

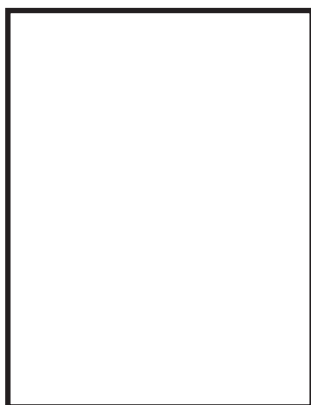


Bulletin

The Information Source for the Floriculture Industry Since 1929

CIRCULATE

Native Plants: There IS a Market!



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Native plants – those plants that originated in a given place or arrived there without human intervention – have emerged as an identifiable product line in recent years. On the production end of the market, propagators are experiencing a great increase in demand from wholesale nurseries. On the installation end of the market, demand is increasing from clients as diverse as landscape companies working on mitigation projects, golf courses, and home gardeners.

Why? Natives are a natural complement to at least five current landscape trends. First, their design

attributes and adaptability to local conditions make them valuable in natural and low maintenance landscapes. Second, native plants provide food and shelter for wildlife. Third, strong native plant communities have been advocated as a means of combating invasive exotic plants. Fourth, shade gardeners prize native woodland wildflowers. And fifth, native plants are an important component of wetland

mitigation projects, native habitat re-establishment efforts, and federal- and state-funded building projects.

HOW GREAT IS THE DEMAND FOR NATIVE PLANTS?

In spring 2000, we assessed the demand for native plants in the Maine market, with the assistance of a marketing grant from the Maine Department of Agriculture, Food, and Rural

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IMPLEMENTING FRINGE BENEFITS IN SMALL COMPANIES

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There is room for interpretation of the words “fringe” and “small” in the title of this article. When I look in the dictionary, the word “fringe” is described as: “less important, minor.” “Fringe benefit” is defined as “a payment other than wages or salary made to an employee.” I would challenge any of you to try and run a company with the attitude that fringe benefits are less important or minor. Fringe benefits are what can draw and keep star performers in your company.

Too often in the interviewing process, we tell the candidate what the hourly rate or salary is but do not tell them of our corporate culture. Employees want more out of their jobs than a paycheck these days. They want respect for themselves and their families. Respect can be given in various ways.

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(As adopted by the OFA Board of Directors 2/18/01)



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WORKING WITH SOIL IS A GIFT



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When I was a small child, my father had a garden. His prized possession was a beautiful climbing 'Peace' rose, which grew along the back of the house on Matson Avenue. Neighbors would come from the several streets around to see the dinner plate-sized blooms. I shared in their admiration of the shiny green foliage and the swaying branches laden with peachy-yellow blooms. Dad loved the attention, and I have to admit, I learned very early the value of a beautiful bloom shared.

We moved when I was six years old, and our new yard was large. Not only was the yard big enough for all 10 of us kids, it was large enough to hold a huge garden. Dad took advantage of the size and planted an even larger garden chock full of vegetables and roses. During the long summer months, he would send several of us kids to deliver tomatoes and peppers, along with his colorful roses, to elderly neighbors. I loved doing this. I loved the smiles and occasional candy treats.

As I became a teen and my responsibilities began to include the weekly household chores, I grew to love the summer months, when after cleaning I went to the yard and cut bouquets of roses to place around the house. Adding flowers always made the job seem so much more complete ... this small addition of color and fragrance.

When I married Michael, I also married into a family business. I thought I knew the "power of flowers." After all, I'd experienced firsthand the smiles, the pleasure of a long day at work in the garden, and the simple bouquets on a table! What I didn't realize was the overwhelming commitment I was making for my children and myself. I did not know at the time that this business "got into your blood." I had no idea the sacrifices we would make as a family or the adventures we would share.

Michael was the third generation to become involved in the family business. Grandma Benken was still alive when he asked for my help. I hauled our youngest daughter Kate with me to the greenhouse so I could work side by side with Grandma. It was early January in 1980, and we were going to transplant seedlings by hand into wood flats of homemade

soil. We used a No. 2 pencil to poke holes between the lines in the damp soil. Then we used the same pencil to gently tear apart the tiny seedlings, using the pencil to help push them in. I wasn't very fast. Between rewinding the baby swing and readjusting the pencil, I fell way behind what Grandma thought was 'good producing.' But every day, as I got a little better and the baby became accustomed to the rickety old swing, I began to fall in love with the feel and the smell of the soil.

By late January, the Easter lilies needed moving. It was a late Sunday afternoon when we walked across the driveway into the warm and sunny greenhouses. Michael built a "ride" out of the skates used to move plants, piling the kids into the old wooden flats. The flats carrying the twins, John and Lindsay, held several lily plants, while Tim and Angela only left room for one lily plant between their legs. All afternoon we pushed and played and moved the lilies. It was fun, and we were hooked.

Easter came and went, and we experienced our first Mother's Day. Six weeks of nonstop hustle. No spring sports and very few dinners with Dad. We hauled the dinners to him and began to feed employees along the way. The kids and I made a production line in the kitchen, sometimes feeding 35 employees, four or five days in a row. It was a challenge coming up with simple but home cooked meals. As I cooked, the kids took orders, learning to write and count, and we hand-delivered the meals across the driveway. For all it was a great sense of accomplishment, and we still do it today.

We did struggle with trying to balance our lives between the children, our marriage, God, and the family business. We



dreaded First Holy Communion that fell on Mother's Day weekend. We bemoaned PTA meetings or sporting events during a holiday week, or friends that did not understand why we couldn't make their Derby

parties. Promises were broken when shipments arrived just as we were walking out the door. We left picnics early to water or didn't go at all. In the winter, alarms were set to check boilers in the bitter cold of night. Off days at school meant work, and the older kids sometimes resented the freedom of their peers. The younger ones only knew the greenhouse and the employees that were their friends.

Sometimes the challenges outweighed the rewards. As I look back now, there are some things I would change if I could. I would have tried harder to keep God first, family second, and business third. Other than that, the lessons learned were valuable. Whether a small or large garden, the sun shines equally on both, and working with the soil is a gift.

My mother raised 10 children and still found time to dig dandelions. Her knees would be full of dirt, but she loved it. Michael's Grandma worked in the floral shop making bows until she was 96. It does get in your blood, and I thank God every day for the opportunity He has given me within this industry and for the growth of my children.

I am blessed beyond measure to have been chosen to be the vice president of the Ohio Florists' Association. My roots are in the good earth and soil. I will always enjoy sharing the simple beauty of a flower, the bounty of my garden, and the joy of flowers in my life.

OFA

A New Employee's First Day of Work ... Are YOU Ready?

Checklist for Success

- ✓ Is their work area ready?
- ✓ Who will explain their job details?
- ✓ Is their company attire ready or been explained?
- ✓ Is the company manual ready and up-to-date?
- ✓ Are you planning a welcoming activity?

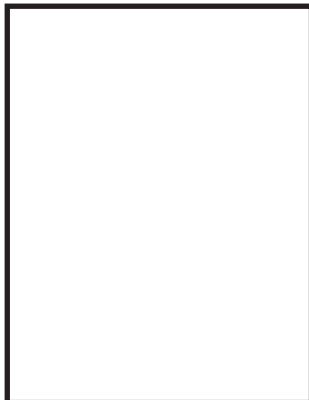
6 Tips to Keep Your Best People

- Praise employees regularly for their efforts.
- Remember employees don't quit companies – they quit bosses.
- Ask your employees for their input.
- Invest in your employees' futures.
- Say thank you, often.
- Encourage fun in the workplace.

2000-01 OSU Fall Pansy-Viola Trial Results



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Pansies are no pansy! After a long, cold, grey, snowy Midwest winter, everyone suffers from “cabin fever” and is ready to see some color in the garden. That’s why tulips and daffodils are so much appreciated. They flower at times when nothing else is available. Well, almost nothing else we should say. One of the best-kept secrets is that some pansies, if planted in the fall, can bloom earlier than bulbs and keep blooming well into late spring or early summer depending upon location (Figure 1). They can provide a fantastic show of color!

While most growers are aware of the potential of the fall pansy crop, many do not grow the product because the demand is limited or nonexistent. In other words, customers are not aware of the tremendous gardening benefits and satisfaction that a fall pansy crop provides.

Therefore, we decided to start fall pansy trials with two objectives in mind: 1) to evaluate pansy cultivar (varieties) performance during fall and the subsequent spring, and 2) to use the trials as a promotion tool. Achieving the first objective would provide growers and customers with information on survival during the winter and flowering characteristics during the spring. With the second objective, we hope to slowly change public perception of pansies, and hopefully increase demand of the product. This is important for many growers because fall pansies have to be grown in the summer, a time when a lot of greenhouses are empty.

One drawback of fall pansies is that they have to be planted as a well-developed plant in mid-September in Ohio (even earlier in other parts of the country). At this time, most

of the summer annuals are still doing well, so it is difficult for many gardeners to remove them to make room for the pansies. Customers will have to be advised to either leave spaces in between the annuals for fall plantings or interplant the pansies among some of the smaller annuals that are beginning to deteriorate.

Our trial was conducted for the first time at The Ohio State University from September 2000 to May 2001. The trials are part of the Learning Garden Project in the Department of Horticulture and Crop Science. On page 6 in Table 1 you will find some of the results of this trial. Plants representing 60 cultivars were generously donated by Bob Barnitz of Bob’s Market & Greenhouse in Mason, West Virginia. Ten well-developed plants per cultivar were planted in raised soil beds on September 18, 2000. No mulch was used for cold protection or weed control. Ten days after planting and on October 16, the beds were fertilized with a 20-10-20 fer-

tilizer solution at a rate of 200 ppm nitrogen.

Spring evaluations were conducted by 18 persons, some OSU faculty and staff, some students, Chadwick Arboretum volunteers, and Master Gardeners. Using a scale of 1 to 5 (1 = not acceptable, 5 = Exceptional), they evaluated three plant characteristics: “flowers”, “leaves” (foliage), and “uniformity.” The category “overall” represents the average of “foliage” and “flower” evaluations. Table 1 contains results of the spring evaluation conducted from April 23 to 25. For fall evaluation results and initial pictures of each cultivar, go to www.ag.ohio-state.edu/~flori/archive/jun01/fpansy.html.

Over all, most cultivars fared very well considering the fact that it was a cold winter (Figure 2) with minimal snow cover and no mulch was used. Some of the cultivars stayed green (Figures 3 and 4) (although stressed) all winter and were the first to show color in early spring, even before daffodils and tulips began flow-



Figure 1. Bed #1 pictured in May.

ering. We plan to repeat the trial for the 2001-02 season. This time we have invited several breeders to send us seeds of the cultivars they want to trial. Plants will be grown again by Bob's

Market & Greenhouse. Stay tuned!

We thank David Snodgrass, Marcia Feller, Jim Vent, and all evaluators for their important assistance.

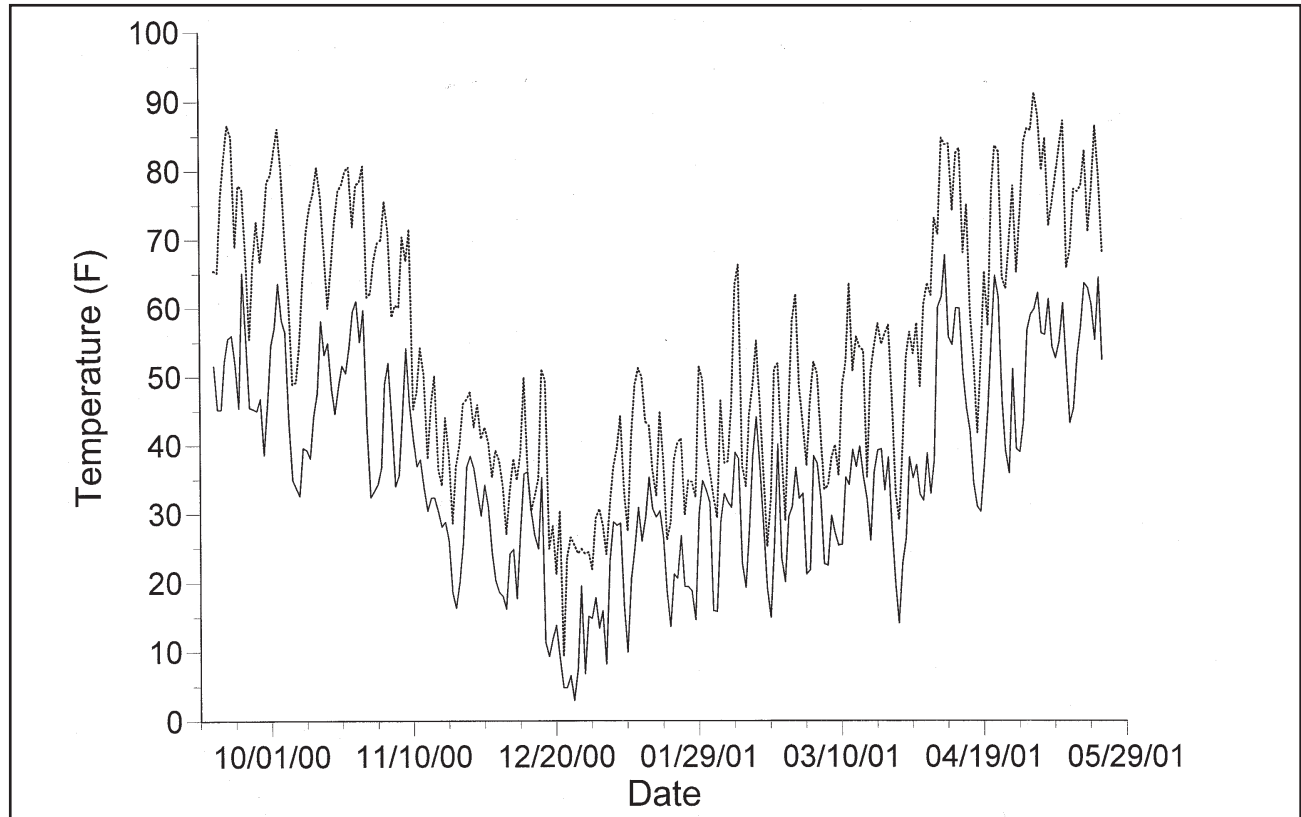


Figure 2. Outside air temperature recorded by the environmental greenhouse computer of the OSU Department of Horticulture and Crop Science. The pansies were located a short distance from the greenhouses. Dotted line = maximum daily temperature. Solid line = minimum daily temperatures.

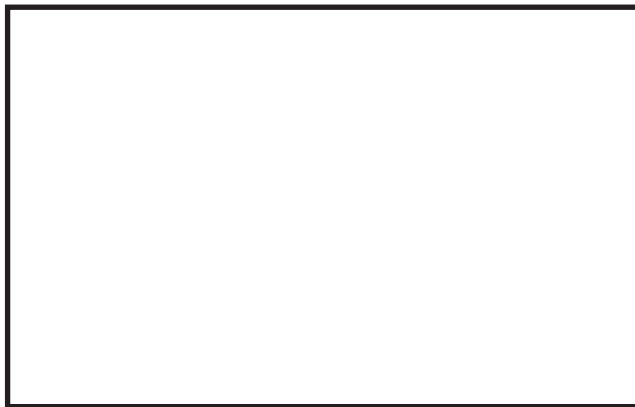


Figure 3. Some of the violas maintained a portion of the green foliage.



Figure 4. A view of bed #1 in January. All plants looked "dead."

Table 1. Results of the spring evaluation conducted April 23-25, 2001. (1 = not acceptable, 5 = exceptional)

Series	Cultivar	Flower	Foliage	Overall	Uniformity
Baby Bingo	Lavender Blue	4.8	4.7	4.8	4.7
Baby Bingo	Beaconsfield	4.7	4.7	4.7	4.3
Viola-Sorbet	Plum Velvet	4.5	4.7	4.6	4.9
Baby Bingo	Midnight	4.6	4.6	4.6	4.7
Viola-Sorbet	Sorbet Mix	4.7	4.4	4.6	4.6
	Purple Rain	4.4	4.7	4.6	4.8
Imperial	Beaconsfield	4.4	4.4	4.4	4.9
Crystal Bowl	Supreme Yellow	4.1	4.1	4.1	4.0
Crystal Bowl	Blue Center	4.6	3.6	4.1	3.2
Bingo	Clear Azure	4.3	3.9	4.1	3.7
Bingo	Clear White	4.1	4.0	4.1	3.9
Happy Face	Happy Face Marina	4.2	3.9	4.1	3.8
Regal	White w/ Blotch	4.2	3.8	4.0	3.5
Crown	Azure	4.2	3.7	4.0	3.3
Bingo	Mix	3.9	3.9	3.9	4.2
Ultima	Silhouette Mix	4.2	3.7	3.9	4.4
Delta	Light Blue w/ Blotch	4.1	3.7	3.9	2.4
Crown	Blue	3.8	3.9	3.9	4.1
Bingo	Blue Frost	4.1	3.6	3.9	3.9
Delta	Yellow w/ Red Wing	3.7	3.9	3.8	3.7
Delta	Pure Yellow	3.6	3.9	3.8	4.2
Crystal Bowl	Purple	3.9	3.7	3.8	3.0
Delta	White w/ Blotch	3.8	3.7	3.8	3.6
Regal	Deep Blue w/ Blotch	3.6	3.8	3.7	3.1
Regal	Purple/Yellow w/ Blotch	3.7	3.7	3.7	4.2
Regal	White w/ Rose Blotch	3.6	3.7	3.6	3.7
Crown	Golden	3.6	3.6	3.6	3.3
Bingo	Deep Purple	3.5	3.6	3.6	3.1
Delta	Pure White	3.7	3.4	3.5	2.5
Sky	Skyline Copperfield	3.5	3.5	3.5	4.0
Accord	Black Beauty	3.4	3.6	3.5	2.7
Delta	Violet w/ Face	4.0	2.9	3.4	1.9
Delta	Pure Primrose	3.4	3.4	3.4	2.8
Fama	Fama Red	3.3	3.5	3.4	3.1
Delta	Pure Violet	3.7	3.1	3.4	3.1
Crystal Bowl	Supreme White	3.5	3.2	3.4	2.9
Delta	Lavender Blue Shades	3.6	3.1	3.3	2.3
	Trick or Treat Mix	3.3	3.2	3.3	2.5
Delta	Blue w/ Blotch	3.4	3.1	3.3	1.7
Delta	Pure Colors Mix	3.2	3.2	3.2	3.2
Majestic Giants	Purple	3.0	3.3	3.1	2.8
Regal	Yellow w/ Red Blotch	3.1	3.2	3.1	2.9
Delta	Pure Deep Orange	3.1	3.1	3.1	2.7
Majestic Giants	White	3.1	3.1	3.1	2.4
Majestic Giants	Yellow	2.8	3.3	3.1	3.2
Delta	Rose w/ Blotch	3.0	3.1	3.1	1.8
Delta	Delta Mix	2.9	3.1	3.0	1.8
Delta	Pink Shades	2.9	3.1	3.0	2.3
Bingo	Clear Yellow	3.2	2.9	3.0	2.8
Delta	Red w/ Blotch	3.2	2.9	3.0	1.7
Contessa	Mixed	3.3	2.6	2.9	1.6
Delta	Pure Red	2.9	2.9	2.9	2.9
Delta	Tapestry	2.7	3.0	2.9	2.1
Delta	Pure Rose	2.6	3.1	2.8	2.3
Imperial	Antique Shades	3.1	2.5	2.8	1.9
Majestic Giants	Mix	2.8	2.7	2.8	2.2
Bingo	Blue w/ Blotch	3.2	2.3	2.8	1.4
Majestic Giants	Red & Rose Shades	2.4	2.6	2.5	2.4
Delta	Fire	2.9	2.0	2.4	1.7
Majestic Giants	Blue Shades	2.6	2.1	2.4	1.9

IMPLEMENTING FRINGE BENEFITS IN SMALL COMPANIES

Continued from page 1

One of the biggest changes I have seen in the past 10 years is the advent of flextime. I know that I have personally alienated and lost a few great employees due to my inflexible nature early in my tenure as head of the company. Flextime allows the employee to choose what is most important on a given day at a given time. You simply cannot talk about fringe benefits without mentioning flextime.

Sure, the plants need to be watered, the phones must be answered, and the customers need to be checked out, but what about getting the kids on the bus, taking care of elderly parents, having foster children, and taking a longer lunch? These are all reasons to offer flextime to your employees. Just make sure you offer flextime to all of your employees – singles, widowed, married, black, Hispanic, white, part-time, full-time, or salaried. Consistency is the key to any benefit. This will require more attention to a schedule, but once everyone understands how it operates, you will have a more committed workforce.

Another benefit to your employees is your employee discount. I swear we have people working for us for free. You know the type: they spend their entire paycheck at your company. Do you offer great discounts? We offer our employees the wholesale price on everything we grow. Other discounts range from 10 percent (seeds, bulbs, roots) to 30 percent (gift shop, cut flowers). If I am placing an order for artwork, statuary, or fountains, and the employee wants to order something, they can have it for cost plus freight. This is also a great way for you to meet minimums with certain vendors.

Although it took two passes by my Board of Directors, we finally have a SIMPLE IRA plan in place for our employees. I believe this is THE plan of the future for small businesses. In our town, employers are converting their 401(k) plans into SIMPLE IRAs. A SIMPLE (Savings Incentive Match Plan for Employees) IRA is a relatively new type of plan that became effective on January 1, 1997. The plan is available to businesses with 100 or fewer employees (typically less than 25). For the employer, it is an easy low-cost alternative to the 401(k) plans. It is easy to set up, has minimal paperwork, and is easy to administer. There is no IRS filing or compliance testing. Employees fund their own account through payroll deduction. The employer's contributions are tax deductible. For the employee, payroll deduction makes investing easy and contributions are deducted pre-tax. I think this plan is a winner!

A typical fringe benefit is health insurance. While we do not pay 100 percent of our HMO, we do offer to pay 50 percent of the employee's costs for health insurance. We have the Cadillac of plans and do have prescription cards. Health insurance is the reason many older workers are returning to the workforce. Health care is viewed as expensive. Offering to pay some or all of health insurance costs will position you better in a very competitive employment environment. We also offer dental insurance.

Paid vacations, sick days, and holidays are another benefit. We have different schedules for part-time, full-time hourly,



and salaried employees. We actually call this Flex Time Off (FTO). Our part-time (20+ hrs/week) employees earn from one to five days of paid time off. Our full-time (32+ hrs/week) employees earn from one week (one year of employment) to four weeks (10 years of employment) of paid time off. Our salaried individuals are on an accrual system, parallel to the full-time. In addition, salaried employees are paid for legal holidays and have three days of paid sick leave per year. We also offer "compassionate leave." It is important to have a broad definition for "compassionate leave." You do not want to get yourself into a situation where the word "family" is used. You would then have to define what family means.

Food is a huge motivator with employees and a benefit not to be taken lightly. We always order in pizza or subs when there is a need to work late leading up to the holidays. If there is a 7 a.m. meeting, feed them! Buy juice and bagels. For one of our employee meetings, a dietician came in and spoke on sugar and fat levels found in the food we eat every day. She had test tubes filled with fat, representing amounts contained in typical things we eat. Yuck! (Good thing we didn't do donuts that day). We have a fire safety meeting in the fall in which we all learn to use fire extinguishers. Meetings which teach such life tasks should be viewed as a benefit. Think beyond sales meetings and training meetings. Educate your employees on everyday skills.

Speaking of education, send your staff to state and national association meetings. Better yet, buy them a membership in these wonderful organizations. Have a line item in the budget for staff education. If it is in the budget, you will commit to it and not wait to see how the profits are. I am a strong believer in the saying "you have to spend money to make money." Invest in your employees. The rewards are huge. We pay for technical school classes (upon completion) including floral design, Master Gardener, computer languages, and boiler design and maintenance. If an employee wants to buy a particular book that helps his job, we will reimburse him for the cost of the book. Encourage and support the employees who are looking to improve themselves.

I have to dwell on food just one more time. Cook for your employees. Really, they love it! We have a local festival called Oktoberfest each year in the fall. I turn brats on the grill for about four hours. In the spring, I have been known to bake egg dishes for a morning breakfast leading into a busy Good Friday. At Valentine's Day, our grower makes everyone lunch. A little food goes a long way in showing you care.

Remember corporate culture? This is what it is all about. We have celebratory "Build Your Own Sundae" parties after reaching sales goals. In the spring, we have had a "Smart Cookie of the Week" award (the huge cookies at the mall) that is unveiled in the break room on Monday mornings after a hectic weekend. I have even hired the local university's physical therapy club to come in and give upper body massages.

Try something different, and you'll have THEM eating out of your hand.

OFA

PRIMULA IS STILL A COOL CROP

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Primula has been produced for years as a cool season crop. Several primula species are commercially grown including English primrose or acaulis primula (*Primula vulgaris*, synonym *P. acaulis*), polyanthus, polyantha primrose or hybrid primrose (*P. polyantha*), fairy primrose or baby primrose (*P. malacoides*), and German primrose or poison primrose (*P. obconica*). Chinese primrose (*P. sinensis*) is also grown in limited numbers and some interest exists in producing drumstick primrose (*P. denticulata*) as a container plant.

In addition to flowering potted plants, primula is used together with other plants in potted arrangements, color bowls and hanging baskets, or as a potted plant for outdoor planting in areas with moderate summer temperatures. In recent years, sales in the United States have primarily been as bedding plants in areas with mild winters or early spring elsewhere. The information provided here refers primarily to the production of English primrose and polyanthus, because the production guidelines, flowering requirements, and plant development are similar for these two species.

A large number of primula cultivars are available. The introduction of F₁ hybrids has resulted in improved germination rates, increased flower size, more uniform flowering and better postharvest quality than open-pollinated selections. The Danova series was introduced in 1989 by Daehnfeldt Inc. in Denmark and may be the most widely produced English primrose cultivar today. The Danova series is intended for early-season marketing in November and December in the Northern hemisphere from a June seeding. Cultivars developed and selected for mid-season (January and February) and late-season (February and March) marketing are also available.

The polyanthus is a hybrid, primarily between cowslip (*P. veris*), oxlip (*P. elatior*), English primrose, and Julian primrose (*P. juliae*). The flowers of polyanthus develop in a cluster on an extended main flower stalk. Sometimes this inflorescence is referred to as the polyanthus type in contrast to the acaulis type in English primrose with flowers on individual stems from the center of the plant. For years, the most important polyanthus cultivars have been the Pacific Giant series. The series Concorde, Hercules, and Rumba, with more compact but stronger flower stalks than the older Pacific Giant series, are now also available.

Primula is exclusively propagated by seed. The seed size for English primrose and polyanthus is 28,000 seeds/oz. (990 seeds/gram). Unfortunately, germination is often erratic and low. Improved seed quality, close attention to moisture and

temperature conditions, and the development of F₁ hybrid cultivars with higher seed viability have increased germination rates and uniformity during recent years. A well-drained peatlite medium such as 60 percent fine peat, 25 percent perlite, and 15 percent vermiculite works well for germination and early seedling development. The sowing medium should have a low nutrient content and a pH between 5.5 and 6.0. Electroconductivity (EC) of less than 0.75 mmho/cm (using saturated paste extract) is essential because high soluble salt levels may interfere with germination.

The recommended germination temperature is 60°F (16°C) and should never be allowed to rise above 70°F (21°C). Seed treatments such as exposure to 40 to 50°F (4°C to 10°C) for one or two weeks or soaking the seed in gibberellic acid (the active ingredient of, for instance, the growth regulator ProGibb) for several hours have been tried. The results have been variable, and none of these treatments provide consistent and reliable effects to warrant recommendation.

Most primula cultivars require light for maximum germination or at least to control the height of seedlings immediately following germination. In addition to providing light, sufficient moisture is crucial for good germination and early seedling development. Covering the seeds with a layer of vermiculite, perlite, or any well-aerated medium can be used to improve the humidity around the seeds. The layer must remain thin to allow light to diffuse through to the seeds. An alternative is to add a protective layer later when the radicle emerges 7 to 10 days after seeding. Following germination, the temperature can continue at 60 to 65°F (16 to 18°C). After six to eight weeks, the seedlings should have two or three true leaves and are suitable for transplanting.

A single seedling is planted in a 3- or 4-inch pot. For larger pots, two or more seedlings are used. Similar to the germination medium, the growing medium should be high in organic matter and well drained at a pH of 5.5 to 6.0. Keep the planting depth the same as in the seedling flat to avoid crown rot and other diseases. The plants are spaced when the leaves reach the edge of the pot. Suitable final spacing for 4-inch pots is four pots/ft² (42 to 44 pots/m²).

During germination and early seedling development, the medium should never be allowed to dry out. The seedlings, however, are sensitive to overwatering and waterlogged conditions. When seedlings are established following transplant, they can be allowed to slightly dry out before watered thoroughly again. Plants allowed to dry or grown at uneven moisture readily develop brown, dried leaf edges.

Fertilizing should start as soon as the cotyledons begin to develop, about two weeks from seeding. The initial fertilizer rate should be low at levels of 60 ppm of nitrogen and potassium. The rate can increase up to 200 ppm nitrogen immediately prior to transplanting. During the production phase, fertilizer rates of 90 to 100 ppm nitrogen and potassium from a complete fertilizer with micronutrients are suitable. Primula is sensitive to high soluble salt levels that may result in necrotic leaf margin burns. Recommended EC value is 1.25 mmho/cm (using saturated paste extract). Micronutrient deficiencies or toxicities are common in primula production and a medium pH between 5.5 and 6.2 is essential for micronutrient availability. Regular monitoring of pH, soluble salts, and the nutrient balance in the medium through soil tests is highly recommended.

Unattractive plants with too much leaf growth can usually be traced back to high fertilizer and ammoniacal nitrogen levels. Long days or night break treatments have in the past been correlated to large leaves and, therefore, are avoided. Recent studies under a large number of climatic and daylength combinations failed to associate leaf size to daylength. High ammoniacal nitrogen levels are a common factor in development of long leaves.

Production guidelines for flower initiation in English primrose and polyanthus have traditionally included several weeks at 40 to 50°F (4 to 10°C). The temperature is dropped when plants have developed a good root system and 6 to 10 leaves. To promote bud set, some growers increase the fertilizer rate from 60 to 200 ppm nitrogen and double the potassium rate in relation to nitrogen two weeks prior to temperature drop. The use of calcium nitrate and potassium nitrate with a low proportion ammonium nitrogen has worked well. When flower buds are visible, the temperature can be increased to between 50 to 55°F (10 to 13°C) or remain below 50°F (10°C).

Cooling the plants for up to 10 weeks is expected to improve plant quality by increasing flower number, maintaining smaller leaf size, and reducing the flower stem length. The lower temperature, however, slows overall rate of development, and flowering has been observed at continuous 60 to 68°F (16 to 20°C). Newer cultivars such as 'Dania' do not require a cold treatment, and flower initiation was up to 45 days slower depending on light conditions at 40°F (4°C) compared to 60°F (16°C). Optimum temperature for flower initiation and development was estimated at 55°F (13°C).

Short days used to be considered suitable for primula production. However, flower initiation at low temperature was especially slow when combined with short days (eight hours). Cultivars that do not require low temperature exposure appear to also have altered response to daylength, with long days more beneficial for flowering. When natural daylengths are less than 12 hours, extending the day to 16 hours or utilizing four hours of night interruption at a minimum of 10 footcandles ($2 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$) is now recommended.

A higher night than day temperature (negative DIF) has been suggested to hasten flower initiation. At the same average daily temperature, flower formation and development was faster with a negative (54°F/70°F, day/night) than positive DIF (75°F/54°F). Especially under short-day (eight hours) conditions, negative DIF appears to promote faster bud formation and flowering than constant temperature or positive DIF. Slightly negative or zero DIF is also helpful if plant height (flower stem length) is too great. B-Nine is effective, although proper spacing, temperature, and irrigation are better methods for controlling stem elongation than plant growth regulators.

Even though primula is considered a low-light crop, daily irradiance affects flower initiation efficiency. The optimum daily irradiance for flowering was estimated to 11 $\text{mol}\cdot\text{d}^{-1}\cdot\text{m}^{-2}$ (1,250 footcandles for 12 hours). Shading may be necessary at high natural light conditions to prevent sunscald and improve temperature control, since plant quality decreases above 68°F (20°C). Maximum peak irradiance should not exceed 600 $\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ (3,000 footcandles). Failure to develop flowers may be caused by exposure to cool temperatures before the plant has developed a good root system or temperatures higher



than 68°F (20°C) during the initial stages of floral induction. Stress at any time during plant development has been suggested to cause flowers of English primrose to develop on an elongated stem similar to the inflorescence of polyanthus.

Primula is relatively pest free. Aphids, thrips, whiteflies, and caterpillars are the most commonly encountered pests. During germination and early seedling development, fungus gnats and shoreflies may become a problem. Control of algae growth and the use of insecticides may be required to restrict the fungus gnat population during early sensitive stages of plant growth.

Low temperatures and high humidity are ideal conditions for the development and spread of gray mold (*Botrytis*). Cultural control measures include proper air circulation, sanitation, and irrigation practices. Deep planting, which covers the growing point, predisposes the plant to various soilborne fungi (*Phytophthora*, *Pythium*, *Rhizoctonia*) that cause crown rot. Overwatering may result in *Pythium* root rot. Symptoms of *Pythium* root rot include wilted foliage with brown and soft roots. Brown, necrotic leaf spots caused by *Ramularia* may serve as an entry way for gray mold.

Tomato spotted wilt virus (TSWV) and impatiens necrotic spot virus (INSV) have been identified. The symptoms include browning along the veins of the leaves and yellow mottling. No chemical controls exist for viral diseases. The best control is to rogue infested plants and eliminate thrips, the insect vector that spread the virus.

Primula is marketed when the first five to seven flowers have opened. Proper temperatures for shipping and holding are 36 to 43°F (2 to 6°C) and maintaining the plants well watered is vital for longevity. Primula is highly sensitive to ethylene. A silver thiosulfate spray application at 65 to 165 ppm (0.2 to 0.5 mM) has successfully improved the keeping quality. The home environment is often at low relative humidity and higher temperatures than the preferred 60 to 65°F (16 to 18°C). Although the keeping quality is expected to be limited under these conditions, a high quality primula should flower and remain attractive for 10 to 12 days.

Recently-developed production guidelines call for higher temperatures than traditionally used. With proper attention to nutrition, irrigation, and other environmental conditions, current cultivars grow well at a wide range of conditions including low temperatures. Long or extended days (14 to 18 hours) are essential fast flower formation, especially under low irradiance.

The popularity of primula appears to be everlasting, creating continuous marketing possibilities and opportunities. The many cultivars with an assortment of flower types and colors make primula suitable for a variety of applications and markets. Bedding and landscaping use continues to increase, and the potential as a container plant may be realized with innovative marketing.

OFA

NATIVE PLANTS: THERE IS A MARKET!

Continued from page 1

Resources. We looked at the demand for native plants among home gardeners. We also assessed trends in native plant sales at Maine garden centers and nurseries.

We first developed a free bulletin, *Native Plants: A Maine Source List*, which lists more than 60 Maine nurseries and garden centers that sell native plants. In spring 2000, we distributed that bulletin to home gardeners, along with a companion bulletin, *Gardening to Conserve Maine's Native Landscape: Plants to Use and Plants to Avoid*, which lists more than 125 native plants that possess good landscape qualities. At the end of the 2000 gardening season, we surveyed those gardeners to determine if the bulletins had impacted their purchasing decisions.

To assess the industry's ability to supply native plants, we asked the companies listed in *Native Plants: A Maine Source List* their gross income from native plants, and also asked them what barriers they faced in selling native plants.

Our results are cause for optimism for the native plant market. Eighty (32.9%) of the 243 gardeners who received the survey returned it. Of those 80 gardeners, 63 (79%) reported that they had purchased landscape plants in 2000. Their plant purchases averaged \$339.52, and they spent 45.5 percent of that (\$154.42) on native plants. For the following season (2001), 77.5 percent of the respondents planned to purchase landscape plants, and 80.6 percent of them said they were very likely to purchase some native plants. For the following season (2001), 77.5 percent of the respondents planned to pur-

chase landscape plants, and 80.6 percent of them said they were very likely to purchase some native plants.

The home gardeners relied on the bulletins for information: 77.5 percent of them used the native plant list to decide which plants to buy; 72.5 percent of them used the source list to decide where to shop; and 55 percent of them purchased plants from the businesses in the source list.

We first surveyed the 64 nurseries and garden centers listed in the source list in spring 2000. They were optimistic about native plant sales: wholesalers projected a 6.5 percent increase in sales of native plants in 2000, compared to 1999. Retailers projected a 17.7 percent increase in native plant sales in 2000, compared to 1999 sales. When we resurveyed the same companies in November 2000, they were again optimistic: wholesalers projected a 22.1 percent increase in native plant sales in 2001 compared to 2000. Retailers projected a 14.3 percent increase in native plant sales in 2001 compared to 2000.

Nursery and garden center owners did perceive some barriers to selling native plants. Of the 64 companies surveyed, 29 reported that their customers weren't particularly interested in native plants. In addition, 26 reported difficulties in finding wholesale sources, and 26 felt they needed to learn more about native plants in order to market them effectively.

To summarize this project, we found that some Maine nurseries and garden centers did sell native plants in 2000, and that they were

optimistic about the growth of this product line. Many more companies are probably selling native plants, but do not identify native plants as a distinct product line. Nursery and garden center customers (home gardeners) have a high level of interest in native plants, suggesting that the demand for native plants might increase in the future. Written comments from both industry members and home gardeners suggested the need for education about native plants. Specifically, people need more information about which plants are native, where to purchase both wholesale and retail native plants, and how to use native plants in the landscape.

MARKETING NATIVE PLANTS

If you are interested in highlighting native plants in your business, you might consider the following steps:

Assess the need.

- Talk to your sales staff. Did they see an increase in requests for native plants this past year?

- Survey your customers to determine their level of interest in native plants. After all, if they didn't see any native plant signs in your sales area, they might not have thought to ask your sales staff.

- Check local information sources: libraries, bookstores, gardening magazines, television garden shows, and newspaper garden columns. Has there been an increase in information about native plants in the past year or two? Increased media coverage suggests a growing interest among audience members.

- Call your local county Extension office and adult education agencies. Have Extension agents received

increasing numbers of questions about native plants? Have they incorporated the topic of native plants into their Master Gardening courses? Have they introduced more native plants into their teaching gardens? Are adult education agencies offering courses about native plants? Increased awareness through education creates market demand.

Select native plants.

Obtain a list of native plants for your area. You may find that you already offer more native plants than you realize. You may be able to test this market by simply grouping those plants in one area and promoting them as natives.

If evaluating native plants to add to your offerings, select those that dovetail with popular garden trends in which you already have strength. Select native plants with interest, sustainable maintenance attributes, and sales appeal.

Get started.

- Market the *concept* of native plants, rather than the individual plants.

- Check sources of native plants, and develop a relationship with a reliable source of nursery-propagated native plants.

- Be persistent. As with any new idea, the adoption process takes time.

- Work to promote both your business and the industry. Develop literature within your business to promote your specific line of native plants. On a broader scale, work with your state trade association, Department of Agriculture, technical colleges and/or land grant university to develop literature like *Gardening to Conserve Maine's Native Landscape: Plants to Use and Plants to Avoid* and *Native Plants: A Maine Source List*.

PRODUCING NATIVE PLANTS

Native plants are a large and diverse group of plants in every respect. They vary greatly in their production requirements. Some are easy to produce and have become standard nursery items, but others present such propagation and/or production challenges that only specialists produce them.

It is difficult to generalize propagation and production details of such a diverse group, but if you are considering production of native plants, here is some advice from experts. Susan Greene, head propagator at van Berkum Nursery in Deerfield, New Hampshire, and Steve Effner, head propagator at Western Maine Nurseries in Fryeburg, Maine, are both experienced native plant professionals. They are successfully propagating many difficult native plants. Much of their companies' success with native plants is based on their adherence to these ideas:

Define what you mean by "native plant." Often, people use state lines to define where plants are native. However, if your sales area is very small and has unusual flora, and if you want to market to that niche, you may want to define "native" within your county, watershed, or valley. On the other hand, if you market across state lines, you may want to define your "native zone" more broadly. Keep your focus. However you define

the term, be consistent, be truthful, research plants accurately, and develop a knowledge base that informs rather than confuses your clients.

Be patient. Many unusual native plants are not fast crops. Some wildflowers native to the Northeast, for example, require two seasons just to germinate. Many seed-propagated trilliums do not flower until their fourth year. These are crops for knowledgeable specialist growers with patience.

Consider facility space. Because of the variable production time of native plants, you may find it a challenging juggling act to accommodate space and facilities for storing seed, germinating seed, rooting cuttings, and producing finished plants.

Schedule your crop timing carefully, and maintain enough flexibility to readjust as you learn what specific plants require. Hepatica, a popular Northeast native wildflower, must be transplanted before its summer dormancy. Bloodroot is fairly easily propagated from seed, but you must be by the plants at the moment they drop their seeds in order to collect them. Some woody plants are best propagated from softwood cuttings, others are best from hardwood cuttings; and the timing of collecting both types is dependent on the growing season.

Pay attention to propagation details. You may have "beginner's luck" with a



plant, never to succeed as well again. Propagation literature is sketchy or nonexistent for many native plants, and you'll find that trial and error can be very educational but expensive in both time and money. Learn what you can ahead of time, and then fine-tune your procedures as you gain experience.

Keep records. You'll learn over time, and what you learn will be of great value not only in your production, but also to your clients.

Consider native plants' cultural needs when selecting production sites. It is not always possible to design production sites that are similar to natural habitat sites, especially in large-scale, mechanized production. Finicky native plants can die if they are overwatered while entering a dormant phase, for example. That's why larger nurseries do not always succeed with crops that have unique requirements – and that creates a niche for small nurseries that can accommodate those requirements. Grow native plants that are both marketable and able to thrive in the production facilities you can provide.

Start small. Work out propagation and production

details on a small scale while you get to know the plants' needs, the crop costs, and the market demand.

Maintain your integrity. Adhere to your definitions of native plants, to your philosophy about their conservation in the wild, and to their use in landscapes. Don't cut corners. Native plants with exacting production requirements do not lend themselves to mass production. Don't allow market demand to compromise your crop's quality. Selling a crop early may result in immediate cash and a temporarily happy customer, but if the crop subsequently dies, the long-term result might be a loss of that cash and a customer who shies away from native plants in the future.

Remember that education is critical in the successful production and marketing of native plants. As businesses reported in the Maine survey, there is a need for both producers and end users to learn more about native plants – developing a definition of just what "native" is, choosing native plant crops that fit into an existing product line, and learning how to incorporate native plants into sustainable landscapes. OFA

Kip Or ner

Jim Metzger
D.C. Kiplinger Chair

FACULTY ADDITION STRENGTHENS THE OHIO STATE UNIVERSITY'S COMMITMENT TO FLORICULTURE

Since the return of floriculture research at The Ohio State University in 1994, a strategic plan was developed to map future research. At the outset of the planning process, the goal of the floriculture faculty was to develop a component of the research program that would address an underserved area of importance to the floriculture industry.

That plan contained a major component directed toward developing a program in floriculture crop improvement at the genetic level. Crop improvement is important to the industry for two reasons. First, key to sustained consumer interest in floriculture products is the continual introduction of novel products for the home and garden. But, from the grower's perspective, genetic improvement can also result in the development of new cultivars that require fewer inputs, thereby improving profitability.

In fulfilling our commitment to this component of the floriculture strategic plan, we now have research programs in cultivar evalua-

tion, new crop development, and application of biotechnology to floriculture crops. Moreover, with the recent establishment of the OSU Ornamental Plant Germplasm Center (see KipKorner in the May 2001 *Bulletin*), OSU floriculture research is positioned to make unique and significant contributions to the floriculture industry.

This aspect of our research program has been further strengthened with the recent addition of Dr. Michelle Jones to the floriculture faculty at the OSU-Wooster campus. Her position is 85 percent research, 15 percent Extension, with a focus on germplasm enhancement. In this edition of the KipKorner, I will highlight Jones' research program.

Before we get into Jones' research program, let's first take a short look at her background. She is a product of Iowa, graduating from Iowa State University with a B.S. degree in agricultural biochemistry. She did her Ph.D. work at Purdue where she studied postharvest phys-

iology in carnations, under the guidance of Dr. Randy Woodson. This work was awarded the Alex Laurie award at this year's OFA Short Course. After receiving her Ph.D., Jones accepted a position as an assistant professor in the Horticulture Department at Colorado State University where she taught hormone physiology and continued research on the regulation of flower senescence.

Jones' main research interest is postharvest physiology and its practical application to the floriculture industry. The development of bedding plants and potted plants that retain blooms longer will allow growers to increase the range of shipping and open up new markets. It will also increase the amount of time that these plants are saleable in the retail market and decrease postproduction losses. From the grower's perspective, it would be advantageous to have new cultivars with superior postharvest characteristics rather than relying on an additional step – like a chemical treatment – that may add additional costs to the production of the crop.

Currently Jones is focused on understanding the regulation of flower senescence at its most basic level. Her long-term objective is to identify targets that can be manipulated by genetic means, either by conventional breeding or biotechnology. While the experiments are initially being conducted using petunias, the technology will be transferable to other crops of interest. Senescence represents the last stage in the development of the flower. While the end result of senescence is the death of

the flower, it is a very controlled process with an important recycling and conservation function. During senescence, the cellular components of the flower are systematically disassembled so they can be reused by rapidly growing tissues like the ovary, which contains the developing seed. The initiation and progression of senescence is regulated by the controlled expression of specific genes. Therefore, Jones' laboratory is attempting to identify appropriate target genes for manipulating senescence. Because of the central role of the plant hormone ethylene in regulating senescence, the most likely targets for manipulation are those induced by this hormone.

While most of Michelle's research can be characterized as basic with a long-term pay off, she also has an applied segment to her program. In one project, she is using biotechnology to generate plants with superior postharvest qualities by genetically engineering petunia plants to produce more cytokinin, a naturally occurring plant hormone that delays normal senescence of flowers and other organs. In preliminary results, the life span of the flowers from the transgenic plants can be extended by more than a week. In other work, Jones' laboratory is currently evaluating the use of a new plant growth regulator called MCP (EthylBlock™) that can prolong the postharvest life of cut flowers by blocking the normal action of ethylene. This compound shows great promise as a safe and environmentally friendly replacement for silver thiosulfate. **OFA**

DISEASES OF SEEDLINGS AND A COOL GREENHOUSE

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Diseases of plugs or seedlings can be divided into two types, **preemergence** diseases and **postemergence** diseases. Preemergence diseases occur prior to, or at the time of seed germination. The most obvious symptoms of preemergence disease is that the seedlings never break the surface of the growing medium and you have bare spots. Postemergence diseases occur after the seedling has grown above the medium surface and the seedlings have produced cotyledons or immature true leaves. The most obvious symptom associated with postemergence damping-off is that the seedlings wilt and subsequently collapse onto the growing medium. In most cases, preemergence damping-off is caused by the same three plant pathogenic fungi, *Pythium* sp., *Rhizoctonia* sp., and *Thielaviopsis* sp. Many of the environmental conditions that favor the development of preemergence damping-off are similar for all three fungi.

Postemergence damping-off is usually caused by *Pythium* sp., *Rhizoctonia* sp. and *Botrytis* sp. Like preemergence damping-off, the environmental conditions that favor these pathogens are very similar.

The purpose of this article is to educate the growing professional about the most common pathogens that initiate disease in plugs/seedlings. Practical disease control, particularly when growing seedlings in a cool greenhouse, will also be covered.

Pythium damping-off. This is the most widespread of the damping-off diseases. The disease is caused by the soilborne fungus *Pythium* sp. There are several species of *Pythium* that cause damping-off, and their host range is very large. *Pythium* can cause both pre- and postemergence damping-off. If seeds are planted in a medium that is not well drained, or if the medium temperature is too cool for proper seed germination, *Pythium* will be a problem. The fungus will attack the seed, which rots. The end result will be a bare spot in the flat where a seedling should be. If the seed germinates and emerges from the medium and the conditions are still favorable for the disease, the fungus will attack the stem of the seedling at the medium line and form a stem canker – thus causing the stem to be sunken or too narrow (wire stem) to support the weight of the seedling. The affected seedling will collapse under its own weight and will die. In some cases, the fungus can be seen growing on the collapsed seedling.

Rhizoctonia damping-off. Preemergence damping-off caused by *Rhizoctonia* sp. is not as common as with *Pythium*, however, it does occur. With emerged seedlings, this disease is similar to that caused by *Pythium*, however the way the disease develops on the host is a bit different. *Rhizoctonia* attacks the seedling at the base of the stem (crown) and works its way up the stem causing the seedling to eventually collapse. The diseased stem appears brown and water-soaked and under conditions of high humidity, a brownish web-like growth will be evident on the stem and may cover the collapsed seedling. Severe cases of *Rhizoctonia* on seedling flats are called web blight.

Black Root Rot. *Thielaviopsis brassicola* causes a disease of seedlings called Black Root Rot, and it is very common in plugs of certain bedding plants such as pansies and vinca. The fungus attacks the roots and rots them. The affected seedlings will appear yellow and weak. The infected roots appear black and mushy due to rot and the accumulation of the black fungal resting spores. Unlike *Pythium* and *Rhizoctonia*, *Thielaviopsis* is rarely seen growing on the medium surface.

Botrytis Blight of Seedlings. We can't discuss seedling diseases without talking about *Botrytis* Blight. *Botrytis* sp. is the most common fungus in the greenhouse and it has the potential to cause disease in seedlings, mature plants and flowers. *Botrytis* blight does not cause preemergence disease; however, it is a problem when seedlings have emerged and are grown in cool, moist conditions. *Botrytis* usually attacks and enters the host plant through damaged or senescing tissue. Affected seedlings become soft and rotted and are covered with a brownish-gray fungus.

Bacterial Spot of Seedlings. Although a minor part of the picture when compared to fungi, plant pathogenic bacteria can cause leafspots and rots on young seedlings. The bacteria that cause seedling diseases are many and varied; however, the environmental conditions that favor one bacterial pathogen favor them all. Bacteria can be carried on seed and become active once a seed is planted. In some cases, they may cause a seed rot; however, they are more likely to be a problem on the cotyledons or young true leaves. If caught early, bacterial diseases in seedlings can be controlled and the finished crop will be none the worse for wear.

Control and management strategies for seed and seedling diseases. With all diseases, prevention is the best control. Seed and seedling diseases caused by fungi or bacteria are more of a threat under certain environmental conditions. The following are key suggestions to keeping your seedling crop disease-free.

1. Always start with clean, pathogen-free seed. If you are going to plant seed, make sure you invest in seed that is free of plant pathogens. Many fungi and bacteria can be carried on and in seed. Most major seed companies go to great lengths to ensure that their seed is pathogen-free. Buying cheap seed that is not certified pathogen-free is not worth the risk. Dirty seed equals dirty seedlings.

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DISEASES OF SEEDLINGS AND A COOL GREENHOUSE

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2. Use a well-drained growing medium especially suited for seedling production. For seeds to germinate properly and seedlings to flourish, a specialized growing medium is required. A medium that is well drained, allowing for adequate air exchange, is critical for proper seed germination and seedling growth. A medium that is too heavy will hold too much water for extended periods and encourage root rots such as *Pythium* and Black Root Rot. Also, amending a synthetic medium with any type of native soil is a big mistake. Native soils contain a variety of soilborne fungi and bacteria that can cause seed and seedling disease.

3. Growing seedlings at the proper temperature. This one I can't emphasize too much. During these times of high-energy costs, a grower may feel the need to cut back on the heat. Heat conservation should be avoided as much as possible when germinating seeds and growing seedlings. Most bedding plants produced in a greenhouse are not cool-season plants, and they require the proper temperature for optimum seed germination and seedling growth. Disease-causing fungi such as *Pythium*, *Rhizoctonia*, *Thielaviopsis*, and *Botrytis* are more of a threat in cool temperatures. Heating of plug trays to optimum temperatures to assure proper seed germination and seedling growth will go a long way toward seedling disease elimination. Damping-off is most severe when the temperatures are in the range of 12 to 20°C (53 to 68°F). Remember, this is the soil or media temperature, which may be very different from the greenhouse air temperature. One of the most common mistakes some growers make is putting seed or seedling flats on an unheated floor. Whether it is soil, gravel, or concrete, the unheated floor is the coolest place in the greenhouse. The temperature of the greenhouse floor can be 40 or 60°F, even if the ambient temperature of the greenhouse is in the mid- to high-70°F range. However, if your intention is to cut back on the amount of heat in the house and you are concerned about increasing the incidence of disease, there is a more economical way of raising the media temperature in your seed flats. Don't jack up the heat, just jack up the flats. If you can put them on a bench, that would be best. This puts the flats up in the heat zone of the greenhouse, and warm air is circulating under the flats. If a bench is out of the question, then at least **remove the flats from direct contact with the floor**. Use pressure-treated 4x4s, old wood pallets, bricks, or some other inexpensive way to elevate the flats. Putting them 4 to 6 inches off the floor will make a world of difference and will allow some of the warm air in the greenhouse to circulate under the flat and heat the media from below.

4. Avoid fertilizer toxicity. Seeds and seedlings are highly sensitive to over-fertilization and are easily subject to fertilizer toxicity. Using the proper fertilizer rate for seedlings eliminates the possibility of "burning" or damage to the sensitive roots, especially if the root zone becomes too dry. Note: the proper fertilizer rate for seedlings is probably not the same as the proper rate for pre-finished plants. *Pythium* sp. and *Rhizoctonia* sp. are more likely to be a problem under conditions of fertilizer toxicity.

5. Avoid plant stress. Factors that place a plant under stress are many and varied. Some, such as too much moisture, improper temperatures, and too much fertilizer, we have already discussed. However, there are many other factors that can cause a plant to become stressed – putting the plant in a situation that makes it more vulnerable to pathogen attack. Besides having the proper physical makeup for plug growth, be sure the media is at the optimum pH for the crop you are producing. Plant pathogenic fungi such as *Thielaviopsis* sp. tend to be aggressive when the media is in the range of pH of 6.5 and above. Thus growing a crop such as pansies at a pH lower than 6.0 will result in less plant stress and less disease.

6. Apply strict sanitation techniques. Strict sanitation means running a clean operation. A "clean" greenhouse is a disease-free greenhouse. What is "clean"? Clean means the tops of the benches are free from spent flowers and plant parts. These are all sources of *Botrytis*. It means the area under the benches is free of weeds and volunteer plants. Weeds and volunteer plants can be hosts for viruses and insects and serve as a source for disease. Clean means that the watering hose nozzle is not lying on the floor or coming in contact with the ground. The motile spores of *Pythium* sp. can survive in the moisture on the greenhouse floor and can swim up into the watering hose. A greenhouse full of dust will encourage the spread of the resting spores of *Thielaviopsis* sp. When filling trays and pots with media, dust should be kept to a minimum.

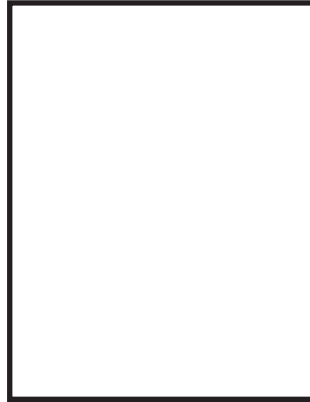
7. Use chemicals sparingly. Once you have done everything you can to eliminate diseases from the seedling production area using cultural controls, it still may be necessary to apply chemicals for disease control. If chemicals are necessary, it is imperative that the proper chemical is used and under the proper conditions. Remember to adhere strictly to the label instructions. When possible, chemicals with differing modes of action should be applied in rotation with one another. The continued use of one chemical with one specific mode of action will eventually lead to resistance to that chemical by the pathogen.

Chemicals and Cool Temperatures. What about the use of chemicals and cool temperatures? This can be the subject of a whole other article, but we need to address some of the general issues here. I remember very little from my college chemistry courses. However, I do remember that "like dissolves like" and that "for every 10°C increase in temperature, the chemical reaction time is cut in half." And likewise, for every 10° decrease, the reaction time is doubled. In other words, the hotter the faster, and the cooler the slower. Most pesticide manufacturers have gone to great lengths with their particular product to keep this type of activity to a minimum. However, this issue needs to be considered when we discuss a cooler greenhouse. Since you are running your greenhouse a bit cooler, it may take you longer to see results with the fungicides that you use. The way to counteract this is to **not double the rate of the fungicide**. The fungicide will work; it just may take a few more hours or one more day. Most fungicide labels give temperature ranges for their products. Just something to keep in mind. By the way, some good news, cool temperatures also slow down the life cycle of most insects.

OFA

New Employee Safety Training

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One of the most important parts of an effective safety program is employee safety training, especially new employee safety training. I am surprised at the number of companies that do not have a formal new employee safety training program. After all, this is the best time to show an employee the importance of safety and the value the company puts on safety. Good safety behavior is easier to achieve in new employees before they have developed unsafe habits. OSHA standards also require training for new employees.

New employee safety training should be separated into two distinct parts, general and job specific. The general part should be done during the new employee orientation and before he or she actually is put on a job assignment. Job-specific training should take place once the employee receives a job assignment and should be conducted by his or her supervisor or designated trainer. This training should be completed during the employee's first week on the job.

Both the general training and the job-specific training should be documented, and both the trainer and the employee should sign and date the documentation once the training has been completed. The training sign-off form should be put in either the employee's personnel file or safety training file, whichever is more convenient. Whichever is used, make sure the records can be produced later if requested by OSHA.

General training topics should include the following topics, but may include others depending on the particular company:

- Company safety policy statement
- General work rules
- Company drug policy
- Safe operation of fire extinguishers
- Company first aid procedures
- Emergency evacuation and reporting procedures

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- Company hazard communication program and types of chemicals used
- Bloodborne pathogens (accident injury clean-up)
- Employee safety responsibility
- Reporting injuries and/or unsafe conditions
- General housekeeping procedures
- Safe lifting procedures

Job-specific topics should include the following:

- Lockout/tagout procedures
- Safe use of ladders
- Types of chemicals used by the employee
- Electrical safety
- Hand and power tool safety
- Job-specific safety training on each job the employee will be required to perform

Other items may be required depending on what a particular employee may be doing. These could include but are not limited to the following:

- Safe driving procedures
- Forklift safety
- Mobile equipment safety
- Crane and hoist safety
- Confined-space entry procedures

In addition to having a training sign-off form that identifies the training to be provided, it is even more important to ensure the individuals doing the training have the necessary knowledge and skills. All too often, the individual conducting the training is not as familiar with the material as he or she should be or has never been taught the proper methods to conduct the training.

All trainers should possess good verbal skills, be enthusiastic, and believe in the importance of the material being presented. Poor trainers will not be able to convince new employees about the important of safety, and often simply bore them.

Another area that is important to new employee safety training is having the time available so the training can be conducted properly. All too often, the training is rushed or certain areas are skipped to save the time.

Remember your employees are your most important assets, and their safety should be a prime concern to the company. This should be reflected in the time and effort taken when they are first hired to ensure that safe work habits are developed. It is much easier and less time-consuming to start employees right than to try to change engrained poor safety behavior.

If you need help setting up a new employee safety training program or any other safety related assistance, contact a safety consultant in your area. **OFA**

NEW OSHA RECORD KEEPING RULE APPROVED

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The Occupational Safety and Health Administration's (OSHA) new record keeping rule has been approved and will go into effect on January 1, 2002. This rule replaces the current OSHA 101 Individual Injury Report and the OSHA 200 Annual Log of OSHA Recordable Injuries with the OSHA 301 Injury and Illness Incident Report and OSHA 300 Log of Work Related Injuries and Illnesses. Most U.S. businesses are required to keep records of work-related deaths, injuries, and illnesses that occur in their workplace, although employers with 10 or less employees are exempt from the record keeping rule.

The new rule will improve how the government tracks occupational injuries and illnesses by making the forms simpler, providing clearer regulating requirements, allowing employers more flexibility to use computers to meet OSHA regulatory requirements, and updating the list of exempted industries to reflect recent industry data.

The new Record Keeping Rule makes the following changes:

- Eliminates different criteria for recording work-related injuries and work-related illnesses; one set will now be used for both.
- Requires records to include any work-related injury or illness resulting in one of the following: death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, loss of consciousness, or diagnosis of a significant injury/illness by a physician or other licensed health care professional.
- Requires a significant degree of aggravation before a pre-existing injury or illness becomes recordable.
- Requires employers to record standard threshold shifts

(STS) in employees' hearing. (An STS is an adverse change in an employee's hearing threshold, relative to his/her most recent audiogram.)

- Applies the same recording criteria to musculoskeletal disorders (MSDs) as to all other injuries or illnesses.
 - Includes separate provisions describing the recording criteria for cases involving the work-related transmission of tuberculosis or medical removal under OSHA standards.
 - Eliminates the term "lost workdays" and focuses on days away or days restricted or transferred. Also includes new rules for counting that rely on calendar days.
 - Requires employers to establish a procedure for employees to report illnesses and inform their employees on how to report. Employers are prohibited from discriminating against employees who report illnesses or injuries. For the first time, employee representatives will have access to those parts of the OSHA 301 form relevant to the employees they represent.
 - Protects employee privacy by prohibiting employers from entering an individual's name on Form 300 for certain types of injuries/illnesses (e.g., sexual assaults, HIV infections, mental illness, etc.); providing employers the right not to describe the nature of sensitive injuries where the employee's identity would be known; giving employee representatives access only to the portion of Form 301 which contains no personal identifiers; and requiring employers to remove employees' names before providing the data to persons not provided access rights under the rule.
 - Requires the annual summary to be posted for three months instead of one, from February 1 to April 30.
 - Changes the reporting of fatalities and catastrophes to exclude some motor carrier and motor vehicle accidents.
- If you have any questions about the new record keeping rule or any other safety related questions, contact a safety consultant in your area.



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