

In This Issue

2	From the Desk of the President
3	Association News
3	Welcome New Members
4	U of D News
5	Winter Monitoring
6	UDBG on the Internet
7	Falling Down and Piling Up
10	Sunny Days for the Greenhouse and Nursery Industry
13	Estimating Equipment Costs
14	Developing Effective Interpretation
16	Marketing Perennials in the Garden Center
20	Poinsettia Quality: Beyond the Bench
23	Deer Control - The War on Bambi
26	Pesticide News
29	Research Briefs
33	Publications
34	Calendar

**FROM THE DESK OF THE PRESIDENT
Christopher Valenti, President, D.A.N.**

The following news release was sent out in conjunction with a tree planting to thank the governor for his responsiveness to the needs of the nursery industry during the drought. Thanks to all the D.A.N. members that participated in this effort.

**Cooperation between the State of Delaware
and the Nursery Industry**

A member of the Delaware Association of Nurserymen (D.A.N.) donated this tree today in recognition of the State of Delaware's consideration and implementation of water conservation suggestions by the Delaware nursery industry during this year's drought emergency. At the Governor's drought advisory board hearing, the D.A.N. testified about the impact that water restrictions would have on the nursery industry in Delaware and proposed ways our industry could conserve. The State listened. When Executive Order Number Thirty Five was implemented, our conservation suggestions were adopted. As time passed, our association realized that homeowners who had invested in new landscapes could lose their investments unless they were permitted to water on a limited basis. In late September, temperatures had dropped significantly, and fall was quickly approaching, thus lowering newly installed trees' and shrubs' need for water. The D.A.N. suggested allowing homeowners to water briefly once per week, in exchange for the nursery industry cutting back even further in water consumption. The State listened and Executive Order Number Thirty Five was amended.

We would like to recognize the Department of Agriculture for its efforts and expertise in helping our industry through this crisis. The

D.A.N. represents the diverse nursery industry in Delaware, which is recognized as the third fastest growing agricultural commodity in the First State. Also, DNREC (Department of Natural Resources and Environmental Control) worked with the D.A.N. to develop water saving strategies. In addition, the University of Delaware Cooperative Extension system researched our proposal and helped quantify the amount of water that could be saved. Finally, the Governor's office listened and implemented the changes to Executive Order Number Thirty Five.

The D.A.N. is proud to be part of this cooperative effort between industry, state government and the University of Delaware. As a result, the citizens of Delaware come out as winners.

NOTE: The tree being planted today is Sweet Bay Magnolia (*Magnolia virginiana*), a native Delaware species. This species was recognized by the nursery industry of Delaware as the 1995 Plant of the Year.

ASSOCIATION NEWS
Marianne McGloin
Executive Director, D.A.N.

Mark your calendars for the 1996 Delaware Horticultural Industry Expo. The brochures have just been mailed. The program has some exciting new changes. Notice the introduction of the employee enrichment session on January 17 which will run concurrently with the management session. We urge everyone to register their employees for this valuable session.

The 1996 Plant of the Year are *Echinacea purpurea* 'Bright Star' (purple coneflower) and *Viburnum nudum* 'Winterthur' (Winterthur viburnum). Promotional material will be available at the Expo. I would like to thank everyone on the selection committee for their contribution.

Now is the best time to begin preparing for the next CNP exam on March 29, 1996. Manuals are available from the D.A.N. and short courses are available through Cooperative Extension. Please call Marianne McGloin or Sue Barton for additional information.

I would like to take this opportunity to say good-bye and thank you to Dick Sterling, Diane Hill, Rosemary Richardson and Tim Ross for their time and support on the board. Finally, a big goodbye to Chris Valenti who has been a huge asset to the D.A.N. for the past two years. He has been a great spokesperson and advocate for the industry and will be greatly missed.

Sadly at the end of 1995 we have lost a dear member of the D.A.N. Ray Wrede of All Seasons Nursery and Garden Center passed away on December 1, 1995. He was extremely involved with the Delaware Senior Olympics so the D.A.N. has made a contribution to the

organization in his name. Our hearts and thoughts are with the Wrede family.

Quote for the Quarter: Never worry about the size of your Christmas tree. In the eyes of children, they are all 30 feet tall.

Larry Wilde, The Merry Book of Christmas (Bantam)

I wish everyone in the D.A.N. a joyful holiday season and a prosperous New Year. Hope to see everyone at the EXPO!

Marianne

WELCOME NEW MEMBERS

Active

Rain Designs, Inc.
521-A Otis Drive
Dover, DE 19901

Warner Landscape Services
74 Southgate Blvd.
New Castle, DE 19720

Paulish's Lawn Care and Landscaping Co.
Holly Hill Est. Lot 90
Smyrna, DE 19977

Lynch's Services
107 Landing Drive
Rehoboth, DE 19971

Associate

Delaware Center for Horticulture
1810 N. DuPont Street
Wilmington, DE 19806

Individual

James Baynard
P.O. Box 243
Townsend, DE 19734

Todd Gruwell
383 Banning Road
Camden, DE 19934

Delbert Glanden
RD #2, Box 211
Clayton, DE 19938

Dean Johnson
2804 Herbert Drive
Wilmington, DE 19808

U OF D NEWS
Susan Barton
Extension Specialist

The 1996 Short Course Program has been planned and flyers will soon be mailed. You should receive one in early January. We are trying several new things in response to your suggestions from the survey we took this fall. We placed more courses in January, February and March. We are also trying several one-day courses. We are devoting one day to a specific topic such as business management, computers in the greens industry, and irrigation. We hope that more of you who could not make time to attend a course that extends over a three- to six-week period will be able to commit to a one-day course. The first one-day short course is Business Management for the Nursery and Landscape Industry. It will be offered on January 16 at the Sheraton as a preconference course to the Delaware Horticulture Industry Expo. We are sending out a flyer that will help advertise the expo and entice enrollment in both programs by offering reduced registration fees for those who attend the expo and the preconference course. We are offering short courses in three locations (Georgetown, Dover and Newark) throughout the state. Look for the following titles for 1996.

Session 1 (January - March):

Business Management for the Nursery and Landscape Industry
Running a Landscape Business in the Electronic Age
Diagnosis and Control of Insects on Woody Ornamental Plants
Advanced Pruning
Turf Management
Evergreens for the Landscape
Irrigation Design, Installation and Operation for Turf and Landscapes

Session 2 (July - August):

Annuals, Bulbs and Grasses for the Landscape
Perennials for the Landscape

Diagnosis and Control of Diseases on Woody Ornamental Plants
IPM in the Landscape

Session 3 (October - December):

Weed Control in Turf and Ornamentals
Drafting Techniques for the Landscape Designer

The D.A.N. sent out a request for proposals to researchers and extension professionals in Delaware in early December. We looked at your suggestions and prioritized areas of interest for these potential projects. Proposals will be due by January 31, 1996, evaluated in February and announced by March 1, 1996. We hope this will generate some research or education projects that benefit the Delaware nursery and landscape industry. If you know someone who would like to receive a request for proposal, please let me know.

The Garden Center Christmas Tour was great. Forty people from Delaware and Pennsylvania toured three Garden Center Christmas Shops. We learned something different from each one. The last tour stop, Homestead Gardens had the most spectacular displays. It is worth a trip to Davidsonville (near Annapolis) for anyone who has a Christmas shop, wants ideas for Christmas or simply enjoys looking at creative displays. This tour continues to be a great opportunity to learn from others both at the tour sites and through discussions on the bus.

I will be going on professional leave from July through December, 1996. I am planning to work on several projects including garden center consulting with Malcolm Scott Consultants. I hope to bring back great information for Delaware nursery people. My responsibilities will be covered by Jo Mercer, Jay Windsor and Gordon Johnson, so you know you will be in good hands. Have a great holiday!

WINTER MONITORING

While you wait for the big snows to hit this winter, why not get a jump on the next season by doing some winter monitoring and mapping. Review client records and determine where there have been recurrent problems. Go out and check injury symptoms and overwintering structures to better plan your spring treatment programs. Some problems, such as Eastern tent caterpillar, pine sawfly and bagworm can be controlled with some simple pruning now. Look for the following pests or their symptoms as you scout this winter.

1. **Adelgids.** Look for galls caused by the Cooley spruce gall adelgid on stem tips of Engelmann, Oriental, Sitka and Colorado blue spruce. For Eastern spruce gall adelgid, look at the base of last year's growth on Norway spruce, Colorado blue spruce, red spruce and white spruce. Hemlock stems may harbor white masses of hemlock woolly adelgids.

2. **Bagworm.** The bagworm overwinters as eggs in the females discarded pupal case. Pick off or prune out these bags to reduce the population that will hatch in early summer.

3. **Black knot.** Look for hard black galls that get bigger with age on cherries plum and other *Prunus* members.

4. **Black vine weevil.** Look for the tell-tale notches of black vine weevil on azalea,

euonymus, holly, rhododendron and other broadleaf evergreens.

5. **Cankers.** Sunken, discolored patches on tree stems and trunks indicate infection by a variety of fungi including *Nectria* and *Botryosphaeria*.

6. **Eastern tent caterpillar.** Eastern tent caterpillar overwinters as eggs laid on thin branchlets. Especially susceptible trees include apple, crabapple and cherry. Prune out those eggs to reduce the population present next season. The egg mass looks like black styrofoam encircling the branch. Look at the branch tips. If the sun is out, egg masses will glisten in the sun.

7. **Forest tent caterpillar.** These egg masses are rectangular and encircle small branches on ash, basswood, birch, elm, maple, oak, sweetgum and tupelo. Prune out egg masses when discovered.

8. **Gypsy moth.** Light brown, hairy egg masses can be found on the undersides of branches or on trunks. Where feasible, remove masses.

9. **Lacebug.** Look for leaf stippling, underleaf fecal drops and eggs laid in the leaf tissue along major veins on leaf backs of azalea, pieris and rhododendron.

10. **Pine sawflies.** Eggs are overwintered inside the needles of many two-needles pines. Eggs are laid in the needles at the tip of the branches. Look for a regular pattern of yellowish to brownish green dots along one side of the needle. Several needles on the same branch are often chosen for egg laying.

Pruning out these infested needles will reduce populations but don't rely completely on this control because some will be missed.

11. **Spider mites.** Stippling, bronzing, chlorosis and egg masses on leaves of azalea, chamaecyparis, ilex, juniperus, picea, pieris, thuja and tsuga indicate the presence of spider mites.

12. **Tip moths.** Nantucket pine tip moth and European pine shoot moth overwinter as pupae in growing tips. Prune out browned tips to remove the pupae.

Excerpted from "Winter Monitoring" by Robert G. Way, *Landscape IPM Notes*, Rutgers and from "Winter pest monitoring tips", *Nursery Management and Production*, May 1995.

UDBG ON THE INTERNET
John J. Frett, Associate Professor
Elizabeth O. Mackenzie, Research Associate
University of Delaware

A Mosaic tour of the University of Delaware Botanical Gardens is on-line at the College of Agricultural Sciences. This tour provides fact sheets about plants in the garden. Each sheet is a mosaic page with on-line images of the plant. Hyper-links include a sound file of the pronunciation of the Latin plant name and images of the plant including buds, flowers, fruits, leaves, and other characteristics. A map of the garden is provided on each page identifying the plant's location to orient visitors and students. There are currently over 1500 images in development.

The Mosaic Tour of the University of Delaware Botanic Gardens can be accessed via
URL:<http://blue-hen.ags.udel.edu/udgarden.html>.

The "Tour of the University of Delaware Botanic Gardens" is being developed to serve several different audiences. First, the program is used in both the woody and herbaceous plant materials courses taught at the University of Delaware. Students can use the program as a study aid to enhance lecture materials, locate plants for study in the botanic gardens and view plants in multiple seasons through on-line images. Secondly, the program will provide information to garden visitors. Visitors may access a list of the plants in the garden, obtain information specific to an individual plant, locate a plant in the collection via a map, or identify a plant in the garden based on location. Finally, any internet user may access the program for general information about landscape plants, or the University of Delaware Botanic Gardens (UDBG).

The botanic gardens program includes plant description pages that present information in a standardized format. This general information is available in many reference texts, but the unique aspect of this program is the link to image and audio files. The audio files provide the pronunciation of the Latin name. This is a great aid to students and visitors who are unfamiliar and intimidated by botanical Latin. The image files are the greatest asset to the user. Multiple images are available to provide additional information and clarification in the context of the text the user is reading. For example, if the user is reading a description of the red fall color of *Acer rubrum* (red maple), the user can access a color image of the red fall color of this plant. If the user can not quite picture a reddish ovoid, imbricately scaled, terminal bud, a glossary is available by clicking on the word glossary at the bottom of each plant information page. This may or may not answer all the user's questions sufficiently but the image is also available to illustrate the terminal bud of red maple. Multiple images are available for each plant and are being continually updated. Over 1500 images are currently being linked to text in this application. To say that a flower is outstanding, attractive, or of no significance requires a judgement by the author but the images allow the user to make the decision.

The newest addition to the features available is a link to an insect program in the Department of Entomology and Applied Ecology at the University of Delaware, being developed by Dr. Dewey Caron. Each plant information page has a list of pests that can be detrimental to the plant. As the insect program develops, the user will be able to click on the insect name and move to the insect program to obtain information on the life-cycle and control of the insect. Images are also available to aid in the identification of the insect problem.

FALLING DOWN AND PILING UP

Lori Ward Bocher

Soon the time will come when that well-cared for turf is under a blanket of snow. When that happens, many turf professionals will turn their attention to the concrete and asphalt on their properties and the need to remove the snow and ice that will invariably cover it.

"Today's society expects clear pavement," said Ron Silvernail, Director of Marketing for Meyer Products, a company that manufactures snow plows for pick-up trucks. "They won't drive in (to a place of business) if there's snow."

In recent years Silvernail has seen a major shift in their market. "Service stations used to have some type of a plow and did lots of snow removal," he reported. "Today it's the landscaper who removes more snow. They have the pick-up trucks that they need. They fit right into the picture. The service station is gone now. That provided an opening for the landscapers."

Meyer Products manufactures 17 different snow plow models for pick-up trucks, with the moldboards ranging from 6 to 10 feet wide. According to Silvernail, they can be attached to any truck, from a sport utility on up, as long as the manufacturer recommends putting snow plows on its vehicles.

Polymers vs. Steel

The Meyer MAX is made of polyethylene, not steel. "We were one of the pioneers of the polyethylene blade for our particular size of snow plow," Silvernail said. "The polyethylene blade provides reduced maintenance, better snow rolling action and more efficiency. It's also stronger, pound-for-pound, than steel. So we offer a two-year warranty on that moldboard."

"There is a stigma associated with polymers because people think of them as plastics, and many people think plastic snow plows couldn't be very good," Silvernail continued. "But, in fact, they are good. They've been used at airports for years on those huge, 20-foot snow plows."

Meyer plows feature a Quik Lift. "That's the hydraulic system that raises, lowers and power angles the blade," Silvernail explained. Another feature is a tactile pad control. "It's like a flat, rubberized surface with raised letters. It requires just a touch of the finger. It's totally electronically controlled. It can be mounted anywhere in the cab that's convenient, and it's illuminated for night operations."

The E-Z Mount system makes it easier to remove all hardware from the front end of the truck when it's not being used for snowplowing. "One feature that we have over our competition is that it comes off in two pieces," Silvernail pointed out. "You have the option of removing the moldboard as one module. And you can remove the lift frame, lights and power unit as a separate piece. With two pieces, it's more manageable because it's not one extremely heavy piece of equipment."

Doing Double Duty

People who care for turf during the summer also have an arsenal of small tractors that can do double-duty as snow removal machinery during the winter. That double-duty usage is given special emphasis at Excel Industries, Inc. Best known for its commercial lawn mowing equipment, the company also manufactures its own line of snow removal equipment to attach to its Hustler.

"We have always prided ourselves on making our equipment usable year round," said Advertising

Manager Ken Raney. "You don't have to let it sit all winter and do nothing."

Excel manufactures a 60-inch V-blade, 60-inch and 72-inch dozer blades, and a 54-inch snow thrower - all which can be attached to their Hustler. "The V-blade is just super for cleaning off sidewalks, like on a college campus," Raney said. "You just go right down the middle of the sidewalk and it throws the snow off to either side." Excel's two-stage snow thrower has a discharge chute that can be rotated 190 degrees from the driver's seat. "You don't have to get out and turn it. Everything is handled from the operator's station," Raney said.

Rick Rodier, a marketing manager for Toro, believes that customers are looking for more user-friendly features in snow throwers these days. "In the past, it was more common to have manual actuators or chute control," he said, adding that the operator would have to get off the machine and manually turn the chute from one side to the other. "Now we're seeing more demand for electric actuators so the operator can flip the switch and turn the chute right from the control panel."

Toro manufactures two snow throwers - a 48-inch, single-stage thrower for its smaller riding products; and a two-stage thrower that fits on its popular Groundsmaster 300 Series. Another manufacturer makes snow throwers for Toro's other Groundsmaster products.

"In general, the tractors that we sell are mainly designed to cut grass. But they have design characteristics that make them work well in other applications, and we're seeing more demand for these products to be used for snow removal," Rodier pointed out. "Municipalities especially have an interest in snow removal products," he continued. "In the past, they would have smaller walk-behind equipment and larger plow equipment do their work. Now they're thinking

that they can get year-round use out of their mowing equipment by using those tractors for clearing snow. In some cases, they end up averaging as much time on their machines in the winter as they do in the summer with mowing."

Hanson-General Products manufactures the larger snow throwers for Toro. It also manufactures units for Jacobsen, Ransomes/Cushman and Garvely, according to Wally Waliullah, Products Engineer. "We use composite liners in our discharge chute and impeller fans to prevent ice formation," Waliullah reported. "There's less of a chance of it getting clogged up." Their units also have electric discharge chute rotation so the direction that the snow blows can be controlled from the cab.

"The customer is always looking for more power and faster removal time," Waliullah said. "We make the attachment for the tractor so the power is whatever is available on the tractor. But we take advantage of the optimum speed, along with high torque, to get the optimum throwing distance. So when you run into heavy or wet snow, it doesn't slow down the snow blower or bog it down."

At Hanson-General Products, they make all two-stage snow blowers. "With single-stage, you probably don't have the power," Waliullah said, adding that there's only one rotating auger to do the work. "With a two-stage, the impeller housing is right behind the auger housing, so the auger is always keeping the housing full. You have a continuous flow of snow coming in, so you probably have faster snow removal time."

Ice Melt Products

Sometimes a thin layer of ice, not a foot of wet snow is the problem. That's when ice melting products come into the picture. "In order to effectively melt ice, you really need a chloride," explained Matt Lederer, sales and marketing

assistant for Vigoro Consumer and Professional Products. "There are four commonly used types of chloride. The first, of course, is rocksalt, or sodium chloride. The second is potassium chloride, also known as potash. Then there are calcium chloride and magnesium chloride."

As Lederer reported, sodium chloride will effectively melt ice at temperatures down to 5 degrees F. Potassium chloride will melt at temperatures down to 15 degrees F, making it impractical for many applications; but it melts for long periods and prevents re-freezing. Calcium and magnesium chloride melt at lower temperatures (calcium chloride down to -25 degrees F); but they also have side effects, tend to refreeze quickly and may require frequent applications.

"For those applying an ice melter, their primary concern are going to be concrete damage and vegetation damage," Lederer pointed out. "The best way to eliminate vegetation damage is to use an ice melter with a balanced formulation of ingredients that are gentle to vegetation. Potassium chloride is a basic fertilizer ingredient so it tends to be a lot safer than many of the other ingredients. But, if you over-apply it, as with any ice melter, you're still going to burn out the vegetation."

Concrete damage is caused by a freeze/thaw cycle, Lederer explained. "Moisture seeps into surface pores, re-freezes and expands. When it expands, it tends to stress the medium and pop or crack the concrete. To avoid concrete damage, we recommend that people remove the slush that's generated from melting ice and snow. We also recommend that, before any snow falls, they seal the surface with a good sealant.

"With our ice melters, we use additives that extend the product's melting cycle to prevent or lessen the chance that it's going to refreeze," Lederer said. "Our main ice melter is called Safe

Step, and Safe Step will reduce refreezing up to two-and-one-half times longer than calcium chloride." Vigoro produces ice melters under six different labels, and each has a different formulation, according to Lederer.

When it comes to applying ice melters, Lederer offers these strategies for various snow and ice conditions: Light, powdery snow: may not need ice melter - shovel or sweep first. Sleet, freezing rain or ice: apply before precipitation, then as needed - but use early to prevent bonding. Wet, heavy snow: apply before precipitation, then as needed - shovel and reapply if needed. Large accumulations: apply on hard crust after shoveling - shovel as much as possible before applying.

Akzo Nobel produces an extensive line of de-icing products under the Diamond Crystal brand name. "One product we've just designed is called Diamond Crystal JiffyMelt," reported Mary Kay Warner, Public Relations Manager. "That product has been developed specifically for use near sensitive foliage. It's also intended to work fast in sub-zero temperatures."

Diamond Crystal Halite is Akzo Nobel's consumer version of highway deicing salt. LoCor is a special low-corrosion de-icer formulated for use on bridges and structures containing metalwork. "LoCor can more than double the life of steel structures by sealing metal surfaces after it melts ice," Warner said.

Reprinted with permission from *TURF NORTH*, November 1995.

SUNNY DAYS FOR GREENHOUSE AND NURSERY INDUSTRY

Geneva Wilks

A recent study done by the University of Georgia revealed that the US greenhouse and nursery industry is the second most important sector in US agriculture in terms of economic output. The study accounted for the value from inputs purchased and from product handling, distribution and marketing. The study also brought to light that, among the various agriculture sectors, the "green" sector is a major employer. Only the combined crop sector, including vegetables, fruits, tree nuts, and hay and pasture employed more person-years in 1990.

In 1994, grower cash receipts for greenhouse and nursery products rose an estimated 5 to 6 percent to more than \$10 billion, according to USDA. Additionally, USDA forecasts that the green industry will generate a 5 percent increase in receipts this year, with sales reaching nearly \$10.5 billion. Grower cash receipts are expected to continue to gain about \$400 million annually, reaching \$12.8 billion by 2000 and \$15 billion by 2005. The rate of growth in the industry will be healthy, although not as rapid as during the previous decade.

The US floriculture sector (which is cut flowers and greens, potted flowering and foliage plants for indoor use) is the largest in the world in retail dollars, worth an estimated \$13.5 billion in 1994 (this amount includes expenditures for domestic products plus imports). The US is followed by Japan, with retail expenditures of about \$10.8 billion.

US consumers spent an estimated \$52 per person on cut flowers and greens and indoor potted plants in 1994. Total expenditures are expected to rise 5 percent this year, to \$14.2 billion, or \$54 per person. This compares with an estimated

\$9.3 billion, or \$39 per capita, in 1986. Most of these items are sold for indoor decorative use by retail floral shops, grocery stores, and street vendors. An estimated 42,000 retail florists account for about 54 percent of US retail floral sales, while an estimated 24,000 non-florists (supermarkets, discount stores, and street vendors) comprise the remaining 46%. The majority of flowers and plants are sold for special occasions such as weddings, funerals, holidays, and birthdays.

The US floral market is expected to continue to grow for the remainder of the 1990s. With additional help from "PromoFlor," a new industry-funded program charged with conducting promotional and consumer information activities focusing on maintaining and expanding the market for US floral products, sales of fresh cut flowers and greens should take off.

On a per capita basis, expenditures on floral products by US consumers trail those of consumers in Japan, Norway, Switzerland, and other European countries, but the US cut flower market is expanding rapidly. According to estimates by the Flower Council of Holland and recent data gathered by USDA's Economic Research Service, in 1994 the US ranked 12th in the world for per capita expenditures on cut flowers and greens, at \$25, while Japan ranked near the top at \$62. The US was second after Japan in 1994 in total expenditures for cut flowers and greens, with US consumers spending about \$6.9 billion, compared with nearly \$7.8 billion by Japanese consumers.

The US is the world's largest producer and market for outdoor landscaping flowers and plants, including trees, shrubs, ground covers, sod or turfgrass, and bedding and garden plants. US retail expenditures for outdoor landscape flowers and plants totaled an estimated \$31 billion, or

\$119 per person in 1994, and are expected to increase 4 percent this year.

Earnings Increase for Floriculture Growers

According to USDA, grower sales of all greenhouse and nursery crops in 1994 accounted for 11 percent of cash receipts for all farm crops. The sector was the sixth-largest commodity group in US agriculture in grower cash receipts, behind only beef, dairy, corn, soybeans and broilers. The green sector ranks in the top 5 commodity groups in 26 states, in the top 10 in 43 states, and the top 20 in all states, in terms of cash receipts.

Grower cash receipts for greenhouse and nursery crops (including turfgrass but excluding seeds, Christmas trees, and greenhouse vegetables) have been rising steadily for more than three decades. Grower cash receipts for the floral crops sector (cut flowers and greens, potted flowering and foliage plants) totaled about \$2.2 billion in 1994, which is a 5.6 percent gain from 1993. Receipts last year were higher for all floral categories except potted flowering plants, which were down slightly because of a change of consumer preference to indoor non-flowering plant varieties.

Grower sales of environmental horticulture crops (excluding bedding and garden plants) rose 3 percent in 1994, to about \$6.3 billion. The gain was less rapid than for floral crops, as rising interest rates during 1994 began to slow housing starts and commercial construction. With continued sluggish activity in the construction sector during the first half of the year, increases in grower sales for these crops in 1995 are forecast to remain nearly unchanged.

Uncertainty in the economy has caused individuals and businesses to cut back or delay maintenance and upgrading of their grounds in 1994, hurting the landscaping business and adversely affecting grower sales, mainly of trees, shrubs, and ground covers (including turfgrass sod). Demand for bedding and garden plants,

however, remained robust. Bedding plants are cheaper than perennials, and are easier to replace.

Continued Growth in Floral and Nursery Products

In worldwide production and trade of floral and nursery products, expansion rapidly continues. World imports of cut flowers and decorative greens, live plants, and bulbs reached an estimated \$8.5 billion in 1994, up from \$5.5 billion in 1989, and are predicted to swell to \$13 billion by 2000. Eighty percent of this trade occurs within the European Union (EU), but countries in the Western and Southern Hemispheres are dramatically increasing their production and trade of floriculture products.

Consumer demand for flowers and plants worldwide is growing as incomes increase in developing countries and as improved production, storage, and transportation capabilities enhance product supplies in more countries.

Reductions in import duties and other trade barriers, especially in the US, Latin America, Europe, and Japan, should greatly benefit world trade of greenhouse and nursery products. The trend towards free market economics worldwide should further stimulate trade.

US cut flower imports could double the 1986 level reaching \$500 million in 1995, and US imports of other greenhouse and nursery products, such as live plants, bulbs, and propagative materials, could exceed \$200 million this year, triple the 1986 figure. US exports of floriculture and other greenhouse and nursery products, although surpassed by imports, have risen substantially over the last decade, growing from \$81 million in 1986 to more than \$200 million in 1995.

For the remainder of the 1990s, the use of houseplants, cut flowers, and decorative greens for beautifying interior spaces as well as the use of bedding and garden plants, and other herbaceous plants and perennials to enhance and maintain landscapes are expected to continue to increase. If expected growth trends prevail and future challenges are met, there will be sunny days ahead for the US green industry. The floriculture and environmental horticulture sectors should each continue to grow at about 4-6 percent annually. Growth will be constrained or spurred depending on general economic conditions, global competition, product availability and prices, and production costs.

Several new and ongoing challenges confronting the US green industry will influence production, wholesaling, and retailing of floral and nursery products. Producers are likely to face greater pressure to conserve natural resources and preserve the environment. Major regulatory challenges for the industry will continue to center on water quality, worker protection standards, and the use of chemicals by nurseries and greenhouse operators.

Changes in phytosanitary regulations will likely affect international trade in flower and plant products. USDA's Animal and Plant Health Inspection Service has proposed revisions to Q-37, the Plant Protection and Quarantine Act, to allow entry for four additional plant genera in growing media. Domestic growers of nursery and greenhouse products oppose any changes to Q-37, because of concerns of the possible introduction into the US of new insect and/or disease infestations.

In conclusion, the growth and success of the US green industry has been accomplished without Federal price support programs, and with minimal Federal research dollars. The green industry will likely remain an important sector in US agriculture and within the total economy,

although challenges to production and marketing will have to be met if the industry is to continue to flourish.

Reprinted from AGRI-VIEW, WEFA Group, October 19, 1995

ESTIMATING EQUIPMENT COSTS

James Huston

This article was provided by the American Association of Nurserymen in partnership with the D.A.N. For more information on AAN, call (202)789-2900 or fax (202)789-1893.

Determining the correct cost for a piece of equipment, and allocating the correct amount to a specific job you're bidding on presents one of the biggest challenges to a contractor's estimating system. It is here that most systems develop "fatal flaws. Some of the largest landscape contractors in the country have "gone broke" because they didn't know how to effectively identify and control incurred equipment costs.

Before equipment costs can be allocated to a project you're bidding on, the cost per hour (cph), and the three components which make up the cph, must be determined for each piece of equipment used on a particular job. A form can be used to help collect and calculate data necessary to compute the cph for your equipment. Below is an explanation of how the cph for a pickup truck was calculated.

Determining Cost Per Hour

The acquisition component of cph is the first item calculated when computing a cph for a specific piece of equipment. For your pickup, it is the sum of the purchase price (including lifetime interest, dealer prep, racks, tool boxes, special paint). Subtract the anticipated salvage value of the truck when it is traded-in. Then divide this total by 8,320 projected lifetime hours (4 years x 2,080 hours/year) to get acquisition cph.

To determine the maintenance component of cph, take the sum of the projected lifetime maintenance (insurance, licensing, painting, and repair costs) and divide it by the 8,320 lifetime

hours. If you have an in-house mechanic, use market prices for maintenance costs unless you have detailed records of in-house costs. Otherwise, you might understate these costs.

The fuel/gas and oil component of cph is calculated differently for light duty (LD) trucks-under two ton-and automobiles as compared to heavy duty (HD) trucks and field equipment (i.e. tractors, trenchers, mowers, etc.). For HD trucks and field equipment, fuel gallons consumed per engine running or meter hour is multiplied by the cost of a gallon of fuel. Oil additives, if applicable, are added to these calculations. However, for LD trucks and autos, the total fuel cost for the year is divided by 2,080 (8 hours/day x 260 days/year) hours for the year to determine fuel cph.

The total cph for a piece of equipment is simply the sum of the three components: acquisition, maintenance and fuel/gas and oil. However, total cph calculations for HD trucks/field equipment vary in two important ways from the LD truck and automobile example.

First, lifetime hours for HD trucks comprise total "meter" or engine running hours prior to the need for a major overhaul for the piece of equipment being costed. HD trucks will accumulate roughly 10,000 meter hours an overhaul is needed; and tractors will average from 1,500 to 4,500 meter hours. These estimates may vary depending on engine size and fuel type.

Second, fuel cph is calculated as a function of meter hours-not averaged over 2,080 hours per year.

Allocating Costs To Bids

Equipment costs are added into bids in one of three ways. First, vehicle and personnel overhead (i.e. owners, estimators, sales people, etc.) should

be included in your office administrative costs allocated to the job.

Second, the crew pickup truck should be allocated to the job at the rate of eight hours per day multiplied by its cph for every day that it is on the job-site. Note that the eight hours per day is not necessarily meter time since this is usually a light duty truck.

Third, determine the meter hours for each HD truck and/or piece of field equipment to be used on the project and multiply these hours by the cph for the respective piece of equipment. The total costs for this equipment, plus your crew pickup costs, will give you the total amount of equipment costs to include in the bid.

Cautions

Remember, every piece of equipment in your company has to generate enough revenue to cover its cost.

Verify your calculated cph figures by comparing them to rental rates for the same item on the open market. Your rates should run 60-70 percent of those from your local rental company. To compare your rates to the market, you should get a copy of the *Contractors Equipment Cost Guide* (\$435.00, expensive but thorough). To order call 1-800-669-3282.

Determining the correct amount of equipment costs to include in a project bid is one of the most challenging aspects of estimating. Once you have calculated an accurate cph for each piece of equipment in use on the job, then you multiply it by the estimated number of hours that each respective piece of equipment will be used on the job to obtain the costs to be included in the bid.

This article was taken from James Huston's new book, *Estimating For Landscape & Irrigation Contractors*, available from AAN. Huston is a consultant to the landscape industry.

DEVELOPING EFFECTIVE INTERPRETATION

Lisa Roberts
Chicago Botanic Garden

Editor's Note: This article was written for public garden interpretation but many of the key points apply to signage and merchandising in the retail center as well.

Because our plants and gardens are so beautiful and fascinating to use, it is sometimes hard to remember that they may not be so for everybody. How could something so wonderful not attract the interest of any casual observer?

Part of an educator's job is to help visitors connect to the plants they've come to see. That connection can take many forms, from an explanation of some odd morphology to an indication of unusual coloring. Visitors cannot always see what our eyes are trained to observe.

Interpretation is about giving pointers to help awaken in visitors that sense of fascination which we feel ourselves. It is also about nudging visitors on to deeper levels of interest and involvement, whatever their level of knowledge.

Tips for Developing Interpretation

Good interpretation is more than good writing. Good interpretation takes into account the target audience, the desired outcome and the medium of communication.

1. Ask yourself, who is my audience? Are they novices or experts, children or adults, or any other categories that may help you to shape your interpretation.
2. Consider what it is about this plant that might interest your audience.

3. Clarify your interpretative goal or outcome. Be realistic!

4. Select an appropriate medium of communication. Consider your audience, your message and your resources. Then ask which media best suit your needs. Typical media include written (signs, brochures, exhibit panels), audio (first person interpreter, tour guide, audio recording), audiovisual (video, slides) and kinesthetic (objects to touch and interact with).

5. Try it out. And don't be afraid to change something if it isn't working! It is extremely hard to anticipate what is clear or confusing to visitors, and often we don't find out until they are actually using (or not using) our interpretation. Experiment with a rough prototype to discover ahead of time what works.

Effective Writing Techniques

Writing engaging copy is both an art and a science. Well written interpretation is at once informative and interesting. Of course, inspiration seldom strikes when called, but there are a few commonly used techniques.

1. The shorter the copy, the more likely people will read it.

2. Avoid passive voice! Contrary to what you were told in school, first person "I" and "we" makes your message personal, personable and accessible.

3. Don't be afraid to be colloquial. Because it uses a more informal voice, it makes your message more approachable.

4. "Hook" the reader's attention:

- Start with a question: "Why isn't this orchid growing in soil?"

- Use humor or puns: "The Root of the Matter"; "Don't Tire of Rubber!"
- Personalize: "Your chewing gum came from this plant."
- Start with a misconception: "Bonsai trees are not really dwarfs."
- Start with some quirky fact: "The flower of this cactus smells like rotting meat!"

Making It Look Good

Just as important as engaging writing is attractive presentation. It's a simple formula: if interpretation is hard to look at, visitors are unlikely to give it more than a passing glance. The following tried and true principles should always be kept in mind.

1. Bigger is (almost) always better! Remember all sorts of other stimuli are competing for people's attention: noise, other exhibits, hunger, the really tall guy in from of them.

2. Written type should be a minimum of 12 point if it is being read from a close distance. If it is on a wall and needs to be seen from farther away, it should be even bigger.

3. Serif type (with "tags" on the tips of letters) is easier to read than sans serif.

This is an example of serif type.

This is an example of sans serif type.

4. Dark against light is easier on the eye than light against dark. High contrast is essential.

5. Upper and lower case is easier to read than all one of the other.

6. Accompanying graphics or photographs help drive a message home.

Reprinted from *AABGA*, August 1995.

MARKETING PERENNIALS IN THE GARDEN CENTER

David Culp, Sunny Border Nurseries,
Kensington, Connecticut

Edited by Steven Still

Editor's Note: *This presentation was given at the 1994 Perennial Plant Symposium, Philadelphia, PA.*

You don't need me to tell you or your customers that perennials are HOT! They are receiving pounds of mailers and magazines at their door or picking them up in the supermarket lines. It's no longer a matter of catching the perennial wave, it's riding it. The demand is now!

Waterloo's Perennial Department, Pennsylvania, approaches one million dollars in sales. It had the highest percentage of increase in all green good departments the past five years. The Devon location, which does two-thirds of Waterloo's perennial business, doubled its volume in the past four years. I know this is happening elsewhere. Accounts that I call on tell me annual sales are flat and perennial sales are approaching their volume. We have a mega opportunity in front of us.

Gardening is the nation's number one past-time, yet the percent of dollars spent on plants is less than half what it is in Europe - CHALLENGE. Restaurant sales are down nationwide, people are eating at home. The tourist industry is down, signs all over point to money being spent on the home - CHALLENGE. And it's not a matter of besting the competition, it's a matter of getting the consumer to spend that dollar on a perennial instead of a fishing rod or golf clubs.

My marketing program is a three prong approach:

1. New introductions - Keep the market stimulated. Look what happened to juniper and marigolds.
2. Customer frequency - Your best customers are your least customers. Give them a reason to come back often.
3. Create your market as well as responding to the market.

Do you find yourself in a quandary wondering just what to buy? It's not a matter of gazing into a crystal ball. I admit, however, that buying may be twenty (20) percent magic, but the rest is based on the facts and experience.

The next topic is not visually attractive, but it's not a pretty picture if you don't manage your inventory. We have to be profitable to keep our jobs and maintain our plant habits. You've got to base most of your decisions on buying and marketing facts, not "I believe we sold X amount." The following are some methods and documents from our expensive friend, the computer, to help manage inventory.

The Item Master is a list of all perennials by SKU (stock keeping unit). A five digit SKU number indicates it was purchased from another source. It also contains the cost, cultural requirements and from whom the item was purchased and the date the item was purchased.

The Sub Class Report is a large break out of where business is happening. The list contains one hundred (100) sub classes and it is very easy to see at a glance what is selling. It is roughly broken down by genus color or cultural requirements, i.e., sun/shade, moist/dry site. It also aids in identification of trends quickly.

The Eighty-Twenty Report gives us the top twenty percent of SKU's by dollars sold. It proves true the maxim that twenty percent of your

inventory gives you eighty percent of your business. Proper use of this report helps you to keep track of your "bread and butter" items.

Current Inventory on Hand Report aids in making buying decisions in the spring and summer. You can decide how much to purchase before a crop is ready or how much more to purchase if an item is selling rapidly or is sold out.

The Popular Item Report is a weekly report of top selling items by location.

You can balance your inventories or make-decisions on re-orders.

The Top Five Sub-Class Report is a series of graphs based on three (3) years sales. This report is an extremely important tool in buying. Remember, you can't sell it if you don't have it on the floor. Keep in mind current trends, that is the percent of increase or decrease when purchasing and factor that into your decisions. This report also helps to plan promotions. I promote major items when they are in bloom as a lower percent off. Customers will come to you to purchase a popular plant at a reduced price and fill their carts with regular priced merchandise. (The Turkey's on sale at Thanksgiving time promotion adapted to perennials).

If you do not have a sophisticated computer system, I strongly suggest the use of a written Rolling Calendar. Don't trust your memory. Write down sales numbers by day, week, and month with a diary of what worked and what could be improved upon. The Weekly Sales Monitor is another written way you can chart your business and also help you and your team to set and meet the goals. If a personal computer is available, it can be used as a diary to aid in tracking sales and events. This will identify trends and patterns in your business.

Major purchasing should begin for the next year at the end of June through July. "Fill ins" and new introductions are added throughout the summer, fall, and winter. The team approach to purchasing allows more feed-back while recent memory is fresh. The team signs on to items purchased and hopefully learns on that basis how the buyer made his decisions. This helps insure an item's success. It has been my experience that if you wait too late in the season to make your buying decisions, the items will already be "cherry-picked". Buying early also helps in getting your in-house catalog out earlier. A purchase order form should be used for record keeping. It is also the first step to feed information into the computer. The purchase order is used in making tags and labels. Most importantly, it establishes profit margins.

Tags and labels are made in-house at Waterloo Gardens. Information on both tags and labels include genus, species, cultural name, height, sun requirements, water requirement, bloom time and color of bloom and suggested uses. The tags have the items retail stock number and bar code on them. An item master is kept on all perennials purchased at Waterloo. It contains the above mentioned data on several thousand plants. Hick's Nursery in Westbury, N.Y., prints their company name on both their tags and labels. This keeps the company name in front of the consumer as several other nurseries print color pictures of the plants in bloom on their signs. This is so very important. We all know that color sells. The picture is a great aid in selling plants that are out of bloom and aids the consumer in making decisions concerning a plant in which they are not familiar. Waterloo Gardens purchases pictures of the plants and inserts them in the sign holders. Their sign holders are tracks that hold the signs in place but allow the signs to be easily moved. The sign holders also do double duty as overhead irrigation holders.

The most important thing I can say concerning signage is that everything must be signed and that signage should be consistent. Anything from hand written to sophisticated computer generated or etched stone is OK. Just sign it!

The winter is a great time to work on your signage. Classification signage of your top selling classes aids the consumer in locating items that are in high demand. Special new introduction signage is used to highlight items and reemphasize your commitment to new introductions and varieties. Special-use signage highlights plants by use and cultural requirements. Don't make the mistake of assuming the customer knows what they are looking at. Special-use signs can be important educational tools! An example of a combination of special signage and new introductions is the Specialty Plant table at Hick's or the Connoisseur Table at Waterloo. Plant collectors and "hortheads" will flock to this table. It reemphasizes your commitment to new introductions.

Late winter is a good time to design your floor layout. There are roughly two schools of layout, A Garden Style and the Nomenclature Style. Both are right depending on the garden center involved. The Garden Style layout is aesthetically very pleasing. The Nomenclature Style encourages the use of nomenclature and appeals to a certain sense of orderliness. Aisle numbering and alphabetizing plants by genus are integral parts of nomenclature floor layout plan. In both styles, aisle length should be no longer than 40 feet. Aisles should be broken up with cross aisles to avoid visual boredom. The width of the aisles should be wide enough for two carts passing one another. It is my feeling that the styles can be effectively blended. The Nomenclature floor layout can be visually stimulated with proper displays of display pots and display gardens or containerized plants.

Displays, while visually attractive, also sell combinations of plants. You are doing design work for your customer. It is a service for them as well as your business, and be sure to sign your displays. Do not assume the consumer knows what they are looking at. The sign will aid them in deciding if it fits their needs. In summer months when the stock levels are low you can condense tables and put displays at their ends. Displays of garden color, bloom specific time or cultural usage lend themselves easily to displays and endcaps. Be creative with your displays.

During peak traffic periods the staff at Waterloo Gardens have to change and re-do the beds three (3) to four (4) times a day. During summer months, lower table heights. This allows for the customer to move easily and see all of the tops of the blooms. Mid-summer/fall is the time to break the nomenclature rule. The rows in the front or opening tables should be full of plants in bloom or color blocks. At this time, gardeners are searching for instant gardening gratification. Color massing helps in this regard and visually stimulates the customer from the beginning. Merchandise in these areas should be kept fresh and turned as rapidly as possible.

In-ground display gardens, sell not only the plants but the Perennial Garden concept. They are the "sizzle" that sells the plants. Often the customer will duplicate or modify an entire garden scene. I encourage the use of display in every square inch of space available. (In front of the store, parking lot borders and rock walls). Be imaginative with your use of perennials. Remember to sign your plants in public areas. It will save you steps of having to walk outside to look at the plant and save the flowers from people cutting them to bring them in for you to identify.

The front entrance of the garden center sets the mood for the entire shopping experience. Keep the displays fresh and full of perennials in bloom. Color sells. Perennials in color at the front

entrance and by the cashier and checkouts increase the possibility of impulse shopping.

Schedule advertising and promotions in February. This is the time to chart your business for the coming season. You control your business, it does not control you. Again, this is done by the team approach. The year's guidelines are not ironclad, but are planning techniques. You must be able to respond to the weather conditions and consumer buying patterns. At Waterloo sales are computerized and sales graphs are utilized in planning. For example, in planning when to schedule perennial week, I decided to place the event the first week of a significant drop in business. The event increased sales and stimulated our business for several weeks. The highest sales curve is in peak season, this signifies consumer demands (sales). What we as an industry need to work on are the down sides of this curve to extend our selling season. Growers give us plants that bloom early and late in the season. Merchants utilize perennials that bloom in this season. Color sells!

The sales graphs are also used in making a marketing plan and deciding when to advertise. As a rule of thumb, price information is used before peak selling periods in newsletters, informative signs, lectures and bag stuffers. At peak selling periods, a moderate reduction is offered. At the first week after the significant drop, a greater discount may be offered. Later in the season when sales are flat, an even greater discount may be offered. On the other side of the center, a moderate discount may be offered on pre-bloom or dormant pots. The idea is to time your advertising to take a moderate percent of discount reduction and sell out before the end of the season. Hopefully, this will avoid deep discount late in season and large amounts of inventory to overwinter, which ties up capital and increases the chance of winter losses. With the chance of winter loss, cost of product labor to maintain, cost per square foot, rent, taxes, labor to

cut back and divide, I'm not sure how profitable it is to overwinter materials.

Sale signage should be easy to locate. There is much to consider concerning sale items (cost to company not in the least). Sale sign coloration use should be different than on price merchandise and coloration should be consistent on all groups of signs.

A copy of the week's promotions should be located at the front of the store or in the front of the department. This lets the consumer know the value savings as well as making them aware that something noteworthy is going on in the department. You need to create an air of excitement. Displays of items promoted should be set up at least one week prior to advertising to maximize your advertising campaign. Trying to maximize the front side of the sales curve, I recommend that you set your sales floor as soon as weather permits.

Smaller pot sizes should be used to a greater extent early in the season. Smaller pots can be placed on the window sills until ready to be planted outside. The perceived value of this is greater to some consumers. The plant has the opportunity for a full season's growth. The cost of the plant is generally much less. In early season 3 and 4 inch pots usually account for 15-20% of my floor space moving into larger sizes as the season progresses. Two gallon containers were used mid to late season accounting for 20-30% of my floor space. I learned an important lesson while managing the annual department - TURN.. Most of my pots are 5 pt/1gal which lend themselves to quick turns. I do believe that you should carry a variety of pot sizes, something to suit most every customer's situations.

Reprinted from the Ohio Nursery & Landscape Association's Official Publication: *THE BUCKEYE*, July, 1995.

POINSETTIA QUALITY: BEYOND THE BENCH

One of the busiest times of the year for growers of flowering potted plants is during the early part of the Christmas season. Many types of flowering potted plants are bought as gifts, to decorate homes or businesses, or just for the sheer pleasure of having a colorful plant in the depths of winter. In order to keep customers satisfied and coming back for more, growers should work in cooperation with retailers to provide vigorous, long-lasting, and problem-free plants at a time of the year when many environmental conditions are unfavorable for good plant growth. In addition, shipping and handling of greenhouse plants in the chilly temperatures of November and December presents additional obstacles that must be overcome to maintain plant quality.

Obviously the most popular of all flowering potted plants sold during the Christmas season is the poinsettia. Poinsettias are classic! For many consumers, they are as traditional a holiday-time purchase as a fresh-cut Christmas tree. Growers strive to produce the best poinsettias they can to command a high price from the retailer in a market which is very competitive and often over-supplied with plants. Retailers want a poinsettia that not only will lead to increased profits through sales, but also retain its colorful bracts, dark green leaves, and vigorous appearance throughout the Christmas sales season. And of course, customers want a poinsettia that will stand up to their "black thumbs." Until a few years ago, people assumed that the grower's production practices had little or nothing to do with the postharvest quality of a poinsettia. Through research, we now know better. Production conditions play a major role in the ability of a poinsettia to withstand the stress of shipping and marketing. Many production factors and practices, including light, fertilization, growing media, temperature, irrigation, and pest control

influence the postharvest quality and longevity of poinsettias.

Cultivar choice also plays an important role in the postharvest quality and longevity of potted poinsettias. Each cultivar may react differently to a grower's production system, and this in turn is reflected in the plant's reaction to postharvest stresses involved during shipping and handling. For example, low light levels during the last three to four weeks of production have been shown to induce premature cyathia (true flower structures) drop in some cultivars, including Hegg variety poinsettias. Because the cyathia drop detracts from the appearance of the poinsettia, and indicates overmaturity, this may reduce their economic value. Thus, maintenance of optimum production light levels, and possibly the use of high intensity lighting, may ultimately improve postharvest longevity, vigor, and appearance.

The optimal fertilization regime for poinsettias varies from grower to grower based on the grower's facilities, ease of application, and/or past experience. The choice of fertilizer, as well as the amount and timing of application, can effect how the poinsettia holds up after leaving the greenhouse. Growers should avoid use of high rates of liquid or slow-release fertilizers late in the production period. This will often result in weak, fleshy growth that is especially subject to damage during shipping. Also, the risk of media soluble salt buildup late in the crop production will increase. Salt buildup will injure the roots and make water uptake more difficult. A poinsettia that is suffering from soluble salt buildup in the media will have a shorter postharvest longevity than a poinsettia with low soluble salts in the media. A common recommendation for growers is to discontinue fertilization two weeks before the poinsettias are to be sold. This has been shown to increase postharvest (Nell and Barrett, 1990).

In addition to fertilization, irrigation and soil media are two other inter-related factors that the grower can control to help extend postharvest longevity. Besides providing nutrients to the plants, the media also effects water uptake and frequency of irrigation. A suitable mix should have a good water holding capacity, but must also be well-drained. Poinsettias hate to have wet feet! A reduction in the frequency of irrigation, starting about two weeks before the plant is to be sold, is advisable. However, the plant should never be allowed to wilt; in fact, cyathia drop may occur if this happens. Also remember, that due to frequently cloudy days in November, plants will be transpiring less and growth will be reduced. The reduction in frequency of irrigation is part of a "hardening off" process which helps to prepare the plant for the stress of a drier interior environment after sale.

Temperature and light are other factors influencing postharvest quality of poinsettias. Due to lower light levels in the late fall, poinsettias may tend to stretch if greenhouse temperatures are kept too warm. During the beginning of the crop season, when plants are growing quickly and storing carbohydrates, greenhouse temperatures should be maintained between 16 and 21 degrees Celsius at night and 21 to 29 degrees Celsius during the day. At the end of the crop season, reduced light levels are a problem. Plants may start to elongate, even if previously treated with growth regulator, and deplete their stored carbohydrates. Lowering the greenhouse temperature will slow the utilization of those stored carbohydrates. This is important because the poinsettia will draw on those stored carbohydrates after it is removed from the greenhouse and living in an interior environment. The more energy stored before leaving the greenhouse, the more reserves the plant will have after leaving the greenhouse environment.

Once the poinsettia leaves the greenhouse, the plants are usually individually sleeved in cone-

shaped plastic, paper, or mesh bags. Proper packaging of the poinsettias is an important and necessary part of good transportation. The value, appearance, and quality of the poinsettia will not usually improve during shipping. But, proper handling and shipping conditions can virtually assure that the plant's quality will remain as good at the time it reaches the consumer, as it was in the greenhouse. Shipping and handling do present some problems. Prolonged storage of poinsettias, in any type of sleeve, may result in a condition known as epinasty, a droopy appearance of the plant. The mechanical upward bending of the leaves and bracts during sleeving causes them to later hang down after the sleeve is removed (Ecke and Hartley, 1990). This is one case where the choice of poinsettia cultivar can limit the problem. Research has shown that cultivars in the Hegg Series and Peace Series are sensitive to epinasty, while Eckespoint and Gutbier Series are very resistant (Nell and Barrett, 1990). Epinasty has been linked to high ethylene concentrations in boxed poinsettias. Ethylene is generated by the plants themselves, as well as by heaters and gas engines. Both the concentration and length of exposure to the dangerous levels of ethylene determine the effect on the poinsettia. When exposed to high levels of ethylene, leaves and bracts become flaccid and twisted. With extended exposure, the leaves may turn yellow and drop off (Nell, 1990). The damage from ethylene can be avoided by placing the poinsettias in a well-ventilated area and by removing plants from their shipping boxes as soon as they arrive.

Another problem that occurs during shipping and handling is bract and leaf abrasion. During shipping plants may rub against each other, the plant sleeve, or the shipping box. The abrasion damage is represented by broken or bent sections of leaves or bracts, or as white sappy areas on the plant. This can reduce the value of the poinsettia, especially if the abrasions are on the colorful bracts. To prevent bract and leaf abrasion, use plant sleeves that are taller than the plants, and

boxes that are taller than the sleeves. Also retailers need to avoid handling the plants roughly when unsleeving for display.

Postharvest temperature is also a consideration when shipping poinsettias. Temperature is directly related to respiration rate, depletion of stored carbohydrates, and sensitivity of the poinsettias to harmful gases. The optimal shipping temperatures for poinsettias are between 10 degrees and 15.5 degrees Celsius. This optimal shipping temperature will reduce respiration but will not induce chilling injury. Poinsettias are susceptible to chilling injury between 0 and 10 degrees Celsius. The longer the plants are exposed to these temperatures, the greater the damage. Chilling injury may not be apparent when the poinsettias are unpacked, but the plant develops whitish bracts as the plant warms. Also, poinsettias can be killed by momentary exposure to freezing temperatures. Growers should arrange to have poinsettias shipped in trucks heated to 10 to 13 degrees Celsius. Also, note on the boxes that the contents should not be exposed to freezing temperatures.

Water stress is another problem that can occur, especially at the retail level. Growers should ship the plants with moist soil, but the leaves should be dry. Fungal diseases, including *Botrytis*, can develop in a closed box with wet foliage and little aeration. It is also important for the retailer to know that a poinsettia may or may not wilt when it is dry. The leaves might curl, yellow and drop first. Overwatering is also problematic. Flooding of the root zone will cause root rot, leaf chlorosis, wilting and eventually death. Tell retailers not to let them sit in trays of water.

Low light levels during shipping and merchandising will reduce the longevity of the poinsettias. Plants will start to stretch and use up stored carbohydrates if left in darkness. While cultivar choice has some influence, poinsettias need to be in a bright location in order to

maintain vigor. Retailers should display poinsettias in a bright sunny area. Unfortunately, most modern retail stores do not have much natural sunlight entering the sales area. The retailer should then try not to over order on an initial early shipment, but should order fresh plants in smaller quantities at intervals during the season.

In conclusion, it takes the cooperation and expertise of the growers, shippers, and retailers to provide special, high quality poinsettias for the discriminating poinsettia buyer. Many factors must be managed in order to insure a proper postharvest longevity of the poinsettia so the consumer will be satisfied and purchase again next Christmas season.

References Cited:

1. Ecke, P. Jr. O.A. Matkin and D.E. Hartley. 1990. *The Poinsettia Manual*. Paul Ecke Poinsettias, California, USA.
2. Nell, T.A. 1990. Commercial transport of flowering potted plants: Keeping quality beyond the bench. *Grower Talks*: 53 pp. 24-40.
3. Nell, T.A. and J.E. Barrett. 1990. Where are we in Improving Flowering Potted Plant Quality and Longevity? *American Flower Endowment*, December 1990. pp. 1-8.

Reprinted from *Southeastern Pennsylvania Greenhouse Growers News*, Penn State Cooperative Extension, Oct. 1995.

DEER CONTROL - THE WAR ON BAMBI

Kathleen Fisher
American Horticultural Society

It should be news to no one that deer damage has become a major headache for gardeners--more costly in terms of plant damage than insects, disease, or clumsy house painters. At the turn of the century, American's deer population had swindled to a half-million. Now an estimated 13 to 15 million of them are roaming about our nation, many in suburban and even urban areas where there is little in the way of scruffy browse to sustain them, but plenty of juicy rhododendron buds and 'Casablanca' lilies. A recent release from Cornell University reported up to 90 deer per square mile in metropolitan Rochester, New York.

Attempted solutions fall into several broad categories: fear, sensory deterrents, barriers, and plant selection. Unfortunately, solutions in the first two categories stop working over time. The deer simply get used to the noise or the foul smell and help themselves to you yews again. Deer may munch even the most bitter-tasting plant if they are hungry enough. And fences are expensive and need frequent maintenance. But we'll offer what we've heard in each category, since even a temporary solution is better than no solution.

Fear

These ploys are intended to make deer think they're in imminent danger of attack by a human or other predator.

Radios - Some gardeners have had luck rigging up a radio to go off at times that deer are most likely to feed. You may want to try hard rock or rap, however. One gardener recently reported on the Internet that deer in his neighborhood were fascinated by classical music particularly Chopin.

Dogs - We recently heard about some orchard owners who were scaring deer off with several dogs kept in bounds by the invisible fencing that works via an electronic signal on the dogs' collars. But this solution, like many others seems destined to be short-lived. In March 1993 we reported on the success the Morris Arboretum in Philadelphia was having with Beanbag, a Jack Russell terrier that was frightening deer from their rose garden. Before the issue was off the press, Beanbag had been retired. In his second year on patrol, he had become too familiar to the deer to be effective.

Irregular sorties - You like to stroll around your garden anyway, so try to time these visits to deer hours--morning and evening, preferably while talking loudly to a companion or yourself. This won't work of course, where deer have become tame enough to look over your shoulder while you read the seed catalogs.

Sensory Deterrents

The goal here is to apply something directly to plants to make them taste bad (a contact deterrent) or, in the garden, to make the air smell bad (an area deterrent).

Contact deterrents work best on new plantings, the experts note. Once deer have acquired a taste for your new hedge, these are less likely to have an effect. There are commercial products and homemade brews. The homemade products have, of course, not been studied for health hazards or toxicity, and even the "natural" commercial products could have long-term effects on plants if used repeatedly.

Hot sauce - Try a mix of one or two teaspoons of Tabasco sauce or a solution of hot peppers mixed with two tablespoons of an anti-desiccant to help the hot sauce adhere to the leaves, mixed in a gallon of water. There is a commercial equivalent called Miller Hot Sauce that is said to repel other mammals as well. A Connecticut

study found it only a third as effective against deer as other commercial products.

Egg spray - Blend two eggs in a gallon of water and spray on the foliage. Some users swear they can't detect the smell; others find it unpleasant. The commercial equivalent of this is Deer Away, which is made from rotten whole egg solids. It is said to be effective for up to two months, but is considered one of the most expensive of the repellents.

Hinder - A number of sources recommended this product, a liquid made of ammonium soaps of fatty acids, which is also used to keep rabbits from girdling young trees. Concentrate can be bought for about \$15 a gallon. It is said to be safe for using on edibles--although as with all the products, the directions should be followed carefully. It needs to be reapplied every two to three weeks, but still appears to be the least expensive of the commercial products. (One study found it ineffective when used in corn fields. Deer studies are predictable only in their lack of consistency).

Bath soap - Bars need to be hung in a garden about every 10 feet, a la "soap on a rope," or hung in cheesecloth or panty hose. Studies indicate that there is only a tiny bit of difference in effectiveness between soap brands (you never see this used as a selling point in television commercials, do you?). There is some dispute over whether the soap should be a deodorant soap, removed from the wrapper, or kept wet.

Human hair - Some gardeners collect clippings from their hair stylist's floor and hang them in bags around the garden. Experts suggest that dirty hair is more effective than freshly shampooed. The Arboretum of the University of Wisconsin-Madison uses bags of human hair to protect valuable specimens. This and the soap approach work only where deer aren't yet used to the presence of humans.

Milorganite - A study at Cornell University found that this composted sewage sludge from Milwaukee, normally used as a fertilizer, repels deer when used at the rate of five pounds per square foot one or two times a month. However, it appears to have the most pungency and hence, effectiveness when the weather is warm and humid.

Barriers

Relandscaping - Particularly if you own a sloping property, an expensive but elegant solution is to design your entire landscape around this problem. In the March issue of *Green Scene*, the publication of the Pennsylvania Horticultural Society, designer Jeffrey R. Chorba wrote about taking advantage of deer's reluctance to climb cliffs by creating sunken and raised beds retained by boulders. He also found that tight masses of shrubs around a property's perimeter will discourage deer from moving in closer.

Plant protectors - It may be easier and cheaper to fence individual plants than your whole garden. Bird netting may be sufficient for small shrubs, but chicken wire or plastic is usually recommended. The fencing should be close enough to the shrub that deer can't jump inside, but far enough away that the deer can't reach the foliage. Plastic tree tubes may protect saplings from the antler rubbing of bucks.

Tripper-upper - Galen Gates, manager of horticulture collections at the Chicago Botanic Garden, says they have found that a quick fix is using chicken wire "just unrolled so that it's still springy" laid on the ground around prized plantings. The deer apparently don't like the unstable footing this creates.

Double fence - Because deer avoid small enclosures, a single low fence may protect a small vegetable or herb plot. If you need to fence a larger area, it may work to build two relatively

low (four feet) fences some five feet apart. Deer realize they will be trapped if they jump the outer fence.

High, slanted fence - One article suggested a six-foot fence, but most authorities agree that a large deer can easily jump eight feet. Additional psychological discouragement can be achieved by slanting the fence away from the garden at a 30 degree angle.

Electric fence - If you have children living anywhere near you, this solution is not an option, but you might want to consider it for an isolated area, especially where valuable crops need protecting.

Researchers at the University of Wisconsin-Madison and the Maryland Cooperative Extension Service report a high degree of effectiveness using a relatively inexpensive, single-strand polywire fence.

Polywire is a plastic filament wire interwoven with strands of stainless steel. A single strand is suspended about 30 inches above the ground from three- to four-foot long fiberglass rods placed 30 to 50 feet apart. Aluminum foil flags are attached to the wire with tape or clips, and the undersides of the flags are baited with peanut butter. When the deer try to eat the peanut butter they receive a shock and become conditioned to avoid the area.

To prevent fawns from walking under the wire, two wires can be used, one a two feet from the ground and the other at three feet.

Information from the Maryland Cooperative Extension Service suggests that an electric charger with two joules of power is needed for 6,000 feet of fence wire. An AC-powered charger is the least expensive and needs the least maintenance, but battery or solar power may be more practical in a rural area. The cost of

materials for a two strand fence big enough to enclose three acres--including the jar of peanut butter was estimated at less than \$300.

Electric fence supplies:

West Virginia Fence Corp., U.S. Route 219, Lindside WV 24951, (800) 356-5458.
Waterford Co., Box 1513, Fort Collins, CO 80522, (970) 482-0911

Commercial repellents:

Necessary Trading Co., One Nature's Way, New Castle, VA 24127-0305, (703) 864-5103.

Worm's Way, 3151 South Highway 446, Bloomington, IN 47401, (800) 274-9676.

Although the idea of landscaping with "deer resistant" plants is an attractive one, a list of such plants is problematic because when deer are hungry, they will eat anything and there was little agreement between eight different lists written by nursery owners, designers, Extension agents and garden writers.

A very general rule is that deer will tend to avoid prickly twigs and leaves, and herbaceous plants that are bitter or toxic. Thus a plant with a medicinal use, such as foxglove, is a good candidate.

But this is another aspect of gardening for which there is alas, no substitute for your own experience. In the interest of doing something to assist the deer-plagued, however, we have compiled the following list. If a plant appeared on even two of our eight source lists, we offer it for your consideration.

Generally Deer Resistant

Trees and shrubs

Berberis (barberry)

Buddleia (butterfly bush)

Buxus (boxwood)

Cotinus (smokebush)
Myrica californica (wax myrtle)
Myrica pennsylvanica (bayberry)
Nerium (oleander)
Osmanthus
Picea (spruce)
Pinus (pine)
Robinia (locust)
Spiraea (spirea)
Syringa vulgaris (common lilac)

Herbaceous plants

Achillea (yarrow)
Ageratum
Aquilegia (columbine)
Begonia
Coreopsis (tickseed)
Digitalis (foxglove)
Echinacea (purple coneflower)
Ferns
Iris
Paeonia (peony)
Stachys byzantina (lamb's ears)

Generally Favored by Deer

Trees and shrubs

Euonymus
Rhododendron
Taxus (yew)
Thuja (arborvitae)

Herbaceous plants

Hosta
Hemerocallis (daylily)
Lilium (lily)
Pelargonium (geranium)
Rosa (rose)

Reprinted from *VNA Newsletter*, July/August 1995. Originally appeared in AHS's *American Horticulturist*, July 1995.

PESTICIDE NEWS

Insecticides:

NEEMAZAD (azadirachtin) - WR Grace - A new formulation being introduced for usage on ornamentals. Two formulations will be available, one that is .25% active and the other 4.5% active.

DURSBAN (chlorpyrifos) - Dow Elanco - as result of IR4 Project have added usage on 20 new ornamentals.

SANMITE (pyridaben) - BASF - A new insecticide recently approved by EPA for use on greenhouse ornamentals.

DDVP (organophosphate insecticide) - USEPA is proposing the cancellation of dichlorvos products for ornamental plants. Comments should be sent to Public Response Branch of EPA by 12/27/95 (EPA Office of Pesticide Project, 401 M Street, SW, Washington, DC 20460.)

PT 1325 ME DURAGUARD (microencapsulated chlorpyrifos) - Dow Elanco - has expanded its label to include poinsettias. The product is labeled for control of aphids, fungus gnats, whiteflies, thrips and several other pests. Duraguard is an organophosphate with long residual control, a 12 hour re-entry interval, and comes in a liquid concentrate.

PINPOINT 15G (acephate)- is a granular formulation of the active ingredient in Orthene. Its systemic activity allows it to be applied to the soil where it dissolves and enters plants through their roots. At this point, the label limits use to poinsettias, azaleas, and several container grown nursery plants. Pests listed for control include aphids, mealy bugs, and azalea lace bugs. Pinpoint's REI is 12 hours.

DIMILIN (difluebenzuron) - Uniroyal - Received EPA registration to control fungus gnats in enclosed commercial structures such as greenhouses, shadehouses and interiorscapes. Up to 60 days control expected. Apply as a soil drench or a heavy spray to the soil surface.

LINDANE - EPA has decided not to initiate a Special Review of pesticides containing lindane. Lindane is registered for fruit crops, seed treatments, ornamentals, pecans, forestry crops and others.

Fungicides:

BENLATE (benomyl) - DuPont - Deleted from their label usage on turf and lawn grass areas.

MANZATE 200 (mancozeb) - DuPont - Delete from their labels the usage on non-agricultural turf and lawn grass uses.

BAYLETON (triadimafon) - Bayer - As a result of the IR-4 Project they have added 20 new ornamentals to their label.

BENEFIT (thiophanate-methyl/prodione) - The Scotts Co., - A new combination fungicide for use on greenhouse and field grown ornamentals. Applied as a foliar spray soil drench or by chemigation.

KOCIDE (copper hydroxide) - Griffin - As a result of the IR-4 Project they have added to their label the usage on a number of new ornamental crops.

PROSTAR PLUS (futolonil/triadimefon) - Agr. Evo. - A new formulation available in water soluble bags for use on turf to control brown patch and dollar spot.

SOILGARD 12G - W.R. Grace is microbial fungicide that was recently registered for soil

incorporation as a preventative for diseases caused by *Pythium* and *Rhizoctonia*. The active ingredient is *Gliocladium virens*, which is a naturally-occurring soil fungus that is antagonistic to *Pythium* and *Rhizoctonia*. SoilGard acts as a preventative and will not cure plants that are infected. The REI is 12 hours.

BIO-TRK 22G - Wilbur-Ellis - This strain of the biological fungus *Trichoderms harzianum* has been approved by the U.S. Environmental Protection Agency for use on ornamental stock, greenhouse crops and non-food crops to reduce *Sclerotinia*, *Pythium* and *Rhizoctonia*. The granular products should be mixed into soil before planting and will help root growth and increase plant vigor.

STRIKE 25 (Olympic Horticultural Products - The systemic fungicide can be used for disease control on poinsettias and hydrangea.

SYSTEC 1998 WDG - Regal Chemical Co. - This water-dispersible, highly systemic, broad-spectrum fungicide for both curative and preventative disease control can be used as a pre-plant dip treatment, a foliar spray or a drench treatment on ornamentals, roses, flowers and shade trees in fields. It controls anthracnose on shade trees and woody ornamentals; black spot on roses; leaf spots on azalea and rhododendron; scab on pyracantha; and cylindrocladium and thielaviopsis rots on woody ornamentals such as rhododendrons, azaleas and conifers. Plants, cuttings and bulbs can be dip treated.

BAYLETON 25 (triadimefon) - Bayer - added to their label the control of zoysia patch in turf.

Herbicides:

OUST (sulfometuron-methyl) - DuPont - A label changed added the following: "Do not apply Oust

to conifers or hardwoods grown for Christmas trees or ornamentals."

RONSTAR (oxadiazon) - Rhone Poulenc - Product available in water soluble bags.

ASULAX (asulam) - Rhone Poulenc - As a result of the IR-4 Project they have added to their label the usage in English Ivy, periwinkle, mugo pine, white pine and Japanese spruce.

OO-HERBICIDE (oxadiazon/oxyflourfen) - Regal Chemical - The dry-granule herbicide contains a mixture of oxadiazon (Ronstar) and oxyflourfen (Goal) for weed control and doesn't inhibit root mitosis. Spurges, chickweed and oxalis are controlled along with most annual weed seeds.

SIMAZINE - Ciba - As a result of IR-4 Project have added to their label usage on heavily bamboo, weeping birch, cotoneaster, bald cypress, false cypress, Euonymus, iris and yew.

Miscellaneous:

FLOREL - Florel label expanded. Florel is now registered for use for flower induction on bromeliads, defoliation of roses, height control of potted daffodils and hyacinth, and increased branching of azaleas, begonias, mums, geraniums, impatiens, fuchsia, lantana, verbena and vinca.

Landscape Workers Carry MSDSs On Their Trucks

Are your material safety data sheets (MSDSs) "readily accessible" to your employees? It's an OSHA requirement that could cause you problems if your workers are on the move a lot.

"The requirement is that the sheet be on the job site. But some of our employees move from site to site, day to day," says Laurie Bostick, employee program coordinator for The Bruce Company.

So The Bruce Company, a Wisconsin-based landscape contractor, made up small booklets of MSDSs that workers carry with on their trucks.

Bostick reviewed which products the company's crews would likely be exposed to on a daily basis. Then she made up the booklets containing the MSDSs for those products.

"The MSDSs (for one to 20 products) are in a small notebook and have plastic sheet covers. They fit behind the seat, under the seat or in the glove box."

Some of the products that have "Portable" MSDSs are hydraulic fluid, gasoline, diesel fuel and a couple of premergent herbicides.

What Does OSHA Say?

OSHA requires employers to have MSDSs on hand for each hazardous chemical that's used. You do not need to have MSDSs for soap, hand cream or other cosmetic products you provide for the personal use of your employees.

OSHA specifically requires employers to have copies of MSDSs "readily accessible" to workers in the area where the chemicals are being used.

Winter Storage Tips

Fall clean-up time may mean some people put their pesticide products away for the winter. To continue to get good results from these products, there are several things consumers need to keep in mind when storing pesticides:

- Always store pesticide products in their original containers and out of reach of children and pets.
- Some pesticides begin to slowly break down once the container is opened. In fact, environmental extremes such as heat or cold, air, light and humidity can cause products to lose effectiveness. To slow the breakdown, reseal opened containers tightly, and store where temperatures will not reach extremes.
- If your customers have leftover product they feel they won't use, suggest they offer it to a neighbor, friend, or gardening club in its original container. That way they don't have to worry about storing or disposing of unused product.
- Instruct customers to mark the date directly on the package when the product was bought and put in storage for the winter.
- If a consumer must dispose of a pesticide, instruct them to check the label or their local public works department for information about proper disposal.
- Most unopened pesticides will remain effective for many years.

RESEARCH BRIEFS

Propagation:

Propagation of *Sedum* 'Autumn Joy' by hanging. Stonecrop was successfully propagated by hanging stems cut in September upside down in a well-ventilated room with night temperatures at or above 50 F. Within four weeks, small rosettes developed at each node. Rosettes rooted in less than a week in soilless media with no bottom heat. A. Avitabile.

Field Production:

Dogwood production. Increasing photoperiod is a factor in releasing flowering dogwood from dormancy, whereas decreasing photoperiod can promote dormancy. Results may suggest that bare-root flowering dogwood seedling be planted in fall for best survival in warm areas, such as the Coastal Plain region of the southeastern US. Seedling should set terminal buds but do not appear to require chilling temperatures in the nursery before lifting. In areas with cold winters, fall transplanting is not recommended because transplanted seedling may be killed by low temperatures or desiccation due to frost heaving. J.M. Ruter, M.P. Garber and D.J. Moorhead.

(Previous two articles excerpted from *American Nurseryman*, November 15, 1995.)

Field-grown specialty cut flowers. Twenty perennials and 20 annuals were evaluated for two years for yield and stem length (>41 cm long). The following species combined high yield with long stems (without major pest or postharvest problems) resulting in high profitability.

Perennials:

Achillea filipendula

Echinacea purpurea

Liatris spicata

Platycodon grandiflorus

Annuals:

Antirrhinum majus

Cosmos bipinnatus

Scabiosa atropurpurea

Zinnia elegans

T.W. Starman, T.A. Cerny and A.J. MacKenzie.

(Previous article excerpted from *HortScience*, Vol. 30(6), October 1995.)

Container Production:

The effect of in-ground containers on transplant survival. Green ash were grown in grow bags and in the field. After two years trees were harvested and transplanted to the landscape. There was no difference in canopy width, leaf stem or root dry weight, or number of large or small roots, regardless of production method. Results from this study indicate there is no advantage to using grow bags over traditional field-production techniques when transplanting easily transplantable material, such as green ash. J.C. Cole and D.L. Hensley.

(Previous article excerpted from *American Nurseryman*, November 15, 1995).

Irrigation and fertilizer placement for trees grown in in-ground fabric containers. It appears that for less rapid growing species, i.e., live oak, both fertilizer and irrigation should be applied only inside the container the first 2 years. For more rapid growing species, i.e., Chinese elm, half-inside, half-outside placement of both irrigation and fertilizer appears to produce the most desirable results. Greater fine root mass was harvested with both species from the soil with a higher clay content. R.C. Seeson, Jr. and E.F. Gilman.

Nitrogen and phosphorus sources for container-grown azalea production. Nutrient contaminated effluent and its potential pollution

of surface and ground waters are primary concerns of the nursery industry. Resin-coated NH_4NO_3 and urea lost more NO_3 in the effluent than composted turkey litter. Sulfur coated P and composted turkey litter lost greater amounts of P_2O_5 in the effluent than resin-coated P. Resin-coated NH_4NO_3 and ureas had the highest N efficiency (56%) while resin-coated P had the highest P efficiency (43%). Data herein emphasize that controlled release fertilizers are efficient, but nutrient sources which comprise each fertilizer and the mechanism which controls nutrient release regulate the level of efficiency. Adjustments in P sources and coating technology may improve P efficiency. In addition, cultural practices such as reduced irrigation volumes that may further curtail nutrients lost in runoff water need to be investigated. S.L. Warren, T.E. Bilderback and H.H. Tyler.

(Previous two articles were excerpted from *J. Environ. Hort.* 13(3), September, 1995.)

Weed Control:

Herbicide injury and weed control around roses. Preemergent herbicides (Pennant 5G, Surflan, Treflan, Prowl, Devrinol and Goal) were effective at controlling winter weed populations and caused no injury when applied over dormant rose plants with 1/4 to 1/2 inch shoots just pushing. Grass herbicides (Ornamec, Poast and Envoy) controlled ryegrass and resulted in no injury to roses when applied at the above stage. Trimec and Roundup 4S however, caused plant injury. Roundup 4S-treated plants showed less injury and recovered more rapidly than Trimec-treated ones. Injury could be considered minimal since roses had not completely emerged from dormancy. Trimec and Roundup 4S applied when blooming roses were 24 to 30 inches tall showed severe injury. Trimec-treated plants recovered after 11 weeks but Roundup 4S injury persisted throughout the season. J. Karlik and M.P. Gonzalez.

(Previous article excerpted from *American Nurseryman*, September 15, 1995.)

Corn gluten meal for weed control. Pre plant incorporated treatments are more effective in reducing shoot length and root development of weeds. Rapidly germinating species get too developed before PRE treatments become effective. At lower rates, broadleaf species are more susceptible to corn gluten meal (CGM) than grasses. Greater than or equal to 75 percent reduction in survival and rooting of black nightshade, common lambsquarters, creeping bentgrass, curly dock, purslane and redroot pigweed was achieved with GCM. PRE application of CGM may provide acceptable control of annual bluegrass, black nightshade, buckhorn plantain, catch-weed bedstraw, common lambsquarters, curly dock, dandelion, giant foxtail, orchard grass, purslane, redroot pigweed and smooth crabgrass in turf. B.R. Bingaman and N.E. Christians.

(Previous article excerpted from *HortScience*, Vol. 30(6), October 1995.)

Effect of 2,4-D and triclopyr on annual bedding plants. Auxin-like herbicides are applied postemergence to control broadleaf weeds in turfgrass and along roadsides with sensitive ornamentals nearby. Low concentrations of these herbicides can cause variable injury symptoms to many ornamentals. With annuals, the order of species sensitivity from most sensitive to least sensitive was petunia > begonia = marigold = pansy = statice > geranium = impatiens = rose periwinkle = salvia. A herbicide comparison study showed petunia was more sensitive to Turflon than Weedar64, whereas marigold was moderately sensitive to both herbicides, and impatiens was moderately tolerant to both herbicides. Injury symptoms were expressed as general growth suppression, reduced flower production, and callus formation.

H. Hatterman-Valenti, N. E. Christians and M.D.K. Owen.

Tolerance of containerized landscape plants to some postemergence herbicides. Additional selective postemergence herbicides are needed for weed management by the nursery industry. Stinger (clopyralid) and Manage (MON 12051) are new herbicides that will effectively control problem weeds including nutsedge, and information about the tolerance of landscape plants to these postemergent herbicides is needed. The deciduous species, Crape Myrtle and Cotoneaster, were more sensitive to all three herbicides (Stinger, Manage and Basagran) when topical applications were applied post emergent to the landscape plants in containers. Therefore, topical applications should be avoided. The junipers evaluated displayed a higher degree of tolerance, however, there were growth reductions in some cases without accompanying foliar injury. None of the herbicides injured or reduced the growth of Parson's or Blue Pacific juniper.

(Previous two articles were excerpted from *J. Environ. Hort.* 13(3), September, 1995.)

Disease Control:

Selected American elm susceptibility to Dutch elm disease. Dutch elm disease (DED), caused by the fungus *Ophiostoma ulmi*, remains a threat to American elms (*Ulmus americana*) in the forest and in the landscape. If disease-tolerant American elm clones were identified, the nursery industry could once again consider growing and selling this adaptable and beautiful tree. This study examined the relative susceptibility to *Ophiostoma ulmi* of American elm clones that previously had been selected for their DED tolerance. Several clones showed levels of disease tolerance much higher than average American elm seedlings and, although not immune, offer promise for the return of this species to the landscape. When data from both

inoculation dates were combined, six American elm clones ('American Liberty,' 'Princeton,' 680, R18-2, 180 and 3) showed significantly fewer foliar symptoms after four weeks than the American elm seedling and three other American elm clones. Five of these same six more tolerant American clones averaged significantly less crown dieback after one year than the other American clones or seedling tested. One of the American elm clones (cone 3) showed a level of disease tolerance equal statistically to 'Frontier' and 'Prospector,' two cultivars which have shown a high degree of tolerance to DED in other studies. A.M. Townsend, S.E. Bentz and G.R. Johnson.

(Previous article excerpted from *J. Environ. Hort.* 13(3), September, 1995.)

Insect Control:

Differential susceptibility to euonymus scale.

This study identifies the susceptibility of 6 *Euonymus* species and cultivars to infestation of euonymus scale. The significantly lower levels of euonymus scale infesting *E. kiautschovicus* 'Manhattan,' *E. japonicus* and *E. fortunei* in field studies indicate that these are desirable selections for landscape production. In contrast *E. japonicus*, 'Albomarginatus' and *E. japonicus* 'Micophyllus' in landscape plantings would likely be more susceptible to euonymus scale infestation. D.K. Jefferson and P.B. Schultz.

(Previous article excerpted from *J. Environ. Hort.* 13(3), September, 1995.)

Landscape:

Psychological benefits of public gardens for urban residents.

Results from a visitor exit survey indicate a reduction in stress in urban residents after a garden visit. Furthermore, urban residents identify relaxation, stress reduction, and inspiration as the three most important reasons

for visiting the gardens. All three suggest that urban residents find the affective rewards of visiting public gardens to be more important than other more tangible rewards. E.S. Bennett.

Previous article excerpted from *People-Plant Council News* 5(3), Fall 1995.)

Pathogen-free compost and mulch. The spread of the canker-causing fungus *Botryosphaeria dothidea* is a concern in composted organic waste. Studies at the National Arboretum showed that a wood chip treatment that would sustain temperatures of 50 C or higher for at least two weeks would ensure the elimination of *B. dothidea* throughout the pile. The treatment called for addition of manure to wood chips at a rate of 10 percent and weekly turning of the pile for one month. Without turning, the pile heats unevenly. The final product was slightly composted material that appeared to be ideal for mulch and pathways. K. Jacobs.

(Previous article excerpted from *AABGA Newsletter* No. 250, November, 1995.)

New Releases:

Exochorda serratifolia 'Northern Pearls.'

'Northern Pearls' is a new cultivar of *Exochorda serratifolia* (pearl bush) from the University of Minnesota Landscape Arboretum. It is an upright rounded shrub with a more compact appearance than is typical for the species (6-8 feet tall by 4-6 feet wide). Fall leaf color is a golden yellow. White flowers are borne in mid-May in terminal racemes. The buds resemble a string of pearls. 'Northern Pearls' has exhibited excellent cold hardiness. 'Northern Pearls' has been successfully propagated from softwood cuttings collected in early June. 'Northern Pearls' has been released through the royalty program of the Minnesota Nurserymen's Research Corporation. Royalties collected will help provide funding for further landscape plant breeding efforts. Growers

should contact the authors or Mr. Don Selinger, Minnesota Nurserymen's Research Corporation, 1325 Bailey Road, St. Paul, MN 55119.

(Previous article excerpted from *J. Environ. Hort.* 13(3), September 1995.)

Guide to Sustainable Landscapes. Published by University of Massachusetts Extension under the leadership of Cape Cod Extension. A 74-page guide containing information on fertilizing trees, shrubs and lawns; the fate of pesticides applied to lawns; a review of low-maintenance trees, shrubs and turfgrasses; and more. Available for \$7.50. Send check to the Bulletin Center, Cottage A, Thatcher Way, University of Massachusetts, Amherst, MA 01003.

EPA's Public Information Server

([HTTP://WWW.EPA.GOV](http://WWW.EPA.GOV)) provides feedback mechanisms, a title and content search engine and other research capabilities. Includes: a full range of EPA topics, "People Locator Program" using surnames and phone numbers, Environmental Monitoring and Assessment Program (EMAP) and the Great Lakes Information Network.

The OSHA Home Page ([HTTP://WWW.OSHA-SLC.GOV](http://WWW.OSHA-SLC.GOV))

is a well-organized site developed by the Salt Lake Technical Center. Updates are provided twice weekly and a simple search engine allows access to all 29 CFR and any applicable Federal Register topics.

Technical Information Services

([HTTP://WWW.DOE.GOV](http://WWW.DOE.GOV)) provides a comprehensive site for DOE materials. The "What's New" component includes tools and information on NEPA and a "Future Enhancements" section. Sample MSDSs can also be downloaded. Interesting DOE Interpretations of OSHA standards can also be found.

The U.S. House of Representatives Internet Law Library

([HTTP://WWW.PLS.COM:8001/HIS/CFR.HTML](http://WWW.PLS.COM:8001/HIS/CFR.HTML)) provides an experimental server dedicated to making the CFR available to the public at no cost. An elegant five-option search engine provides a range of queries for targeting various government databases.

The Year in Trees - Superb Woody Plants for Four-Season Gardens.

A new book by Dr. Kim E. Tripp and Dr. J.C. Raulston is scheduled to be published this fall by Timber Press. This book has beautiful color photos, along with detailed descriptions about the plants. For more information call Timber Press (1-800-327-5680).

Ornamental Grasses and Grasslike Plants, edited by A.J. Oakes, PhD. This comprehensive reference emphasizes the ornamental value and versatility of a wide variety of grass species and grasslike plants. With practical information on the adaptation, habitat, appearance, cultivation, and uses of hundreds of species and cultivars. To order call (1-800-342-9678 or fax:607-722-6362.

BMP Guide from SNA. The Southern Nurserymen's Association released its Best Management Practices manual for container-grown woody plants this fall. The manual was created by Tom Yeager, University of Florida, Donna Fare, Tennessee Tech University, Charles Gilliam, Auburn University and Alex Niemiera, Virginia Tech. In May 1994, southeastern growers decided to try to ward off federal environmental regulations by establishing self-regulation for growing practices. Through SNA, the growers contacted the four researchers and asked them to examine current research and industry methods. From that data, the researchers were to compile a production guide emphasizing growing practices with greatest control over environmental impact. Input and review was solicited from the nursery industry. For more information contact Tom Yeager, University of Florida, Environmental Horticulture Department, 2517 Fifield Hall, Gainesville, FL 32611; (904) 392-7940; fax (904) 392-3870.

January 2-5 and 8-12 - Advanced Turfgrass and Advanced Landscape, IPM Short Course, University of Maryland, College Park, MD. Contact: Advanced Turfgrass IPM Short Course, Extension Secretary, Dept of Entomology, University of Maryland, College Park, MD 20742, Tel:(301)405-3913.

January 4-6, 1996 - Winter Mants, Baltimore Convention Center, MD. Contact: Carville Akehurst, Tel:(410)256-1799, Fax:(410)256-2208.

January 5-8 - GrowerExpo '96 - Hyatt Regency O'Hare, Rosemont, Illinois. For more information call: Tel:1-800-456-5380, Fax:1-800-456-0132, or write P.O.. Box 9, Batavia, IL 60510-0009.

January 9, 10, 11- Eastern Pennsylvania Turfgrass Conference, Valley Forge Convention Center. Contact: Pa Turfgrass Council (814)863-3475, Nancy Bosold (610)489-4315.

January 10 - 11 -(Jan.10)- The Building Blocks: A Designer Oriented Study of the Eastern Native Landscape, (Jan. 11)- Nature and Design Accomplished: Case Studies, Villanova University, Villanova, PA. Fee (per person) \$239 includes continental breakfast/lunch -\$28 for dinner option. For more information contact: Morris Arboretum, Ed. Dept., 9414 Meadowbrook Ave., Philadelphia, PA 19118. Tel:(215)247-5777, Ext. 156.

January 11 - Biological and Integrated Greenhouse Insect Management Seminar & Tour. Sponsored by: Ohio Florists' Association and Lorain County Extension Service. Registration deadline: January 2, 1996. For more information contact: Ohio Florists' Asso., 2130 Stella Ct., Suite 200, Columbus, OH 43215 or Tel:(614)487-1117, Fax: 614-487-1216.

January 11-14 - NCAN "Green & Growin' Show, Winston-Salem, NC. Contact: Bill Wilder, Tel:(919)266-3322, Fax:919-266-2137.

January 16 - 1996 Ornamental Short Course offering - Business Management for the Nursery and Landscape Industry, Sheraton Inn, Dover, DE. For more information contact: Susan Barton, Tel:(302)831-2531, Fax:302-831-3651.

January 17, 18 - Delaware Horticulture Industry Expo, Sheraton Inn, Dover. Contact: Marianne McGloin, Tel:(302)677-1895.

January 18 - Eastern Regional Landscape & Nursery Seminar, Delaware Valley College, Doylestown. Contact: David J. Suchanic, Tel:(610)489-4315.

January 22-24 - Ohio Cents Trade Show, Columbus, OH. Contact: ONLA 800-825-5062.

January 23-24 - Irrigation System Design, Aquarius Irrigation, 314 West Basin Rd., New Castle, DE 07506. Cost \$35.00 per person. For more information call:(610)941-6662 or (302)328-3326.

January 25 - Landscape Lighting & Pond Design, Aquarius Irrigation, 314 West Basin Rd., New Castle, DE 07506. Cost \$25.00 per person. For more information call:(610)941-6662 or (302)328-3326.

January 26 - Drip Irrigation Design, Aquarius Irrigation, 314 West Basin Rd., New Castle, DE 07506. Cost \$25.00 per person. For more information call:(610)941-6662 or (302)328-3326.

January 26, 27, 28 - Southern Gardening Symposium, 10th Anniversary. For more information, contact: Symposium Coordinator Martha A. Miller, Education Dept., Callaway Gardens, P.O. Box 2000, Pine Mountain, Georgia 31822-2000, Tel:(706)663-5161.

January 29 - 6th Annual University of Delaware Cooperative Extension Pesticide Conference, Sheraton Conference Center, Dover, DE. Contact: Dr. S.P. Whitney, (302)831-1407, for further information.

January 31 - Running a Landscape Business in the Electronic Age. Ornamental Short Course, Pearson Hall, University of Delaware, Newark, DE. Contact Susan Barton, (302)831-2531.

February 1-4 - AAN WNGA/NLA/GCA Management Clinic, Louisville, KY. Contact: AAN.

February 5, 6 - ISA Penn-Del Chapter - 30th Annual Shade Tree Symposium, Host Conference Center, Lancaster, PA. Contact: Elizabeth Wertz, Penn-Del ISA, Tel:(215)795-2096.

February 5-7 - Trees and Utilities National Conference, Arbor Day Farm, Lied Conference Center, Nebraska City, Nebraska. Presented by: The National Arbor Day Foundation and The Utility Arborist Association, A

Professional Affiliation of the International Society of Arboriculture, in cooperation with The Alliance for Community Trees.

February 6-8 - Winter Workshop - Landscape Contractors Association, MID-DC-VA, Bethesda Marriott, Bethesda, MD. Tel: (301)948-0810.

February 7, 8 - NJNLA's New Jersey Trade Show, Garden State Exhibit Center, Somerset, NJ.

February 7-10 - Virginia/Mid-Atlantic Direct Marketing Conference, Sheraton, Fredericksburg, VA. Tel: (804)229-4009.

February 8 - Northeastern PA Turfgrass & Grounds Maintenance School, Mountain Laurel Resort, White Haven, PA. Andrew McNitt (814)863-1368 or PA Turfgrass Council (814)863-3475.

February 8, 13, 15, 16 - Turfgrass Management for Professionals, Montgomery County 4-H Center, Creamery. Cost is \$65.00. Contact: Nancy Bosold (610)489-4315.

February 12, 13, 14 - Pennsylvania Nurserymen & Allied Industries Conference, Hershey Lodge & Convention Center. Contact: David J. Suchanic (610)489-4315, PLNA (717)238-1673.

February 13, 15 and 20 - Diagnosis & Control of Insects on Woody Ornamental Plants. Ornamental Short Course, Fischer Greenhouse, University of Delaware, Newark, DE. 3-5 PM. Contact Susan Barton (302)831-2531.

February 15 - Winter Grounds Maintenance Seminar, Kutztown Grange Hall, Kutztown, PA. Contact: Judith L. Schwank (610)378-1327.

February 25 - March 3 - Philadelphia Flower Show, Philadelphia Civic Center, Philadelphia, PA. Tel:800-444-7666.

March 6 - Integrated Pest Management Conference, Villanova University. Contact: David J. Suchanic (610)489-4315.

March 8-13 - Georgia-Florida Garden Center Study Tour. For more information send or fax your name and address to the Ohio Florists' Association, 2130 Stella Court, Suite 200, Columbus, OH 43215-1033, Fax:(614)487-1216.

March 13 - Turf Management. Ornamental Short Course, Research & Education Center, Georgetown, DE. Contact Susan Barton, (302)831-2531.

March 14 - Gardening Solutions: Big Ideas for Small Spaces, 1996 Symposium, co-sponsored by the Longwood Graduate Program, Scott Arboretum and the American Horticultural Society, Swarthmore, PA. Contact: Gerry Zuka, Program Secretary, University of Delaware, Tel:(302)831-2517.

March 20 - Irrigation Design, Installation and Maintenance for Turf and Landscapes. Ornamental Short Course, Delaware Department of Agriculture, Dover, DE. Contact Susan Barton, (302)831-2531.

March 29 - CNP Exam, Delaware Department of Agriculture, Dover, DE. Contact Marianne McGloin (302)677-1895.

July 10-12 - Summer Mants, Baltimore Convention Center, MD. Contact: Carville Akehurst, Tel:(410)256-6474.

July 14-16 - 1996 Ohio International Floral Short Course Trade Show, Cincinnati Convention Center, Cincinnati, Ohio. For more information contact: Wendy McAtee, Ohio Florists' Asso., 2130 Stella Court, Suite 200, Columbus, OH 43215-1033, Tel: (614)487-1117, Fax: 614-487-1216.

1996 Management Clinic
February 1 -4
Louisville, KY

Attend the highly acclaimed AAN Management Clinic for a discounted rate.

If we register a group of 20 individual members (or more!) of our state association for the Clinic, each attendee will receive a \$60 discount on full registration. (This special price applies to both AAN members and non-members.)

To receive this discount, send your check and registration form to Marianne McGloin, 952 Monroe Terrace, Dover, DE 19904. We will submit the registrations as a block. The deadline for participation in this program is January 16, 1996. So act now!

