanced environmental computer system. It will utilize multiple sensors for environmental control and has advanced plant sensors to monitor the plants' well being. Model-based control algorithms such as "temperature integration" will provide 24-hour average temperatures for plant growth, while utilizing collected solar energy during the day to lower the night temperature to save energy. The computer is connected to the Internet for up-to-date weather forecasting and off-site growing consultancy (Figure 3).

## Alternative Energy Resources

Traditional energy resources for the greenhouse industry such as natural gas and oil will continue to be used in the future. For the base load of the energy demand, growers will, however, utilize cheaper alternatives and renewable energy resources such as wood chips, saw dust, plant material (such as corn), and even municipality garbage. Based on long-term price-guaranteed contracts for the type of biomass that is readily available in a specific area, the large capital investment in biomass burners will be worthwhile.

The recent shortages in the power grid and high peak demand prices in electricity are also creating possibilities for the greenhouse industry. Tri-generation combustion engines can efficiently produce electricity for the HID lighting, and the by-products, heat and CO<sub>2</sub> can be utilized in the greenhouse.

Several states have recently introduced net metering electricity contracts for renewable energy resources. This means that electricity produced on-site by wind turbines or tri-generation units can be supplied back to the grid. The electricity meter will actually turn backwards, and the operator will only have to pay for the annual or

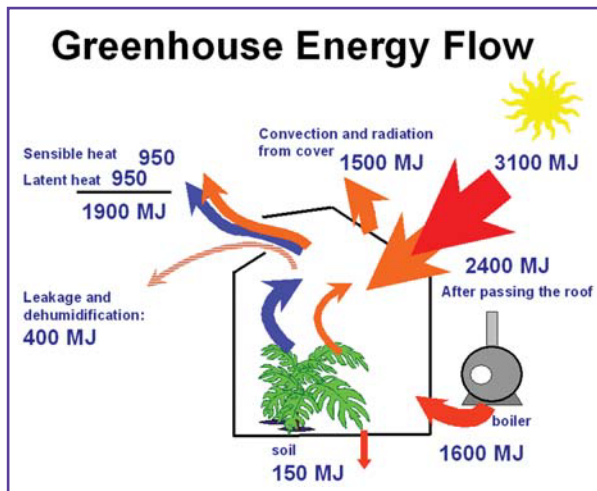


Figure 1. Example of the annual energy flow in a typical greenhouse.

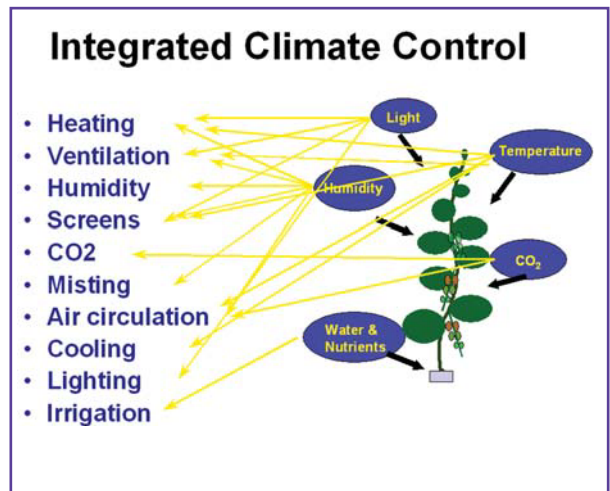


Figure 2. Integrated Climate Control.



# ofa Grower

monthly net-metered amount. The seasonal aspect of the greenhouse business and the wind season will be partly offset with this arrangement.

## Heat and Cold Storage

As discussed earlier, every greenhouse collects far more solar energy than needed for growing crops year-round. The timing, however, is off. For many years, several media have been researched to provide heat and cold storage to balance day and night and even summer and winter.

The most recent development on heat and cold storage has been a commercial Dutch tomato greenhouse project of 5 acres. Priva has been involved in this project as consultant and developer of the environmental control system. Within their "Closed Greenhouse" project, hot and cold water is stored in aquifers (water-bearing sand layers underground).

In the summer, heat exchangers cool the greenhouse air with cold ground water and store the excess heat underground. The top and side vents can remain closed during the complete summer. Within this closed greenhouse, the grower gains complete control of the internal environment. The equipment can provide the exact temperature, humidity, and CO<sub>2</sub> levels needed to maximize production in the greenhouse.

In the winter, the heat pump extracts the low-grade heat and turns it into high-grade heat for the greenhouse heating. The cold water is pumped back into the cold storage aquifer for use in the summer again (Figure 4).

Based on the same principle, heat and cold can be stored in rock layers underground or in the concrete flood floors. More common is the heat storage of hot water above ground. Surplus heat from biomass boilers, tri-generation units, or CO<sub>2</sub> generation can be stored during the day and used at night.

The same hot water heat storage can also be used to maximize the heating capacity of existing boiler rooms. By running the boilers, especially biomass boilers, on a steady pace during 24 hours, the excess heat during the day can be stored and used at night as additional heat supply.

## Summary

Through partnership with leading grower associations, manufacturers of green energy technologies, and all levels of government, the Zero-Energy Greenhouse can become the vehicle to improve the overall energy efficiency in our industry, communicate our "green" industry in a positive manner, and initiate financial support programs for the necessary investments.

Other industries have gone this road before us. Initiatives such as Zero-Energy Housing and Zero-Energy Buildings have created a positive image and generated financial support for investments that are needed for the future of our industry.

This article has listed several elements and ideas to improve energy efficiency to reach the objective of zero net energy consumption. In his presentation during the 2006 OFA Short Course, more details will be provided on this topic.

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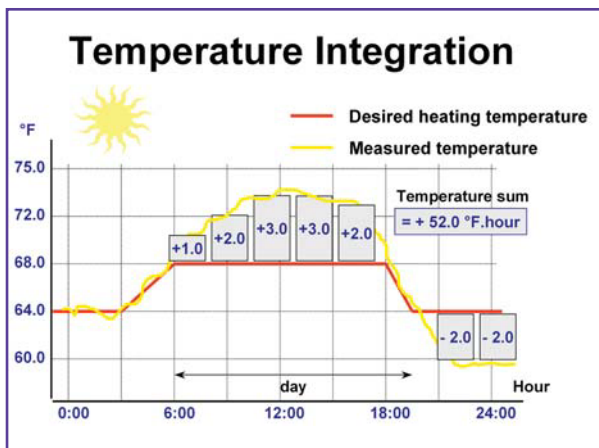


Figure 3. Computer helps with temperature integration.

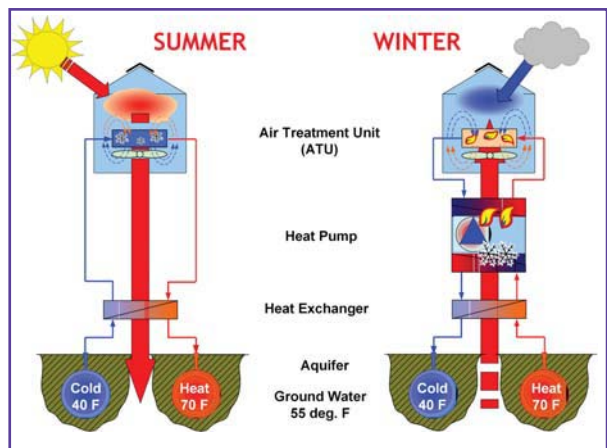


Figure 4. Heat and cold storage example.

## Programming for Profitability: The Physiology of Flowering Perennials

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Over the years, many growers have heard and even learned the principles of forcing perennials, but have not needed to use them to supply perennials to their markets. Even growers who are not currently forcing perennials should learn the principles and mechanics, as they are key to your potential to grow flowering perennials anytime of the year. Understanding and implementing these guidelines allows growers to refine their product mixes and enhance the amount of color they can deliver throughout the entire sales period (frost to frost in many instances).

### Juvenility

Some perennials, particularly those propagated from seed, have an early stage of growth when they will not flower, even if all of the other criteria necessary for flowering have been met. The inability to bloom is often called juvenility. These plants are incapable of perceiving and responding to the environmental stimuli, which cause mature plants to flower. The duration of the juvenility varies by species and can last from a

few weeks to a few months. Once they have finished the juvenility phase, they are considered “mature” and can be induced to flower under the proper growing conditions.

It can be difficult to determine the age or maturity of a plant simply by looking at the size of the plant. The most practical method to determine plant maturity is to count the number of nodes, or leaves, the plant has produced. Each variety must generate a certain number of leaves, referred to as the critical leaf number, before juvenility ends and the plant is “allowed” to flower, provided the other requirements for flowering are present.

Many growers transplant seed varieties in the summer prior to the spring of expected sales. After planting, they are grown vegetatively, a practice often referred to as *bulking*. Bulking allows growers to provide adequate production time to overcome juvenility, without having to worry about counting leaves and risking unacceptable flowering. Bulking also increases plant size prior to forcing and produces a well established root system prior to cold treatment. Bulking can occur in plug flats or in the final containers.

### Vernalization

Many perennials require vernalization, a cold treatment, to induce flowering before they are grown at warmer temperatures. There are three distinct cold requirement categories that perennials can be placed into.

The first category, *no cold required*, represents the perennials which do not require (or do not appear to benefit from) a cold treatment prior to flowering. Vernalization of non-cold requiring perennials does not affect the forcing time or negatively affect the flowering process.

The second category, *cold required*, represents the perennials which absolutely must receive a cold treatment for them to flower. These perennials have an obligate cold requirement for flowering and will not flower unless they receive the necessary vernalization.

The third category, *cold beneficial*, contains those perennials which experience some benefits from a cold treatment, such as more flowers per plant, more uniform flowering, or shorter forcing durations following vernalization, compared with plants that do not receive a cold treatment (Figures 2 and 3).

Successful vernalization depends on the maturity of the plant, or its ability to perceive cold, the cooling temperature, and the length of the cold treatment.



**Figure 1.** Blooming perennials such as the *Campanula carpatica* 'Pearl Deep Blue', shown here create impulse purchases as well as creates new marketing opportunities such as selling perennials as houseplants that can be planted in the landscape when they are done blooming indoors. Photo credit: Benary.



Perennial growers often vernalize perennials inside minimally heated greenhouses, coldframe structures, coolers, or even outside locations. The recommended temperature range for vernalizing most perennials is 28 to 45°F with 41°F being optimum.

Each plant species, and even each cultivar, has its own optimum cold requirement before it will consistently flower. Most commercially produced varieties require 6 to 10 weeks of cold to satisfy the vernalization requirement. Providing more than the minimum recommended amount of cold is not detrimental and often provides a positive response, such as a shorter time to flowering. Providing a minimum of 10 weeks of cold will satisfy the cold requirement for the majority of the commercially produced perennials.

### Photoperiod

Most perennials require a particular daylength, or photoperiod, for flower induction. The photoperiod refers to the number of hours of light provided to, or perceived by, the plant each day. Researchers have discovered that for many perennials, a mere hour variance in the photoperiod can mean the difference between flowering and non-flowering plants. Perennials have been split into four simple groups, defined by the photoperiod they need for flower production.

Perennials belonging to the *long day (LD) required* group have an obligate requirement for long days and simply will not flower unless they are grown under long day conditions. The majority of commercially grown perennials are long day plants requiring a minimum of 14 hours of light per day (some require between 13 to 14 hours daily) in order for flowering to occur. The actual photoperiod necessary for flowering varies by plant species and cultivar (Figure 4, page 12).

Many plants belong to the *long day (LD) beneficial* (facultative) group, which exhibits some benefit for being

produced under long day conditions. Although LD beneficial plants may flower under differing photoperiods, producing them under LD conditions will usually increase the number of flowers they produce and/or decrease the time to flower.

*Day neutral* plants represent a large variety of perennials, which will flower either under long day or short day conditions. Most of the perennials which flower naturally in the spring are day neutral plants. In most cases, day neutral perennials have an obligate cold requirement. Many perennials in this category also have a juvenility requirement and should be bulked up prior to the cold period. This ensures that they will be large enough for sales, because in many cases flowering occurs rapidly in the spring without much additional vegetative growth (Figure 5, page 12).

The *short day (SD) required* category contains a select group of perennials, which will flower when the daylength is less than 13 hours per day. Many short day perennials are naturally fall bloomers that remain vegetative under the long days of summer. Like long day plants, the actual daylength necessary for flowering of short day perennials varies with the plant species and cultivar. Flowering occurs once the plants are exposed to photoperiods shorter than some critical duration.

### Manipulating Photoperiod

To schedule flowering perennials to reach the market on a particular date, growers have found it necessary to manipulate the natural photoperiods, creating artificially long or short days. There are two methods commercial growers use to create long days: day length extension



**Figures 2 and 3.** *Lychnis 'Jenny'* is a cold beneficial plant and has limited flowering when cold is not provided, as seen in the image on the left. All plants did not receive cold in the picture on the left while the plants in the image above received 15 weeks of cold. The treatments in both images are, left to right: short days, 16-hour extended lighting with incandescent lighting, and 16-hour extended lighting with HPS lighting. Notice when 15 weeks of cold are provided, it blooms very readily. Photo credit: Michigan State University.

Continued on page 12

## Programming for Profitability: The Physiology of Flowering Perennials

Continued from page 11

and night interruption lighting. Growers accomplish day length extension by lighting their plants, extending the total number of hours each day the perennials perceive light, up to the desired daylength. For example, if a grower is trying to achieve a 14-hour daylength during a time of the year when the natural daylength is only 10 hours, the grower would provide lighting from about an hour before dusk up to the time the plant has received 14 total hours of light.

Night interruption, or night break lighting, entails providing light continuously from 10 p.m. to 2 a.m. This breaks up the long continuous dark period into two short ones, or creates a long day as far as the plant is concerned. To my knowledge, every long day plant studied has induced flowering when night interruption lighting was provided.

The intensity of the light over the production area should measure at least 10 foot candles at the furthest point from the light fixture when using either day length extension or night interruption lighting. For photoperiodic lighting, researchers have shown that most light sources can be used to provide long day conditions for perennials. Growers have successfully used incandescent, fluorescent, high pressure sodium, and metal halide light fixtures to promote flowering of perennial crops. Of these light sources, growers should note that incandescent light sources emit far-red light which causes plant cells to elongate, and may undesirably increase plant height.



**Figure 4.** *Echinacea x 'Sunrise'* belongs to the no-cold-required group of perennials. However, it is an obligate LD required plant and will not bloom unless it is grown under long day conditions. Left to right: short days, 16-hours days extended with incandescent light sources, and 16-hours extended with HPS light sources.

Photo credit: Michigan State University.

When producing short day plants during naturally long days, it may be necessary to create short day photoperiods by blocking out all of the light. Short day conditions are created by pulling black cloth or black plastic over the production site for a minimum of 13 hours each night. The “black out” area should be completely dark, as even one footcandle of light can be perceived by some perennials, negating the full benefit of providing dark.

### Temperature

After understanding the role of juvenility, vernalization, and photoperiod, growers should understand the role temperature plays with forcing perennials and the effects it has on crop quality and timing. The growth rate of perennials, and all plants, is essentially a function of temperature. Every perennial has a temperature range specific to it; for some perennials the fastest growth occurs in the temperature range of 68 to 78°F and for others the maximum growth occurs between 58 to 68° F.

Besides using temperature to produce plants to reach the market in a timely manner, growers need to be aware of the effects temperature can have on the final appearance of the plant. Understanding how temperature affects such attributes as flower size and flower number can help growers to produce perennials of higher quality.



**Figure 5.** *Delphinium elatum 'Gardian'* is a day neutral plant and will flower under any photoperiod as shown above left to right: short days, 16-hour long days, and 16-hour long days with HPS lighting.

Photo credit: Cathy Whitman, Michigan State University.



As the production temperature increases, the flower size of many perennial crops decreases. However, the effect of temperature on flower size does not appear to take hold until after visible bud. In addition to decreasing the flower size, warmer temperatures also tend to reduce the overall number of flower buds on some perennials. This reduction in flower buds is typically the result of reduced lateral branching that occurs at warmer temperatures. Therefore, temperature is not only important for growers to deliver a perennial to the market on schedule, it also influences the final appearance and quality attributes of the plant.

### Putting It All Together

Many perennial growers have several types of production facilities – coldframes, heated quonsets, gutter connect greenhouses, and even outdoor sites. The natural flowering times from each of these production sites will vary. Production of the same perennial in three different environments will provide availability of that variety for three distinct shipping windows or for an extended period of time. Growers can develop a good mix of perennials for nearly any sales date by utilizing their knowledge and facilities. If there are not enough varieties flowering naturally within your facilities to satisfy your customer base, then forcing a few perennials may be necessary.

The demand for “color” in the marketplace is constantly increasing, causing us to supply a higher percentage of our crops in bloom. Forcing perennials may be an act of survival for now, but someday it will probably become the norm. Whether it is a more conscientious effort to provide a larger percentage of flowering plants that are naturally in bloom for each delivery date, or a more elaborately developed forcing program, the bottom line is growers must provide a higher percentage of blooming perennials to the marketplace. Use the forcing principles and your production facilities to take control of your production, your sales, and your profits.

This *OFA Bulletin* article is just a start on programming for profitability. To learn more about perennial programming, come see Paul on Saturday, July 8 at the 2006 OFA Short Course.

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## Containers by Design

by Kerstin Ouellet

**Editor's Note:** This is a reprint of an article from the July/August 2004 issue of *Interior Landscape Business* magazine.

**S**troll through your downtown business district, thumb through the stack of gardening magazines on your desk, even visit your local garden center and chances are, you'll see container gardens spilling over with color. Container gardens are everywhere.

Maybe you've even begun providing them for your interior foliage customers as an add-on service – a smart strategy. Fact is, according to *The Wall Street Journal* and the National Gardening Bureau, container gardening is the fastest-growing category in the lawn and garden market.

Having said that, container gardening isn't new, because people have been growing plants in containers for thousands of years. What's new is the rekindled passion for the craft and today's many choices of planters and foliage.

The number of choices might be overwhelming if you're working to carefully craft a seasonal color program. But by sticking with proven plant material, working within the basic principles of design and experimenting with distinctive pots, you'll cultivate a successful container-garden business.

### Pot Pluses

What makes container gardens so great, you might ask? They allow you to bring plants and flowers into areas where your clients spend much of their outdoor time and where they typically don't have plants, such as patios, decks, and near entryways and pools. They are easy to move, fast to plant, and generally low-maintenance.

Even better, the supply of new and great plants to work with is nearly endless. Many of them are plants you might not think of using in containers. For instance, have you tried ornamental grasses or grass-like plants in your designs? While some are only a few inches tall, others shoot up several feet – and they come in many



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# ofa Interior Plantscape

## Containers by Design

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colors. They add height without being overpowering, they are rich in texture, and they add movement. Try purple fountain grass (*Pennisetum setaceum* 'Rubrum' and its dwarf form), different sedges (*Carex*), Mexican feather grass (*Stipa*), and New Zealand flax (*Phormium*).

Perennials also are fun and trendy. Select those with impressive foliage, like heuchera, hosta, lamium, or ajuga. They offer color, texture, and easy care.

### Design How-Tos

For a well-balanced design, use upright- or taller-growing plants, mounding or medium-height plants, and trailing elements. Working your way from center to rim, place upright plants in the center, medium-height plants around them, and trailing elements along the edges. Or, if the planter is going to be placed against a wall or in a corner, work your way from back to front, starting with the tallest plants in the back and finishing with the trailing plants in front.

In addition to a balanced composition, color should be a primary consideration – it catches the eye first. Choose hues based on a customer's taste or the job site. Blue tones, for example, work well because they are serene and calm. They're great near a pool. Warm, bold colors –

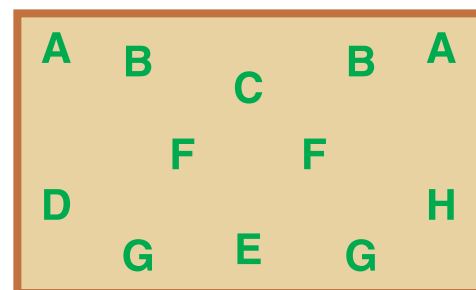
reds, oranges, and yellows – are high impact. Monochromatic designs are elegant, offering a trendy European look.

Other important design elements are proportion and texture. Generally, aim for the plants to take up about two-thirds of the design, and allow one-third for the visible part of the container. If the planter itself is a showpiece, you may use plants simply to accent the container.

Texture also is vital to create a natural look. Incorporate foliage plants in different shapes and sizes for a design rich in texture.

### Dig In

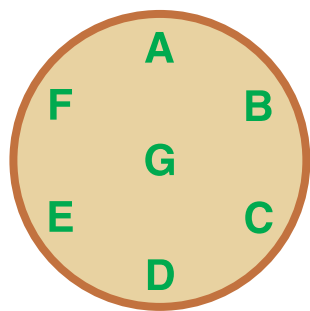
Now that you're inspired, here are a few ideas to make a splash with your container designs. These variety-specific selections are intended merely as guidelines. Make substitutions, depending on what plants are available to you.



**Figure 1.** This design combines exquisite plant selections with an elegant container. It's perfect for a prime spot, like next to a pool or near an entryway. Two perennials, sedum and ajuga, are used as foliage elements, with a mix of ornamental grasses and flowering plants. The heavy iron trough ages nicely over time.

### Key and Map

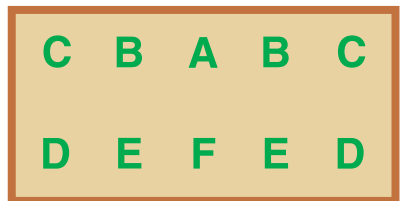
- A = *Carex flagellifera* 'Toffee Twist' (2)
- B = *Begonia* 'Maribel' (2)
- C = *Pennisetum* 'Rubrum'
- D = *Sedum* 'Matrona'
- E = *Osteospermum* 'Orange Symphony'
- F = *Coleus* 'Kingswood Torch' (2)
- G = *Verbena* 'Babylon Blue Carpet' (2)
- H = *Ajuga* 'Catlin's Giant'



**Figure 2.** An unusual planter like this puts special demands on the plant selection. The container shouldn't be hidden by trailing plants too much, and the design requires height. The plant composition in pink and purple tones accomplishes that goal.

**Key and Map**

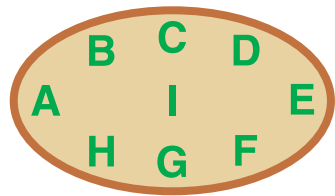
- A = Pennisetum setaceum 'Rubrum'
- B = Ocimum (Basil) 'African Blue'
- C = Hedera (English ivy) 'Glacier'
- D = Diascia 'Little Charmer'
- E = Muehlenbeckia 'Creeping Wirevine'
- F = Lantana 'Lavender Popcorn'
- G = Verbena 'Temari Patio Rose'



**Figure 3.** Vibrant yellow flowers and nearly black foliage build a stunning contrast into this design. Plant in a redwood box and place in a window, balcony, or use as a stand-alone.

**Key and Map**

- A = Argyanthermum 'Butterfly'
- B = Carex buchananii 'Leather Leaf Sedge' (2)
- C = Osteospermum 'Orange Symphony' (2)
- D = Verbena 'Babylon Lilac' (2)
- E = Calibrachoa 'Million Bells Terra Cotta' (2)
- F = Ipomoea 'Black Heart' (sweet potato)



**Figure 4.** This exotic design combines many different plant types, colors, and textures in a bronze-colored metal trough. Use a dwarf yucca like 'Golden Sword' or 'Color Guard.'

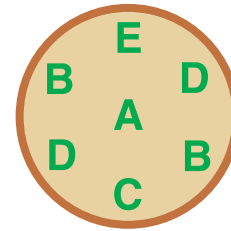
**Key and Map**

- A = Saxifraga 'Harvest Moon'
- B = Diascia 'Coral Belle'
- C = Begonia 'Maribel Pink Shades'
- D = Acorus gramineus 'Ogon'
- E = Osteospermum 'Orange Symphony'
- F = Sutura (Bacopa) 'Gold 'n' Pearls'
- G = Thymus (Thyme) 'Doone Valley'
- H = Yucca
- I = Heuchera 'Purple Petticoats'

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## Containers by Design

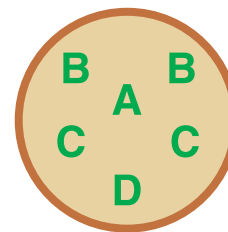
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**Figure 5.** *Heuchera* and *ajuga*'s purple foliage contrasts with the yellow leaves of *Lysimachia congestiflora*, *Lysimachia nummularia*, and *Saxifraga stolonifera*. Use in shade or partial-shade areas to create a beautiful look without flowers.

### Key and Map

- A = *Heuchera* 'Amethyst Myst'
- B = *Lysimachia* 'Outback Sunset' (2)
- C = *Saxifraga* 'Harvest Moon'
- D = *Ajuga* 'Mahogany' (2)
- E = *Lysimachia* 'Goldilocks' (not visible)



**Figure 6.** *Heuchera* is a foliage accent, while *bergenia* provides foliage and flowers. Their colors are echoed in the stripes of *phormium*. *Lotus* vine is used for texture.

### Key and Map

- A = *Phormium*
- B = *Bergenia* 'Autumn Glory' (2)
- C = *Lotus* 'Amazon Sunset' (2)
- D = *Heuchera* 'Amethyst Myst'

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# Decreasing Marketing Risk

by Jennifer H. Dennis and Michael V. Mickelbart

As the 2006 season begins, there are many decisions for every retailer to consider. Most of the growing and plant decisions were made in the winter. Hiring of additional employees may be something that is a high priority now and if the operation was closed for the winter, revamping the retail space. In a few months, the gardening season will be here and as quickly as it began it will be over. Once the season is over, there are few moments to rest before the cycle begins again. Questions that should be asked include, "How did we do this season?" and "How can we improve next year?" Decisions to expand infrastructure (buildings, etc.), hire additional employees, or offer new products may be opportunities to improve your operation. Decreasing risk by making calculated decisions will increase chances for success. This article focuses on decreasing marketing risk to retailers within the green industry. Although this article is focused on garden centers, every firm in the supply chain can benefit from understanding and creating a marketing plan.

## Risk Management Principles

The Risk Management Agency (RMA), a part of the USDA, is designed to help agricultural producers, including horticultural operations, decrease risks in their operations. RMA operates and manages the Federal Crop Insurance Corporation (FCIC) and provides crop insurance to American agriculture producers. To decrease the amount of reactive payments, the RMA has administered a proactive approach in delivering educational and outreach programs on general risk management areas. The agency has declared five areas of risk management: production, marketing, financial, legal, and human risks. This article will focus on decreasing marketing risk. Space constraints make it impossible to cover all aspects of risk management in detail.

## Marketing Risks

Marketing risks include losses that may occur as a result of underdevelopment of the business or an unclear vision. Producers may grow the perfect perennial only to find there is not enough consumer interest to justify growing it. Retailers may notice that needs and wants of their customers are changing and what has sold in the past now collects dust on the shelf. Regardless of your position in the supply chain, bad marketing has the ability to break the operation. Incorrect pricing of products and growing plant material that is not in demand, resulting in reduced sales and small profits, are two examples of how poor marketing can affect a business. Marketing horticultural products and services

involves building relationships and providing the customer with information about products.

The goal of decreasing marketing risk is to reduce the amount of uncertainty and provide a steady base or calculated risk associated with producing, distributing, and/or selling horticultural products. One important way to decrease marketing risk is to develop a marketing plan outlining the current status and future potential of your operation. The marketing plan serves as a roadmap for understanding where your business is going. The USDA-RMA suggests three important considerations in developing a marketing plan: 1) know the accepted level of risk the business is willing to take; 2) increase marketing skills identified in the written marketing plan; and 3) follow an integrated management approach within your business.

## The Marketing Plan

A marketing plan is a written document that helps a company achieve its goals. Most plans incorporate the following:

- Executive summary
- Marketing analysis
- Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis
- Objectives
- Marketing strategy
- Action plan
- Projected profit and loss statements
- Control section

## Executive Summary

Each marketing plan should have a brief executive summary of the main business goals. The executive summary is the first item in the marketing plan, but it is the last to be produced, since it is a summary of the entire plan. Although the marketing plan is produced in-house, others may read it and need a synopsis of current business practices and strategies. As businesses grow, sources of debt capital (mainly lenders) may read this plan. The executive summary highlights the important aspects of your business to a potential lender.

## Marketing Analysis

The marketing analysis presents background information on the state of the industry, regional and national influences, and competitors.

## SWOT Analysis

The SWOT analysis identifies external and internal forces that affect the operation, such as government

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## Decreasing Marketing Risk

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regulations and the competitive advantage of the business. Strengths (internal advantages of the firm) and weaknesses (things that cannot be done well or a product that cannot be supplied, e.g. a plant that you will not have the capacity to grow due to soil, weather, etc.) are those factors internal to the business. External factors to be considered are opportunities (potential contributions to the industry that result from your presence) and threats (external forces that may affect the business in a negative way).

If the marketing and SWOT analyses indicate a potential market and there are sufficient resources and experience to pursue your venture, the planning portion of the marketing plan should be undertaken.

### Objectives

The objectives define the financial and marketing goals of the business, indicating appropriate sales, profit, and market share information. This section can have three sets of projections: optimistic, most likely to happen, and pessimistic scenarios.

### Action Plan

The action plan outlines the marketing steps that will take place to achieve success. For example, owners may want to consider how to position the product for the end consumer, potential markets, the most profitable segments of the market, how to inform customers about current and future product offerings, how to price products to achieve a profit, and what factors may affect the demand and/or supply of products.

### Projected Profit and Loss Statement

The projected profit and loss statement helps to incorporate the cost of production of material into all pricing decisions as well as gather a realistic projection for output to realize a reasonable return (e.g. how many plants need to be sold).

### Control Section

Finally, the marketing plan must set guidelines for monitoring the success of your venture. The control section explains how and when the plan will be monitored and updated. This will allow the business leader(s) to quickly make decisions as the business evolves.

### An Example: Offering a New Service (Shrub Guarantees)

Mass merchandisers such as Lowes have offered plant guarantees on trees and shrubs for a few years. Your consumers have asked consistently for the past two years

for you to adopt the policy as well. There may be advantages to offering this new service, such as increased customer loyalty. How many people would use this new augmented service, and how many people would abuse this policy? Would this be an enhanced benefit for your customer segment? How would you know?

A marketing plan would be a great place to start to evaluate this opportunity. The business in question could start with a **marketing analysis** on shrub sales nationally, regionally, or locally to examine trends. The retailer could start with contacting their local association, examine agricultural statistics, and use other sources to determine current and potential plant sales. Other items that may be included in the marketing analysis could be a list of competitors locally (city or county), within the state, and within the surrounding states that sell the same type of shrubs. Questions to be considered include:

- What is the consumer response for retailers in that area?
- What percentage of sales is returned to traditional versus mass merchandiser stores?

The next step would be to undertake a **SWOT analysis** to determine if the garden center should offer this service. The SWOT analysis is a truthful look at the capabilities of the firm. The first portion of this analysis involves evaluating **strengths** or things the company does well. Possible questions to ask include:

- Does the garden center have an established loyal customer base, thereby making it easier to offer guarantees than it might be for competitors who do not have that base?
- What does the company do well that would be complimented by the addition of this new service?

Identifying potential **weaknesses** involves answering questions dealing with shortcomings that may decrease the chance for success in offering this new service to the end consumer market. Some questions to access weaknesses include:

- Will there be an excess of returns because of poorly maintained plant material?
- Would this be a policy that some employees fail to enforce properly?

**Opportunities** related to offering a new service may also lead to a list of questions.

- What opportunities are available to consumers as a result of this additional service?



- Is there an opportunity to increase consumer education in the segment that returns plant material?
- Would there be an opportunity to increase market share by adding this service?

Finally, there are **threats**, external factors that may threaten the vitality of the business and are beyond the company's control. Question to help determine threats, ask yourself if others will try to imitate the return program your company has invented?

Provided the findings of the marketing and SWOT analyses support adding this additional service (i.e. the marketing analysis indicates more strengths and opportunities than weaknesses and threats), the business owner should create and organize a set of **objectives** for implementation of this service or augmented product. However, if there are more weaknesses and threats than strengths and opportunities, the marketing plan has done its job as an indicator that focusing on providing this service is too risky at this point in time.

An **action plan** should follow. It should clearly indicate the steps and time frame that each objective needs to be accomplished that will help bring objectives and goals to reality. Finally, the **profit and loss statement** will give an overall picture of what is happening with current offerings of the business, and help to explain how this future offering may contribute or hinder the financial situation. Profit and loss statements are good for identifying how many returns

may be allowed or plants that originally need to be sold to create a profit or at least break even. The **control section** should incorporate a timeframe to evaluate the business and allow for changes due to industry and consumer demand. Once all of this is completed, the **executive summary** should incorporate a few details from each section of the plan.

This is an overview of how a marketing plan can help to decrease risk by using calculated steps to make a decision or guide the business. There are many more detailed components of each section of the marketing plan. If you are interested in writing a business plan or marketing plan, Purdue University has a few resources to help you, including the New Ventures Team (<http://www.agecon.purdue.edu/newventures/>).

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## Welcome New OFA Members!

Marcel Asschert - HUB International Ontario Ltd, Leamington, ON, Canada  
 Robyn Bentley - Leyman Lift Gates, Cincinnati, Ohio  
 Brad Brewster - Bloom Master Planter Corporation, Blue Springs, Missouri  
 CARIPO Fondazione Minoprio, Vertemate Con Minoprio, Italy  
 Richard Colasanti - Excalibur Plastics Ltd, Ruthven, ON, Canada  
 Polly Creech - Hyacinth Bean Florist, Athens, Ohio  
 Neree Emmons - Emmons Farms, Fayette, Ohio  
 Gregory Gawne - Thermecs, Kingsville, ON, Canada  
 Justin Girves - The Gardner of Bath, Akron, Ohio  
 Juti Gusi - Conic System SL, Sant Boi De Llobregat, Spain  
 Aaron Kruckeberg - Classic Comfort Heating & Supply, Greenville, Ohio  
 Jim Kuharic - Greenhouse Systems, Vinton, Ohio  
 Sandy Larson - Fir Island Flowers, Mount Vernon, Washington  
 John Leeper - SQM North America, Atlanta, Georgia  
 Laurie Magruder - KaBloom of Willoughby, Willoughby, Ohio  
 JR Mann - Stephens Pipe & Steel LLC, Russell Springs, Kentucky

Cheryl McKirman - Ohio State University, Celina, Ohio  
 Paul Pilon - Perennial Solutions Consulting, Jenison, Michigan  
 Diane Pirocanac - GPN, Des Plaines, Illinois  
 Skip Rountree - Sunshine Horticulture LLC, Orlando, Florida  
 Ruud Ruiten - Schoneveld Twello bv, Twello, Netherlands  
 Michael Shilling - Crescent Trading Group LLC, Miami, Florida  
 Byron Spoon - Richard Rodgers Florist, Dayton, Ohio  
 Angela Storm - Selecta First Class Inc, Davidsonville, Maryland  
 Liz Tinter - Country Bouquet, Olmsted Township, Ohio  
 Mike Tseng - Stoneart Miniature Gardens Ltd, Surrey, BC, Canada  
 Anton Van-Zevenbergen - Trocobel USA LLC, Perrineville, New Jersey  
 Robin Wood - Perennial Enterprises dba Robin Wood Flowers,  
 Cincinnati, Ohio  
 Michael Wu - Bellan International Ltd, Nan Jing Jiang Su, China  
 W Michael Young - Blue Shoe Flowers/Young Farms, Mt Sterling, Ohio  
 YueFeng Zhang - Beijing Besky Agri-Tech Company, Beijing, China

## Hiring Winning Employees



by Debbie Allen

Today's low unemployment rate is making retailers feel the pressure to keep qualified, motivated, and happy employees. The shrinking pool of available help for retail is taking its toll. Retailers of all sizes are struggling to find and hold enough sales staff to get the job done successfully. Think about finding more part-time staff, creating a job share program, or adding creative work schedules to entice more quality applicants.

The impact of this vacuum in the labor market is that there are substantially fewer people available to work. With 280 million people in the United States alone, why is there such a problem? There are a few major reasons, including a higher growth in retail chains and technology and other jobs offering higher pay.

In addition, the smaller Gen X population is needed to service and sell to a largely populated Baby Boomer generation and the ever-increasing Gen Y population. The Gen Y generation (ages 1 to 20) is expected to meet or exceed the huge Boomer generation of over 73 million in the United States. Bottom line: a growing number of people to service and sell to, with the result being that consumers have had to learn how to service and sell themselves to save time.

If you want to offer great 21st century service, you've just got to work harder to find quality members of your team today. Here are some helpful strategies that should help you find those winners for your organization.

### Hiring Strategies for Creative Recruiting in the New Economy

- Post a sign highlighting your company benefits
- Post a sign offering a free \$50 gift certificate for anyone that helps find the next winning member of your team
- Create a brochure about you business and employee benefits
- Post information on the back of your business card about hiring
- Develop a bonus program for your staff to find new employees
- Post help wanted information on your web site
- Post help wanted information at local colleges and/or high schools
- Ask your customers if they know of anyone
- Inform everyone you are looking: business associates, UPS driver, accountant, business associates – everyone

### Questions to Prepare Before the Job Interview

- Why would you like to work here?
- What is your perception of the business?

- How would you handle an irate customer?
- What would be your initial customer greeting?
- Why do you feel you would be a good sales person?
- What would help you to improve your skills?
- How would you go about creating excellent customer service?
- Why have you chosen sales as the career of choice?

### Getting the Most Out of a Job Interview

Once you find a good candidate, the job interview is where you'll get the information you need to decide whether or not to hire him or her. Here are some ways to make the most of each interview.

- Allow adequate time for the interview
- Ask open-ended questions
- Hire attitudes and teach skills
- Get information before you give it – listen more and talk less
- Don't over promise job benefits, hours, or pay
- Don't try to make it work if it doesn't feel right
- Always hire on a 30- to 60-day trial period
- Picture them in your business – that new employee represents your image

The purpose of the interview is to gain deeper insight into the applicant's skills, interests, values, and beliefs – and to evaluate how these skills apply to selling and servicing customers in your business. Remember to ask challenging questions – avoid yes or no responses. Get the applicant to talk to you and sell themselves on the position. How else can you expect them to sell your store to customers?

Debbie Allen will be a speaker at the 2006 OFA Short Course. She is an international professional speaker, business consultant, and author of Confessions of Shameless series of books. As a marketing and retail business expert, Debbie has presented to thousands from around the world. To sign up for Debbie's free online newsletters, learn about her exclusive Power Marketing Membership, or to book her to present at your next meeting contact her through her web site at [www.DebbieAllen.com](http://www.DebbieAllen.com) or directly at 800-359-4544.

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# Building the Plant Chassis with Manual & Chemical Pinching

by James E. Faust



The final crop quality often depends on the chassis built within the plant canopy. The chassis refers to the architecture, or scaffold, that develops as a result of pinching and, in some cases, the use of Florel. The scaffold is influenced by several environmental and cultural factors. In this article we will discuss the impact of pinch timing, pinch technique, and the potential use of chemical pinching agents, such as Florel, to produce well-branched crops.

## Pinching Technique

While pinching appears to be a relatively simple concept, it really has a big impact on the final plant quality in terms of branch number, plant height, flower number, and timing of flowering. To demonstrate this, we examined the effect of pinch height, pinch hardness, and pinch timing on the growth and flowering of vegetatively-propagated nemesia.

## Pinch Height (nodes remaining below the pinch)

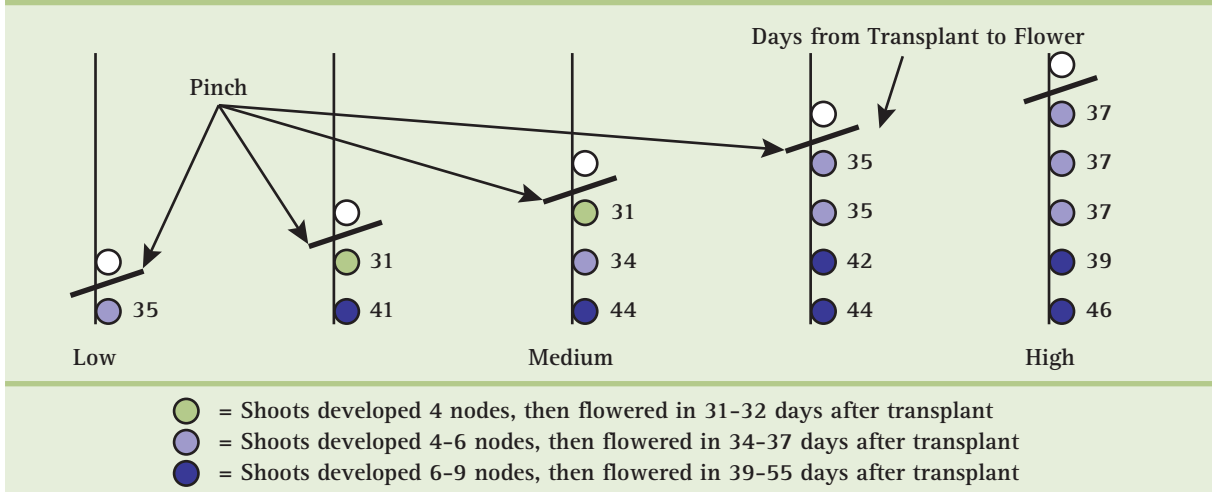
Pinch height refers to the node number remaining on the primary stem after the first pinch. The number of nodes left on the stem below the pinch obviously impacts shoot number, but it is less obvious that this also affects plant vigor and flowering. To demonstrate this, we transplanted several species and then pinched them *low*, *medium*, and *high*. These are obviously relative terms. If a species produced many nodes prior to setting a terminal

flower, such as *osteospermum*, then a low pinch left three nodes, a medium pinch left six nodes, and a high pinch left nine nodes below the pinch. If a species produced a lower node number prior to flowering, such as *nemesia*, then a low pinch left one node, a medium pinch left three nodes, and a high pinch left five nodes below the pinch. The same amount of tissue was removed during each of the pinches. Note that the three different pinch height treatments occurred on different days, since it took longer to have more nodes to develop prior to performing the medium and high pinches.

Figure 1A demonstrates the results that were observed on *nemesia*; however, these trends were consistent for other species. The low pinch (to one remaining node) produced two shoots per plant, while the high pinch (to five remaining nodes) produced 10 shoots per plant. No surprise there, but the flowering response was quite interesting.

The number of days from transplant to first open flower is indicated immediately next to the nodes displayed in Figure 1A. The node closest to the soil surface was always the most vegetative and the slowest to flower, while the highest node (immediately below the pinch) was always the most reproductive and the first node to produce a flowering shoot. Vegetative-ness and reproductive-ness were quantified by recording the number of nodes that formed on the shoot below the

Figure 1A. Pinch Height technique used on *Nemesia*. Plants were pinched to five different heights, so that 1, 2, 3, 4, or 5 nodes remained on the primary stem following the pinch. In each case only one node was removed during the (soft) pinch, thus the higher pinches occurred on progressively later dates.



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## Building the Plant Chassis with Manual & Chemical Pinching

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terminal flower. So, the bottom node typically formed shoots that had six to nine nodes before flowering in 41 to 46 days, while the uppermost node produced shoots that had four to six nodes before forming a terminal flower in 31 to 37 days.

Interestingly, the pinch height had very little impact on time to first open flower. As Figure 1A demonstrates, all five pinch height treatments flowered between 31 and 37 days after transplant. Thus, pinch height had little impact on time to flower but had a great impact on the number of flowering stems per plant. For example, when two nemesia cuttings were grown in a 4 inch pot, the plants that were pinched to 1, 2, 3, 4, or 5 nodes (left to right in Figure 1A) had 3.7, 3.9, 5.9, 6.7, or 11.3 flowering shoots per pot after 40 days.

### Pinch Hardness (nodes removed during the pinch)

Pinch hardness refers to the number of nodes removed during the pinch (Figure 1B). In order to make a fair comparison, plants were grown to 4, 5, or 6 nodes then 1, 2, or 3 nodes were removed during the pinch, so that all plants had three leaves remaining after the pinch. Thus, a *soft* pinch resulted in one node being removed from the shoot, while a *hard* pinch resulted in three nodes being removed from the shoot. Hard pinches were done on later dates than soft pinches since additional nodes had to develop on the stem prior to the pinch.

The time from transplant to flower increased as pinch hardness increased, so that the two uppermost nodes of the soft-pinched plant produced flowering shoots in 31 to 34 days, while the same shoots on the hard-pinched

plants required 36 to 40 days. The actual time from pinch to first flower was approximately 18 days regardless of the pinch hardness; however, the hard pinch had a later pinch date that resulted in extra production time. The shoots that develop on the hard-pinched plants also had an additional one to two nodes per stem.

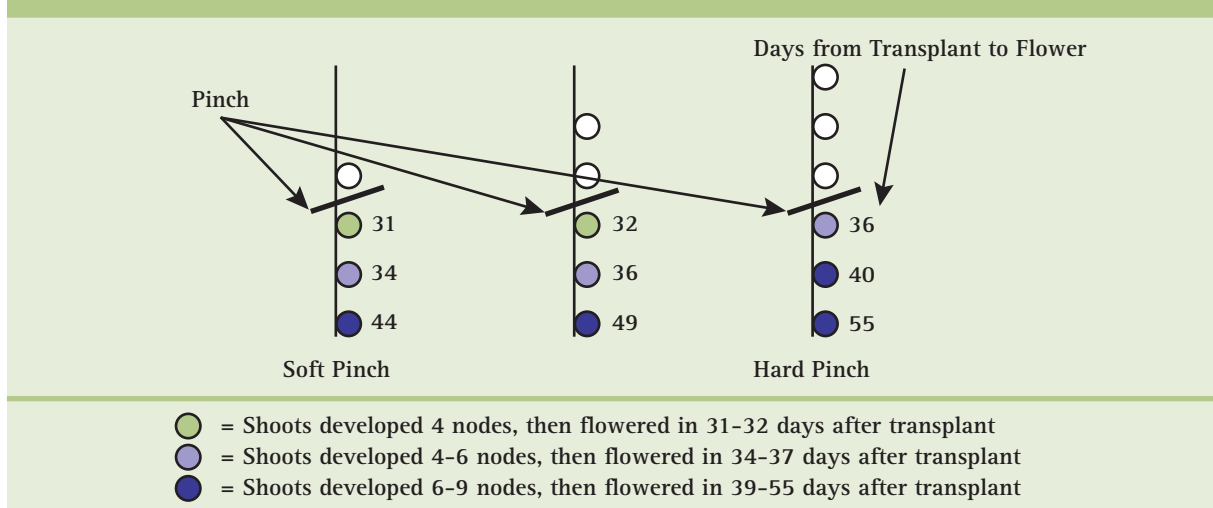
Pinch hardness did not affect total shoot number, but did have a significant impact on the timing of flowering. For example, when two nemesia cuttings were grown in a 4-inch pot, the plants pinched to three nodes which had 1, 2, or 3 nodes removed had 8.9, 8.5, or 4.8 flowering shoots per pot after 36 days (all three pinch treatments had 9 to 10 total shoots per pot). Soft pinches minimized time to flower, while hard pinches increased time to flower. This occurred because the uppermost node below a soft pinch produced a shoot that had a lower node count prior to forming a terminal flower.

Therefore, we can conclude that there is no real benefit to performing a hard pinch unless plants are overgrown and one needs to readjust crop height. The exception occurs on crops like poinsettia, where a soft pinch may not fully remove apical dominance and the lateral shoots break more poorly as a result.

### Pinch Hardness x Pinch Height

In the preceding two examples, the different pinch treatments had to be performed on different dates. This third example demonstrates the interactive effects of pinch height and hardness on pinches performed on the same date. For example, all plants had six nodes at the

Figure 1B. Pinch Hardness technique used on *Nemesia*. Plants were pinched so that 1, 2, or 3 nodes were removed during the pinch, leaving three nodes to develop below the pinch. The harder pinches were performed on progressively later dated.





# ofa Grower

time of pinch and had pinches that were hard and low to one node or soft and high to five nodes (left to right, Figure 1C).

The plants pinched to one node averaged 47 days from transplant to first flower, while the other four treatments averaged 36 days to flower. The bottom node was always the slowest to flower, and when the plants were pinched to just this one node, flowering was quite slow. The bottom node produced shoots that averaged 8 to 9.5 nodes per stem prior to flowering, while the nodes closest to the pinch formed shoots that averaged 4.2 to 6 nodes prior to flowering.

Pinch hardness and height also had a significant impact on the number of flowering shoots per plant. For example, when two nemesia cuttings were grown in a 4-inch pot, the plants pinched to 1, 2, 3, 4, or 5 nodes had 0, 3.7, 3.2, 7.2, or 11.3 flowering shoots per pot after 37 days.

So, what is the best pinch technique? To answer that question we must determine the minimum number of shoots needed to produce a good quality finished crop. There is no benefit to add crop time developing nodes on the primary stem that will just be pinched off. So, you identify the target number of nodes to leave below the pinch (pinch height) and then perform a soft to medium pinch (take out one to two nodes along with the shoot tip). So, if we examine all the different pinch possibilities presented in Figures 1A-C, the best quality plants (sufficient branch number for 4-inch pots) in the shortest crop time were achieved on plants grown to four or five

nodes, then soft pinched. Allowing a sixth node to develop prior to pinch did increase the number of flowering shoots, but when grown at tighter spacing this created a plant too big for the space allotted. Performing a high pinch to five nodes would be fine for plants grown in containers larger than 4-inch. In contrast, an excessively low pinch results in insufficient shoot number which then requires an additional pinch to produce a “full” plant.

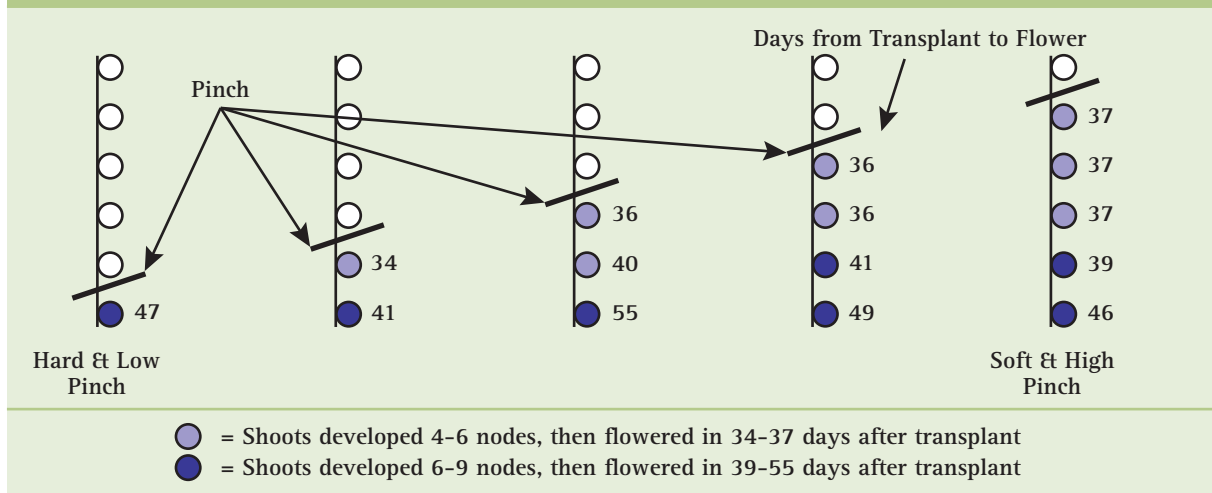
Typically, the worst-case scenario is to grow a plant with two low pinches. This means pinching the primary stem to a low node number and then follow up with another low pinch on the secondary stems. The resulting plant will have a relatively slow growth rate due to the small leaf area remaining after the pinch. Also, the shoot number will be low and those shoots will be more vegetative, so flowering will be delayed.

## Florel

Florel is a useful tool for building the chassis; however, it has limitations. First, we have never observed a scenario where Florel was actually equal to manual pinching in terms of improving branching of a vegetative plant. Thus, in my opinion, Florel should not really be viewed as a chemical pinching agent.

So, what does Florel do well? First, Florel has the potential to abort flower of certain species, such as geranium, New Guinea impatiens, and double impatiens (Figure 2, page 24). With these species, the aborted

Figure 1C. Pinch Height & Pinch Hardness Combination technique used on *Nemesia*. Plants were grown to six nodes then pinched to 1, 2, 3, 4, or 5 nodes on the same date. Green circles represent nodes that were the most reproductive, while dark purple circles represent nodes that were the most vegetative.



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## Building the Plant Chassis with Manual & Chemical Pinching

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axillary flowers are substituted with a vegetative shoot. The result is an improved chassis, since those axillary flowers will impede scaffold development if they are allowed to develop. This ability to abort flowers has tremendous benefit for stock plant production of highly vegetative species. Also, by delaying or aborting the premature flowers on highly reproductive species, Florel can help to increase the uniformity of the first flush of marketable flowers. The downside is that increased vegetative growth may not only delay flowering of some species, but may also increase the need for additional growth regulator applications, since the plants may form more nodes (and more potential height) before additional flowers are initiated.



**Figure 2.** New Guinea impatiens were treated with weekly applications of 500ppm Florel for 0, 1, 2, 3, 4, or 5 weeks (left to right). Note that Florel is effective at restricting stem elongation and reducing leaf size, however, branch number is similar in all treatments.

Second, Florel is an effective growth regulator in two ways: shoot elongation is restricted in much the same manner as the more traditional plant growth regulators, and leaf expansion is inhibited. These two factors allow for the primary stems to experience some growth regulation, while light penetration increases to the lower stems. The result is more uniform branching, which is frequently observed by growers that employ the sandwich application technique on poinsettias. However, it should be noted that in these situations, Florel enhances the manual pinch but does not replace the pinch.

Finally, it should be noted that Florel may cause phytotoxicity on some species, while many other species display no responsiveness to typical application rates. Therefore, growers must perform in-house trials before spraying a lot of plants.

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## Ranting Remarks of a Postharvest Enthusiast: Do Your Homework & Make a List



by Jim Daly

Now that you can get flowers from virtually anywhere in the world with a click of a mouse, phone call, e-mail, or physically buying them, your choices have grown enormously. With increased choices there is a chance that you will make a bad buying decision that negatively affects the postharvest life of the flowers. The fix for this problem is simple: do your homework before buying. The following are some issues to investigate.

### Preharvest Issues

It has been estimated that 70 percent of the post-harvest life can be attributed to preharvest (growing) issues. A few of these issues include:

- The type of nitrogen that is used as fertilizer. Ammonia versus nitrate can greatly affect how the flower and foliage grow. High ammonia-fertilized flowers have a tendency toward Botrytis growth.

- How much and what kind of light is used to grow the flower. Many flowers are grown in countries such as Ecuador and Colombia because these countries are close to the equator, giving the flowers a higher amount of light. Flowers grown in these conditions have a larger head size. When flowers are grown under artificial light in greenhouse conditions, they have a tendency to take up more water (higher transpiration).
- The temperature and relative humidity of the growing environment can affect the level of Botrytis spores present on the flower. In one study conducted with roses, increasing the relative humidity from 75 percent to 91 percent reduced the vase life of roses by 30 percent (Mortensen 1999).

### Grower Treatments

Ethylene is a colorless, odorless gas that acts as the “aging” hormone in flowers. Ethylene is produced by the



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plant and by outside sources like car exhaust, floor cleaners, food (apples), and other flowers. Very low levels of ethylene (10 parts per billion) can cause damage to flowers. In recent years, much work has shown that many cultivars of roses are sensitive to ethylene (Figure 1). Luckily, growers can treat the flowers to protect them against ethylene. Two treatments inhibit the effects of external and internal ethylene, MCP (EthylBloc) and STS (AVB). For a full list of ethylene sensitive crops, see Floralife ([www.floralife.com](http://www.floralife.com)) or Chain of Life Network® ([www.chainoflifeflowers.org](http://www.chainoflifeflowers.org)) web sites.

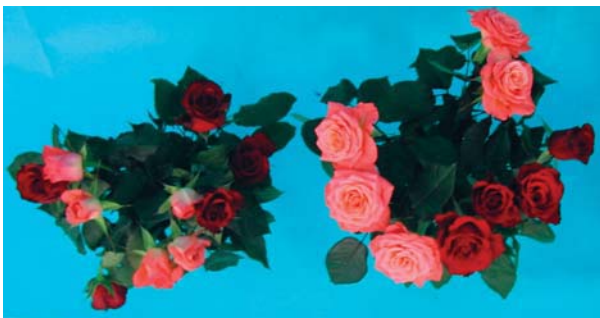
Leaf yellowing can cause flowers to look old and of poor quality. Leaf yellowing is caused by a hormone imbalance, which results in the breakdown of the chlorophyll in the foliage. Chlorophyll breakdown causes foliage to turn from green to yellow. This problem is particularly prevalent in lilies and alstroemeria. Growers can spray or pulse flowers to inhibit leaf yellowing with products like Fascination (Valent), PAL (Floralife), or BVB (Chrysal). These treatments help maintain a proper hormone balance in the foliage resulting in greener foliage.

## Cultivar Selection

Studies have shown that certain rose cultivars can last 25 percent longer than other cultivars (Figure 2). Even the same cultivars grown at different farms can have a different vase life.

## Temperature

In the words of Professor Michael Reid (University of California-Davis), there are only three issues you need to worry about in postharvest: temperature, temperature, and temperature. This is not a new subject as there are written records of the Romans trying to keep grain cool to keep it fresh. Thousands of years later we are still trying to get people to maintain the cold chain. Here are some key points to further promote the issue.



**Figure 1.** Flowers on the right were treated with MCP and then both vases of flowers were treated with 1ppm ethylene for 12 hours at room temperature.

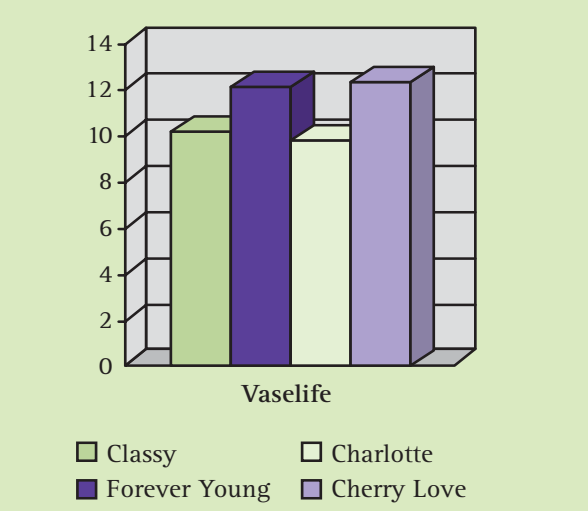
- According to the White Paper written by George Staby and Reid in 2005 (Improving the Cold Chain for Cut Flowers and Potted plants), at least 30 percent of the vase life of a flower can be lost if it is not properly stored. Flowers are stored correctly if the temperature is 32 to 34°F. Further, Reid studied 58 growers and found the average flower temperature at the time of arrival at a truck distribution facility was 51°F.
- Andrew Macnish determined that if the temperature is held at 35°F or lower, ethylene virtually had no effect on wax flowers.
- Low temperature can help stop things like bending of snapdragons, premature opening of flowers (roses), and stem elongation (gerbera).
- In studies done on strawberries (we can logically assume it would be similar for flowers), proper temperature management lowered the incidence of Botrytis by 25 percent.

Make sure that you maintain the cold chain by keeping your coolers at 32 to 36°F. Tropical flowers should be held at 50 to 55°F. Know how your flowers have been stored/transported. Ask your supplier the temperature of their coolers. Do they precool the flowers? How are your flowers transported

## Receiving and Processing

Ok, now you have done all your homework, but that was only half the battle. That's right, half your work starts before you ever receive a stem! Now that your flowers have arrived, what should you do?

**Figure 2.** Rose varieties naturally differ in their inherent postharvest potential.



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## Ranting Remarks of a Postharvest Enthusiast: Do Your Homework & Make a List

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1. Inspection – Make sure the flowers are what you ordered, quality standards are up to par, look for any disease issues, and check the temperature of the flowers upon arrival.
2. Storage – If your cooler is 32 to 36°F, it is best to keep your flowers boxed and dry, processing only the flowers you will need that day. If you cannot maintain that temperature range, process the flowers and keep them in buckets with flower food. At 32 to 36°F very little water uptake or food usage is taking place, so dry is best. Flowers stored above 36°F will use up food stores and take up water so you will need to replace these components.
3. Processing –
  - a. **Action:** Disinfect all surfaces, cutting utensils, floors, coolers, and buckets using a horticultural detergent. **Reason:** Botrytis spores and other microbes can spread and live on walls, floors, and just about anywhere you can think of. Bacteria can grow in buckets and on cutting utensils (any surface), and make their way into the flowers stems, causing blockage and flower death.
  - b. **Action:** Recut the stems (be sure that the blade is kept clean and sanitized by using a horticultural disinfectant/detergent). Cutting underwater is optional as the data is still gray on this issue. If you choose to cut underwater make sure the water is clean. **Reason:** The stems you receive will generally be plugged with bacteria, compounds exuded from the stem itself, and air bubbles. Recutting 1 to 2 inches will eliminate most of these problems.
  - c. **Action:** Hydrate the flowers for an hour or with an instant dip hydrator and then place into flower food. **Reason:** Most of the flowers you receive come very long distances. In most cases, the cold chain is not maintained. Thus, the flowers have been transpiring (using internal water) and are dehydrated. Using a hydration treatment will help rehydrate the flower.
  - d. **Action:** Place the flowers, in flower food, into the cooler. The flowers can now be used in design. **Reason:** Once flowers are cut and moved, photosynthesis can all but shut down, robbing

flowers of the sugars they need to finish maturing and opening. Add flower food to compensate for this lack of food production by the plant. After placing in the flower food, move the flowers into a cooler to lower the temperature of the flowers.

- e. **Action:** After designing, spray flowers with a finishing mist. **Reason:** Certain finishing sprays may help reduce water loss and maintain the hormone balance of many flowers. This will help foliage health and the long-term health of the flower.
- f. **Action:** Give each customer a packet of flower food and care instructions to take home. **Reason:** Surveys show that consumers desire about seven days of vase life to perceive a good value. A flower food packet is cheap insurance to attain those seven days for most flower species.

Now look at your results below (Figure 3)!



**Figure 3.** Flowers on the right were treated as suggested while flowers on the left were recut and put into water.

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ofa



# Ontario Greenhouse Industry Update: Education, Research, and Extension

by Theo J. Blom

## Introduction

In Canada, the greenhouse industry can be split into two sectors: vegetable and floriculture greenhouse. The vegetable sector includes the production of cucumbers, tomatoes, peppers, eggplants, and bib and leaf lettuce. The floriculture sector is a combination of potted plants, bedding plants, and cut flowers. Both sectors are very important to the country's economy. The vegetable sector is worth about \$700 million (Canadian), while floriculture is about \$1.4 billion (Canadian). In terms of crop production the farm gate value of greenhouse floriculture is a close third behind wheat and canola.

The total greenhouse industry covers about 5,000 acres – 60 percent of the total located in Ontario. Most of the vegetable production is concentrated in south western Ontario, while the floriculture industry is primarily centered around the Niagara Peninsula, south of Toronto. The infrastructure support in terms of education, research, and Extension for the greenhouse industry is highlighted in this article.

## Education

There are different levels of educational support for the greenhouse industry in Ontario:

### University of Guelph, Guelph

The University of Guelph is a comprehensive university consisting of several colleges. The faculty of the Ontario Agricultural College is involved primarily in teaching and research, and to a lesser degree in Extension. The program offers degrees at both the undergraduate and graduate levels (MSc. or PhD). Three- or four-year BSc. degree programs are offered in agronomy, agriculture economics, animal science, or horticulture. The horticulture program focuses on general horticulture with some course elements related to greenhouse production. Courses which are taught specifically for greenhouse-focused students are greenhouse production; annuals, perennials, and indoor plants; plant nutrition; applied entomology; plant pathology; biological activity of pesticides; and others. In the greenhouse production course, the students are required to complete a research project. The topics of the projects usually originate from the greenhouse industry, and the results are summarized in abstract form and published in the industry magazine *Greenhouse Canada*. The students are proud to see their names in a magazine and become more connected to the industry.

### Niagara College, St. Catharines

This post-secondary institution located in the Niagara peninsula has recently started a two-year technical program dedicated to the greenhouse sector. A high school diploma (grade 12) is required in order to enter this program. This two-year co-op diploma program is designed to prepare students for careers in the rapidly growing greenhouse and nursery industry. The program is very applied in nature, and during the summer semester the students are expected to work at a production greenhouse (co-op) operation ([http://niagarac.on.ca/studying/programs/fulltime/hort\\_0737](http://niagarac.on.ca/studying/programs/fulltime/hort_0737)).

### Ridgetown College, University of Guelph, Ridgetown

This institution was once operated by the provincial Ministry of Agriculture, Food and Rural Affairs, but is now part of the University of Guelph. It also offers a two-year diploma in horticulture. This diploma provides students with the skills they need in ornamental horticulture and an opportunity to take specialized courses. Practical experience and training complements the more formal material presented in lectures, and provides an opportunity to acquire the hands-on skills required in greenhouse, nursery, and landscaping businesses ([http://www.ridgetownc.on.ca/education/diploma\\_horticulture.cfm](http://www.ridgetownc.on.ca/education/diploma_horticulture.cfm)).

### Flowers Canada Ontario, Adult Education

For people who are employed in the greenhouse industry, Flowers Canada (Ontario) – the trade organization for the greenhouse flower growers and retailers – facilitates night school courses for growers and retailers. These courses cover a given subject area (nutrition, greenhouse environment, utilizing your climate control computer, flowering potted plants, etc.), are presented in a classroom setting, and generally last for 10 evenings. Courses are usually organized by a faculty member of the University of Guelph (Theo Blom), an Extension specialist (Wayne Brown), and area growers. Students may get a certificate from Flowers Canada for completing the course, but the certificate is not accredited. There are also IPM workshops for growers, which are organized by Extension personnel (Graeme Murphy and Wayne Brown). The retail sector is served by an accredited design school at different levels, as well as a number of business courses.

### Canadian Greenhouse Conference

Education is one of the key mandates of the annual Canadian Greenhouse Conference organized by allied



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# Academic Update

## Ontario Greenhouse Industry Update: Education, Research, and Extension

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trade, research, and Extension personnel. This is a low-cost, two-day event with a speaker's program and a trade fair to encourage growers to bring as many staff as possible. The educational program is for both greenhouse vegetable and flower growers with an emphasis on practical, innovative, and timely information. The conference is held in Toronto during the first or second week of October and attended by nearly 3,000 people. Profits from the conference are used for research and education (<http://www.canadiangreenhouseconference.com/>).

### Research

#### Floriculture Research

Research priorities are developed annually by the various industry commodity groups as established by the provincial Ministry of Agriculture, Food and Rural Affairs. These priorities are used by research managers to decide direction so that adequate resources may be allocated to the industry-identified needs. There are two greenhouse crop research committees, one for vegetables and one for floriculture.

A number of University of Guelph faculty members are involved in floricultural research, including Theo Blom (floriculture), Mike Dixon (biophysics), Bernie Grodzinski (biochemistry), Chris Hall (plant hormones), Barry Micallef (greenhouse vegetables), Cynthia Scott-Dupree (Entomology), Al Sullivan (Ornamental crop breeding), John Sutton (pathology), and Youbin Zheng (physiology). In addition to the above team, Les Shipp (entomologist at the Greenhouse and Processing Crops Research Centre, Agriculture and Agri-Food Canada, Harrow) works on insect control in floriculture.

#### Active Projects

- Low nutrient strategy in subirrigation production systems for potted crop (Dixon and Zheng)
- Root zone oxygenation in greenhouse production (Dixon and Zheng)
- Using aqueous ozone in disease control (Dixon and Zheng)
- Using aqueous ozone to extend shelf-life of cut roses (Dixon and Zheng)
- Application of chlorination and ozonation technologies for control of diseases (e.g. Pythium and Phytophthora) in greenhouse and nursery irrigation systems (Dixon, Zheng, and Calvin Chong).
- Ion-specific fertigation feedback control system (Dixon and Zheng)

- Endophyte technology for enhanced vigour, fitness, and productivity of greenhouse flowers (Sutton)
- Phenolic compounds in hydroponic systems (Sutton and Hall)
- Efficacy of fish hydrolyzate in Fusarium control (Sutton)
- Early diagnosis and management of micro-organisms and allelochemicals in recycling systems (Grodzinski, Sutton, and Hall)
- An integrated genetic and phenotypic approach to selecting and producing high quality ornamentals year round in Canada (Grodzinski)
- Optimize phosphorous use in plant growth and development (Blom)
- The effect of night and day temperature, photoperiod, and the use of PGRs on flowering of chrysanthemums (Blom)
- Effect of end-of-night light quality on height of potted chrysanthemums (Blom)
- The use of Sumagic bulb dip on Easter lily (Blom)
- The effect of moisture regime on root morphology of bedding plant plugs (Blom)
- The effect of light pulsing on plant growth (Blom)
- Effect of IBA and light quality on rooting of chrysanthemum cuttings (Blom)
- The use of BTM as a root stimulant (Blom)
- Quantification of Erwinia carotovora in nutrient solution (Hall and Blom)
- Development of IPM for thrips on ornamentals (Shipp)
- New control strategies for leaf miner (Scott-Dupree)
- Development of new ornamental cultivars/germplasm (Sullivan)
- Commercialization of native plant species (Sullivan)

It should be noted that most of the projects involve graduate students.

Annual trial gardens are coordinated by Rodger Tschanz at the Guelph Turfgrass Institute, but there are also trial gardens by the Niagara Parks School of Horticulture (Niagara Falls) and commercial companies (Jack VanKlaveren Ltd and Stokes, St. Catharines). Moreover, an extensive container-grown trial garden with hanging baskets (seed and vegetative annuals) is organized by Mel Sawaya (Focus Greenhouse Management, Simcoe), while an annual poinsettia trial is organized by Wayne Brown (Extension specialist, Vineland Station).



## Vegetable Research

Barry Micallef (physiology/genetics), a faculty member at the University of Guelph, is involved in research of greenhouse vegetables; however faculty members mentioned in the previous section also may work on vegetables. In addition to the group above, there is the federal vegetable research team at the Greenhouse and Processing Crops Research Centre, with Tom Papadopoulos (crop physiology); Xiuming Hao (environment/energy); Les Shipp (entomology); David Hunt (entomology); Martine Dorais (physiology); Ray Cerkauskas (pathology); and Mike Tu (pathology) as team members ([http://res2.agr.ca/harrow/index\\_e.htm](http://res2.agr.ca/harrow/index_e.htm)).

## Extension

Both the floriculture and vegetable greenhouse sectors have two Extension specialists. For the floriculture sector, Wayne Brown (production) and Graeme Murphy (greenhouse floriculture IPM specialist) work closely with the industry from their offices on the

Vineland Station campus of the University of Guelph, which is located in the Niagara Peninsula (between Niagara Falls and Hamilton). The vegetable sector is served by Shalin Khosla (production/energy) and Gillian Ferguson (greenhouse vegetable IPM specialist). These two specialists are located at the Greenhouse and Processing Crops Research Centre, which is close to the center of the vegetable industry. All Extension specialists are employed by the provincial Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), and interact closely with the research community.

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# Emphasis on Electrical Safety Prevents Workplace Injuries

by Gary Hanson

In 2004, workplace accidents involving electricity killed 253 people, according to the U.S. Department of Labor, Bureau of Labor Statistics. This number accounts for 4 percent of all workplace fatalities, including accidents with overhead power lines.

Shocks from electrical hazards can cause injuries including sensations, burns, and cardiac arrest. Electrical shock can cause three types of burns: electrical, arc, and thermal. Electrical burns are the most severe. These burns occur when electricity flows through tissue or bones, causing damage from the heat. Arc burns, which mostly affect welders, occur from high temperatures near the body. Thermal contact burns happen when skin comes in contact with hot surfaces or when clothing catches on fire. For all injuries medical attention should be sought promptly.

Another danger from electrical hazards is called "freezing." When someone freezes during an electrical shock, the individual is unable to pull free from the source of the shock. This occurs because the body's muscles contract, freezing the individual, and making them more susceptible to electrical burns by reducing their resistance to the electrical current. In addition to freezing, the injured person's muscles may act spasmodically, causing collisions, falls, bruises, bone fractures, and death.

Electrical hazards in the workplace are usually due to unsafe equipment, faulty installation, dangerous work

environments, or unsafe work practices. Workplace accidents involving electricity are easily preventable.

To prevent workplace injuries and fatalities, employers should take the following precautions:

- De-energize electric equipment before inspection or repair
- Maintain electrical outlets, tools, and equipment
- Train employees in the use of electrical tools, including exercising caution near power lines
- Provide protective equipment to cover hands, face, and other body parts
- Follow state and federal standards concerning electrical safety
- Use different methods of electrical protection, such as insulation and grounding, to stop or reduce the flow of electricity in power cords, outlets, and other electrical devices
- Emphasize the importance of workplace safety

For more information concerning prevention of electrical fatalities, visit the Occupational Safety and Health Administration (OSHA) website at [www.osha.gov](http://www.osha.gov).

Article provided via Compensation Consultants Inc, Dublin, Ohio.

**Gary Hanson**  
 American Safety & Health  
 Management Consultants Inc.  
 Phone: 330-854-4577





# OFA Award of Excellence



## Suggested Criteria for Consideration:

- Rare honor bestowed upon someone who has made an extraordinary lifetime contribution to OFA and/or the field of floriculture/horticulture.
- Unanimous endorsement by the OFA Board of Directors.
- Long-time OFA member.
- Nomination must be made by an OFA member.
- Letter of recommendation from at least three additional OFA members.

## Rewards:

- Complimentary lifetime OFA membership with all benefits.
- Recognition at annual OFA conference with award/plaque of recognition.
- Name on plaque displayed at OFA headquarters.

## Procedures for Nomination:

- Complete and turn in application to the OFA office at 2130 Stella Court, Columbus, OH 43215.
- Deadline for all applications is October 1.

## Procedures for Implementation:

- Applications presented to Membership Committee at fall meetings for consideration, screening, and comments.
- Recommendations passed from Membership Committee to Board of Directors for final decision(s).
- Notify any award winners by March 1 of award year.

# Application for OFA Award of Excellence

Date received by OFA office: \_\_\_\_\_

Nominee: \_\_\_\_\_ Submitted By (name): \_\_\_\_\_

Company: \_\_\_\_\_ Company: \_\_\_\_\_

Address: \_\_\_\_\_ Address: \_\_\_\_\_

City: \_\_\_\_\_ City: \_\_\_\_\_

State: \_\_\_\_\_ State: \_\_\_\_\_

Zip: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Phone: \_\_\_\_\_

Fax: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_ E-mail: \_\_\_\_\_

Please explain why this nominee is deserving of the OFA Award of Excellence (attach any additional sheets as needed):

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Signature (of person submitting nomination): \_\_\_\_\_ Date of nomination: \_\_\_\_\_



## You're Invited to the 2006 OFA Short Course

You're invited to join OFA – an Association of Floriculture Professionals for our 2006 OFA Short Course! This year's event has a fresh focus on industry education. Discover solutions and techniques to deal with today's challenges facing every segment of the floriculture industry. With more than 120 educational sessions, stimulating idea exchanges, innovative business solutions showcased in 1,300+ trade show booths, and the shared experiences of 10,000 friends and colleagues, you cannot afford to miss the OFA Short Course.

The annual OFA business meeting will be held on Saturday, July 8 at noon in the Columbus Convention Center. All OFA members are invited to attend. New board members will be introduced.

Anyone with a badge is welcome to attend the OFA Awards Program and Opening Session on Saturday, July 8 from 4-6 p.m. There will be a short presentation of OFA

and industry awards that will be followed by the opening session "Consumer Buzz Live Presented by Green Profit Magazine." This is your opportunity to ask questions and hear what the consumer, the end-user of all our industry products, is really thinking.

You've asked for more networking opportunities, and we've listened! We're offering a new and unique networking evening that doesn't compete with our other educational sessions or the trade show. On Sunday, July 9 from 5:30-7:30 p.m., anyone with a badge is invited to participate in the Grower Town Meeting: Raising Prices – The Achilles Heel of Our Industry; a Retailer Idea Exchange to share merchandising and marketing ideas; and a Manager Idea Exchange for a discussion of management-related topics facing you and your colleagues.

We promise there is something for everyone at the Short Course. See you in July!

## Learn & Grow – Lifelong Learning

You are a member of OFA whose mission is to support and promote floriculture professionals (that's you) through lifelong learning, career enhancement, and public awareness.

Let's focus on the "lifelong learning" part of the mission. What does that mean? Lifelong learning refers to the continuing development of knowledge and skills that people experience, not just from formal education but throughout their lives. Even though you may have received education in high school, college, or even post-graduate work, that is increasingly not going to keep you on top of your game during your 30- to 40-year career. In today's world of rapidly changing technology, the knowledge

you acquired from your formal education may have quickly become outdated.

Please allow OFA to be a part of your lifelong learning. As you have probably noticed on all our Short Course information, our message this year is Learn & Grow. The word "grow" doesn't necessarily refer to a greenhouse grower (although that does tie in rather nicely) it refers to growing you and your business. We want to provide you the education to take your business to the next level of success.

Lifelong learning is no longer an option. We believe learning is a necessity to survive and stay profitable in this industry. Don't be afraid to spend a little money to invest in your future. Join us July 8-11 at the OFA Short Course to Learn & Grow.





## OFA Member Decals Available

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

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

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

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

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

## OFA Event Calendar

July 8-11, 2006	<b>OFA Short Course</b> - Columbus, OH
July 10, 2006	<b>Ohio Certified Florist Written &amp; Hands-On Tests</b> - Columbus, OH
October 20-23, 2006	<b>OFA Board &amp; Committee Meetings</b> - Louisville, KY

## New Ohio Certified Florist

OFA congratulates Jim Rauch, AIFD, OCF, of Unique Designs in Dayton, Ohio, for passing the Ohio Certified Florist (OCF) test. A self-study certification program, the OCF program provides recognition for a standardized, professional level of knowledge and expertise in the retail florist industry. There are currently 13 Ohio Certified Florists.

[www.ofa.org](http://www.ofa.org)



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