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Editor: Susan Barton, Extension Specialist, University of Delaware  
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**ASSOCIATION NEWS**  
**Valann Budischak**  
**Executive Director, D.N.L.A.**

Its official...the DNLA website is an official work in process! The technical committee consisting of Tony Lemper, Jay Windsor, Joe Wick, Norman Hedrick, Lynn Harrison, Tracy Wootten, Jo Mercer, and Susan Barton met with the developer, Verve Internet Solutions, and the design is under way. The website will be a valuable tool for the green industry and general public in Delaware. It will give you up-to-date information on DNLA and other green industry educational events; the ability to post classified ads; links to other related websites; and much, much more. The general public will be able to use the online directory to locate DNLA members and the services you provide. Stay tuned! 2006 is going to be an exciting year for the DNLA!

The Delaware Horticulture Industry Expo was held January 18<sup>th</sup> & 19<sup>th</sup> at the Modern Maturity Center in Dover. The event gave us the opportunity to visit with 24 exhibitors, and hear some outstanding speakers such as Jerry Fritz of Jerry Fritz Garden Design, Lenny Wilson of DCH, Stanton Gill of the U. of MD, and the ever popular Bob Mulrooney of the U of D. Five hundred people attended the 2-day event. We're thrilled that so many of you were able to join us. The DHIE will undergo an "Extreme Makeover" in 2007. Our goal is to more effectively meet the diverse educational needs of our audience, and to give you and our exhibitors a separate area to meet.

Congratulations to the 2005 Landscape Award winners! The DNLA honored them at the DHIE. The winners were chosen from among many fine entries. The judging took place in October. The winning entries were submitted by the following:

**John Wiest** of John T. Wiest  
Landscaping Service located in Seaford, DE  
**Andrew Durham** of Andrew C.  
Durham & Assoc. located in Rockland, DE

**Reminder: Please keep our 2006 Landscape Awards program in mind throughout the upcoming season.** We encourage any member to submit an entry. More information will follow later in the summer.

Thanks, once again, to those of you who so generously donated to the DNLA Research and Education fund. The purpose of the fund is to subsidize research and educational projects that are of interest and benefit to the horticulture industry in the state of Delaware. The Horticultural Business Mentoring program is one such program that our organization has assisted. This program has paired 11 mentors with more than 28 new green industry businesses. A special thanks to the following members who have stepped forward to serve as mentors for this program: Jay Windsor of Lakeside Greenhouses; Norman Hedrick; Doug George of Jonny Nichols Landscape & Maintenance; Don Savard of Salesianum School; Dave Heckler of Plants Ltd.; Al Zverina of Al Zverina & Associates; and Joe Wick of Joseph Wick Nurseries. If you'd like to serve as a mentor to a new business, please contact Gordon Johnson at 302/730-4000.

Congratulations are in order for Steve Castorani of North Creek Nurseries. Steve has been named a Fellow of the Eastern Region of the International Plant Propagators' Society. Election as a Fellow is an honor that the IPPS awards in recognition of outstanding contributions to the Society and to plant propagation through research, teaching, extension or leadership in plant propagation. Way to go, Steve!

## **Welcome New Members:**

### **A & B Lawncare**

Jason Adkins  
110 Savannah Drive  
Smyrna, DE 19977  
(302) 653-6290

### **Apgar Turf Farm**

John Apgar  
1381 Smyrna-Leipsic Road  
Smyrna, DE 19977  
(302) 653-9389

### **Curb Appeal Lawn Care, Inc.**

David Lange  
1528 Twin Willows Road  
Smyrna, DE 19977  
(302) 242-1544

### **Green Dreams**

Chris Nowell  
706 Hercules Road  
Wilmington, DE 19808  
(302) 654-2826

### **Greenscape Landscape Contractor, Inc.**

William Nicholl  
210 Pond Drive  
Hockessin, DE 19707  
(302) 235-1133

### **Johnston & Associates**

Dean Johnston  
P.O. Box 532  
Newark, DE 19715  
(302) 521-2984

### **KS Landscape**

Kurt Schwaninger  
P.O. Box 48  
Hartly, DE 19953-0048  
(302) 492-3130

### **Landscapes, Inc.**

R. Douglas Wood  
977 E. Masten Circle  
Milford, DE 19963  
(302) 424-7840

### **Plants Ltd.**

Dave Heckler  
105 Delaplane Avenue  
Newark, DE 19711  
(302) 733-0838

### **S & A Services, Inc.**

Jim Carpenter  
1167 Old Wilmington Road  
Hockessin, DE 19707  
(302) 235-7322

### **Superior Lawn Service, Inc.**

Joe Ashton  
23 Woodward Drive  
Wilmington, DE 19808  
(302) 998-1008

### **Three B's Lawn Care**

William Jenkins, Jr.  
213 Sawmill Branch Road  
Townsend, DE 19734  
(302) 670-7789

### **Wright's Lawn Care & Landscaping, Inc.**

Jill/Bill Wright  
14174 Union Street Ext.  
Milton, DE 19968  
(302) 684-3058

### **Associate Members:**

#### **Bayshore Ford Truck Sales, Inc.**

Jack Dulin  
4003 N. DuPont Highway  
New Castle, DE 19720  
(302) 656-5521

**Ehrich & Ehrich Nursery**

Kevin Fenning  
160 Friendship Road  
Cranbury, NJ 08512  
(732) 329-3888

**Guided Path Planning & Garden Design**

Lorene Athey  
32 Kells Avenue  
Newark, DE 19711  
(302) 292-3554

**Kent Co. Community Services Dept., Parks Div.**

Carl Solberg  
555 Bay Road  
Dover, DE 19901  
(302) 744-2495

**New Castle Co. Property Maintenance**

Paul Johnson  
187A Old Churchmans Road  
New Castle, DE 19720  
(302) 395-5720

**PA Green Expo**

Patricia Hobbs  
3403 New Holland Road  
Mohnton, PA 19540  
(800) 789-5068

**U of D NEWS**

**Susan Barton, Extension Specialist**

Here's a reminder of short courses that will be offered this winter/spring:

**HORT 101** -This series is designed for people entering the nursery and landscape industry or for industry professionals who'd like a good review. Each 2-hour session will cover the basics that practitioners need to get started

New Castle County at the Extension Office from 3-5 PM

**March 7 - Turf/Weeds\*** - Cultural recommendations for managing healthy turf to prevent or reduce disease, insect or weed problems. Weed control recommendations for lawns will be provided.

**March 21 - Insects and Using Pesticides Safely\*** - Principles of insect ID and control using alternative control methods following adequate pest population assessment. Basics of pesticide use and safety issues when employing pesticides in pest control.

**March 28 - Diseases\*** – Understanding the disease triangle, an overview of disease organisms (bacteria, viruses, fungi and nematodes), and how to diagnose and control some common diseases of ornamental plants.

The following sessions will be offered in in Sussex County at the Research and Education Center from 7-9 PM:

**March 2 - Pruning** - Learn how to prune trees and shrubs properly by exploring the branch trunk attachment. Overall guidelines for pruning techniques and pruning timing will be covered.

**March 15 - Turf/Weeds\*** - Cultural

recommendations for managing healthy turf to prevent or reduce disease, insect or weed problems. Weed control recommendations for lawns will be provided.

### **March 22 - Insects and Using Pesticides**

**Safely\*** - Principles of insect ID and control using alternative control methods following adequate pest population assessment. Basics of pesticide use and safety issues when employing pesticides in pest control.

Cost of each session is \$5 or \$25 for the series.

**THE ECOLOGICAL LANDSCAPE** - This 4-part series is intended to focus on the integrated landscape and show practitioners why disturbed landscapes are difficult to manage and how planted landscapes might be brought back to a more balanced state.

**Horticultural Ecosystems** - An overview of landscaping from an ecological perspective. Topics will include differences between natural and horticultural ecosystems, the effects of land disturbance, impacts of plant selection and plant diversity, controlled succession and plant species management, plant-environment interactions, how plants modify the environment, plant stress and plant health, impacts of native and non-native plants, effects of plant selection on other organisms, and landscaping using ecological principles.

**Ecosystem Diversity from an Animal Perspective** - Methods to encourage and promote a diverse ecosystem by keeping often dominant pest species in balance with their natural enemies. How to discourage pests and attract beneficials such as pollinators, birds, small animals and other desirable species into landscapes. Diversifying the landscape to promote species diversity and aesthetic appeal.

**Ecosystem Diversity from a Plant**

**Perspective\*** - Invasive plants can take over and dominate a landscape, completely choking out desirable species. This class will cover invasive plant control and the reestablishment of a desirable compliment of diverse plants that function together effectively as a balanced ecosystem.

**Managing Water in the Landscape** – A look at rain garden technology and planting as well as an overview of products, plants and methods currently available to help address storm water management and restoration.

These sessions will be offered in New Castle County at the Extension Office from 7-9 PM on Thursdays and one Wednesday (April 6,13, 20, 26, ). Cost of each session is \$5 or \$15 for the series.

### **PROBLEMS IN NEW DEVELOPMENTS**

**Classroom Session** - In this session, the effect of soil disturbance will be studied. Topics will include properties of topsoils, properties of subsoils, soil compaction, grade changes, soil mixing, topsoil quality, soil layering effects, root growth effects, construction and tree damage, aeration of soils, subsoiling, air spade use, amending problem soils, and other techniques for dealing with the effects of construction. Wednesday, April 5, 7-9 PM at Research and Education Center (\$5)

**Twilight Session Outdoors** - Principles discussed in the classroom session will be demonstrated at a newly constructed site. Participants will learn how to measure and locate compaction, evaluate disturbed soils, prepare new sites for planting, use aeration equipment, and deal with problem areas. Wednesday, April 12, 5-7 PM (\$5)

### **NATIVE PLANTS IN THE LANDSCAPE**

This workshop will be offered as an 'inside/outside' classroom, so participants need

to come prepared for both environments. We'll discuss the value of native plants (especially shrubs and trees) in our landscape vs. encouraging non-natives and how the entire ecosystem (local and regional) is impacted.

This class will be offered in three locations: One session on Wednesday, June 21 from 9 AM till noon at the Research and Education Center in Georgetown; two sessions on June 29 and July 6 from 7-9 PM at the Fischer Greenhouse in Newark; and one session on Wednesday July 5 from 9 AM till noon at the Kent County Extension Office in Dover. Cost is \$5/session.

### **HEADS UP FOR FALL**

We will offer 2 intensive 2 ½ hour sessions on each of the following three topics: Diseases\*, Insects\* and Weeds\*.

To register for any session, contact Dot Milsom at 302-831-2531.

\* pesticide credits for attendance

### **DELAWARE HORTICULTURAL BUSINESS MENTORS PILOT PROGRAM**

The University of Delaware Cooperative Extension in partnership with the Delaware Nursery and Landscape Association (DNLA) has initiated a pilot program to help new horticultural business. With the expanding horticulture industry in the region, and Delaware in particular, many new lawn care, landscape maintenance, and landscaping businesses have been started. Many of these startups struggle in the beginning and a significant percentage fail.

To help new horticultural businesses get off to a better start and to further professionalize the industry, a pilot mentoring program has been established by the University of Delaware aided by a grant from the DNLA. In this program experienced horticultural professionals are paired with new businesses. Over a 6 month period, the mentors will help guide these new businesses in the creation of a basic business plan. Mentors will share their business and horticultural knowledge with clients.

Some aspects and goals of this pilot program:

- Mentors are volunteers working with Delaware Cooperative Extension and represent the University of Delaware when working with a client.
- Mentors meet with clients at least twice a month, scheduling one half day (3-4 hours) per visit.
- The primary goal of this program is to help clients produce a basic business plan. Mentors help clients get their business plan down on paper and learn how to use the business plan. Clients should complete a basic business plan within 6 months.

- If the client has advanced business planning needs, the program will help to find other resources to work with the client (such as Small Business Development Centers).
- A second goal is to help the client with other business related questions and try to find resources to help. Examples include accounting, labor issues, or complying with regulations.
- A third goal is to help the client with horticulture related questions.
- A fourth goal is to share experiences and knowledge with the client.
- Mentors work closely with program coordinators at the University of Delaware.

The program is currently seeking additional mentors: retired landscapers, turf managers, horticultural teachers or horticultural industry professionals. This is a way to give back to the industry, help new businesses get started, and pass knowledge to the next generation.

Businesses being mentored benefit by doing in-depth planning, analyzing their business, developing a good marketing plan and setting well defined goals. In addition, by working with an experienced retired landscape professional, they gain valuable insight and knowledge of the industry. With a business plan in hand, today's horticultural businesses will be able to take the first step toward success and sustainable business.

Potential mentors or clients (horticultural businesses) in Delaware interested in this program are encouraged to contact Kent County Delaware Cooperative Extension: Jennifer Jones (302) 492-1104 or Gordon Johnson (302) 730-4000.

## STEVE CASTORANI HONORED

Steve Castorani, of North Creek Nurseries in Landenberg, PA, has been named a Fellow of the Eastern Region of the International Plant Propagators' Society. Election as a Fellow of the IPPS-Eastern Region is an honor that the IPPS awards in recognition of outstanding contributions to the Society and to plant propagation through research, teaching, extension or leadership in plant propagation. The International Plant Propagators' Society is a non-profit organization of nearly 2500 members organized into eight separate regions around the world. The membership is made up of individuals with a professional interest in plant propagation from businesses, colleges and universities, botanic gardens and arboreta. The motto of this non-commercial organization is "To Seek and To Share" knowledge and experience in plant propagation.

Born in Wilmington, Delaware, Steve attended Girard High School in Philadelphia, where he graduated high school in 1972. While at Girard, Steve apprenticed in mechanical drawing and was recognized with The Mechanical Arts Award in his graduating class. Upon leaving high school, he returned home to Delaware and assumed the care of his family's property where his interest in horticulture was sparked. Steve had the unique opportunity to grow up in a multi-generational Italian household where gardening was an essential part of family activity.

Steve enrolled in the University of Delaware where he studied Plant Science and Education. He received a Bachelor of Science Degree in Plant Science in 1977. In the years following graduation, Steve took on the responsibility for the maintenance and improvements to the family's 200 plus year old historic apartment building. He worked in various building trades that educated him in the care of historic

buildings. He also spent time teaching high school horticulture as well as growing mushrooms commercially on the family's farm.

In 1979 Steve began Gateway Landscaping and Woodworking Inc., a landscape design - build firm located in Hockessin, Delaware. Gateway Garden Center was a natural outgrowth of Steve's landscape business. Established in 1986, Gateway is now the area's source for new plant selections. The Garden Center specializes in perennials, conifers, native plants, aquatic plants as well as water gardens.

In 1988 Steve co-founded North Creek Nurseries in Landenberg, PA with partner Dale Hendricks. He currently acts in the capacity of CEO and CFO of this progressive nursery that specializes in perennial plant plug production with an emphasis on Eastern regional natives.

Steve has been a member of IPPS since 1992 and is currently the President of the Eastern Region. He has served as a Director on the Board and has served on the Area Meeting, Long Range Planning, Local Site, Membership & Publicity and Employee Evaluation Committees. He was the Program Chair for the Atlantic City conference held this year. Steve attributes much of North Creek's success in propagation to the commitment to shared knowledge among the IPPS membership.

Steve is also very involved in his state's green industry and served two years as President of the DNLA. He was a member of the Governor's Drought Advisory Board drafting legislation to ease restrictions on Nurseries and Garden Centers in the state. He is currently serving on the Delaware Invasive Species Council, developing guidelines for the implementation of an invasive species policy in the state.

Steve and his wife Peg live in Hockessin Delaware with their two sons Sean and Max.

## MAINTAINING FLOWERING PANTS IN HANGING BASKETS

Flowering hanging baskets can bloom and thrive for many months. Help your customers achieve success with their flowering hanging baskets by providing these easy guidelines:

**Is the Light Right?** Match the plant's location with its light and heat tolerance for best results. Impatiens and begonias keep the shadiest spots bright but may not hold up in high light and heat. Fuchasias do best in a spot that gets some shade during the middle of the day. Ivy and zonal geraniums tolerate the brightest and hottest conditions and an occasional drying out.

**Water Before Wilting.** Under average condition, flowering plants in 10-inch diameter hanging baskets use 16 to 32 fluid ounces of water per day. With proper watering, the plants should last 2 to 4 days between waterings.

**Fertilize When Needed.** Add 1 to 2 t/ gal. of water-soluble fertilizer that has 15 to 20 percent nitrogen into the watering can every two weeks and baskets should stay green and flowering. Plastic-coated slow-release fertilizer beads or spikes can be applied to the soil surface at the start of the summer to last all season long. Follow the directions carefully. Too much fertilizer can burn roots and damage plants.

**Remove Dead Flowers and Seed Pods.** This helps keep the plant looking its best and continuing in bloom. If you can't get a plant-sitter to water them for you while you are gone, take hanging baskets down from their hangers and set them on the ground in the shade. With a thorough watering before you leave, most plants will last a week in the ground in a well-shaded location.

*Excerpted from Gardening Notes, CCE, Suffolk Co.*

## A REVIEW OF WEED CONTROL PRACTICES IN CONTAINER NURSERIES

L.T. Case, H.M. Mathers, and A.F. Senesac

*Editor's note; This article reviews some current weed control methods, problems associated with these methods, and possible strategies that could be useful for container nursery growers. The first portion of this article appeared in DNLA News Volume 20, Issue 3, Winter 2005. Another section will be included in this issue with a final section in the summer issue of DNLA News.*

### Chemical control of weeds

Modern herbicide technology was triggered with the introduction of 2, 4-dichlorophenoxyacetic acid (2,4-D) in 1941. By 1996, there were over 140 herbicides available for use. The number of herbicides available to the ornamental industry is considerably less. The overall number of ornamental species produced limits the number of plant species that can be tested for herbicide tolerance and thus the number that can be listed on herbicide labels. The early stages of container production are especially problematic for growers as many products registered for use on established ornamentals or major commodity crops such as cotton, corn, and soybean are injurious to newly established ornamentals. Nursery growers are often left with limited weed-management strategies for specific groups of ornamentals.

Herbicides are effective when used in the proper manner. Bittercress (*Cardamine* spp.) is one of the most common weeds of nursery production but with an effective weed management program, it can be controlled in the containers and in the surrounding areas of the containers with a number of different herbicides. Herbicides for container-grown plants should be highly effective on weeds, yet have low

phytotoxicity on the container-grown plants. Herbicides can and should be applied shortly after potting, although certain precautions should be taken. Due to the large macropores that are present right after potting, herbicides can more easily reach the roots. Dinitroaniline herbicides that can cause root damage should be used with caution. Derr and Salihu (1996) found that abelia (*Abelia x grandiflora*) root growth can be damaged following oryzalin applications. Oryzalin is the most soluble and leachable of the dinitroaniline herbicides.

Identifying weeds is important in nursery container weed control for choosing the correct herbicide to apply. Most herbicides are selective, meaning that the herbicide only kills or prevents seed establishment of certain species. Herbicides can be used preemergence or postemergence, although some herbicides can be used for both. Preemergence herbicides are classified as controlling primarily grasses, boardleaf weeds, or sedges. Even though herbicides may be selective for broadleaf weeds, the crop, which could also be a broadleaf, might be unaffected. This is another example of selectivity. Herbicides can also be nonselective (e.g., glyphosate), which means that they kill most of the plant species present, regardless of the status as a crop or weed. An example of related weeds that exhibit differential response to herbicides is illustrated in the mustard family (*Brassicaceae*). Potential weeds in this family include hairy bittercress and Pennsylvania bittercress. Most preemergence herbicides are effective on the mustards with the exception of trifluralin. Glyphosate and 2,4-D applied as a postemergence directed spray control these weeds. Another example is the pink family (*Caryophyllaceae*). Members of the pink family that may be container weed problems include chickweed (*Stellaria* spp.), and birdseye pearlwort (*Sagina procumbens*). Members of the pink family are controlled by most preemergence herbicides, including simazine,

diuron, dichlobenil, oryzalin, and pronamide. Many pink family members, however, are tolerant to oxadiazon. Glyphosate and paraquat are effective postemergence controls, but 2,4-D provides variable control depending on the pink family species.

Weed management in herbaceous perennial production is even more problematic than in woody ornamental nurseries. The large number of herbaceous perennial species and varieties that are usually grown at even small nurseries complicates the search for herbicides that are generally well tolerated and effective. In the recent past, a number of herbaceous perennial species have been added to the labels of a few preemergent herbicides labels such as pendimethalin, isoxaben, and isoxaben plus oryzalin. These additions have made it possible for limited weed management with preemergent materials in herbaceous perennial nurseries and landscapes. However, due to the sensitivity of herbaceous perennial foliage and growth habits, it has not been possible to find preemergent herbicides that can be sprayed over the top of a wide variety of herbaceous perennials. With the obvious exception of ornamental grasses, herbaceous perennials generally tolerate the postemergent graminicides fairly well. As a result, graminicides are now labeled for use on a substantial number of species. These materials can be useful tools to manage summer annual grasses such as crabgrass.

### **How herbicides work**

Most herbicides have a specific target site in the plant that they bind to and inhibit some physiological function. Mode of action can be defined as the primary mechanism of herbicide interference with plant function or metabolism that leads to plant death. Herbicides with the same mode-of-action tend to have the same translocation (movement) pattern, produce similar injury symptoms, exhibit similar

toxicological profiles, and frequently require the same application method.

One or more vital processes in the plant must be disrupted in order for the herbicides to kill a plant. Many herbicide target sites are enzymes; however, there are exceptions. Some vital metabolic plant processes that herbicides act on include: photosynthesis (capture of light and carbohydrate synthesis), amino acid and protein synthesis, fat (lipid) synthesis, pigment synthesis, nucleic acid synthesis, and maintenance of membrane integrity. Other ways herbicides act to kill plants include: disruption of mitosis (cell division) in plant meristems (shoots or roots), disruption of meiosis (division resulting in gamete and seed formation), interference of uptake of ions and molecules, translocation of ions and molecules, and transpiration.

Preemergent herbicides do not prevent germination, but are absorbed by the weed through growing tissue (hypocotyls, shoot tip, root tip) and inhibit growth of the seedling. Most preemergent herbicides used in container production include a dinitroaniline herbicide. Root inhibition and lodging frequently occur with dinitroaniline. The mode of action dinitroaniline herbicides is through inhibition of growth in the meristematic regions in the young plant by preventing polymerization of tubulin in the cell division process. Despite the knowledge that dinitroanilines are root inhibitors and three to five applications of preemergent herbicides may be required to keep the “chemical barrier” on the container surface, there have been few studies that have investigated the affects of these herbicides on root development of the crop in container production.

### **Herbicide resistance**

The repeated use of one herbicide or herbicides

with the same mode of action may allow a few plants in a population to develop herbicide resistance. Herbicide resistance according to the Weed Science Society of America is “the inherited ability of a plant to survive and reproduce following exposure to a dose of herbicide normally lethal to the wild type.” In a plant, resistance may be naturally occurring or induced by such techniques as genetic engineering or selection of variants produced by tissue culture or mutagenesis. There are different possible mechanisms by which a population of weeds can become resistant. One idea is that herbicide-resistant plants are originally present in a population in very small numbers. The repeated use of one herbicide allows these few plants to survive and reproduce, while those that are not resistant die before they can reproduce. There is then a higher population of the resistant biotype present. Another way that herbicide-resistance may develop is a genetic mutation which develops after the herbicide has been applied, and this mutation then provides resistance to the herbicide. The plants that have resistance can then pass on resistance genes to their offspring.

The development of herbicide-resistant weed biotypes is a dilemma that is facing producers of various agricultural and horticultural crops all over the world. A biotype is defined as a population of weeds within a given species that possess certain traits not common to the entire population of the species. Some biotypes of weeds can possess multiple resistance, which is resistance to herbicides from families with different modes of action. Although the problem of herbicide-resistant weeds is not widespread in nursery culture, nursery managers should become knowledgeable about how resistance develops so that the potential threat and occurrence of resistant weeds can be minimized.

It was once thought that using herbicides from

different chemical families would prevent resistance. However, this is no longer the case. For example, two chemically different groups of herbicides, the sulfonylureas and imidazolinones, have the same site of action [acetolactate synthase (ALS) inhibitors]. Using one of these two herbicide families repeatedly could lead to the development of biotypes resistant to both herbicide families. This type of resistance development would be called cross-resistance. The imidazolinones are primarily used as preemergents and the sulfonylureas are postemergents, although the sulfonylureas can have some residual activity even when applied postemergence. Many nursery growers think applying herbicides at different times (i.e., pre- or postemergence) means that they are applying herbicides with different modes-of-action; however, the example listed above indicates that this is not true.

There are numerous reports of weed resistance to various herbicides. Wimmera ryegrass (*Lolium rigidum*), a common weed in Australia, is resistant to most of the selective herbicides used in Australia. Now, many biotypes of wimmera ryegrass are resistant to glyphosate, a common non-selective herbicide used in container yards. There are not many reports of weeds being resistant to glyphosate, although biotypes of field bindweed (*Convolvulus arvensis*) have shown to be variably controlled by glyphosate. Horseweed has recently been shown to be the first annual broadleaf weed resistant to glyphosate. At present time, there are seven weed species with confirmed resistance to glyphosate. With the continued high use of glyphosate, it can be speculated that there will be more species that will be found to be resistant to glyphosate.

### **Common nursery herbicides**

Granular preemergent herbicides are the most common type of formulations used in container

production. Three common herbicides in container nurseries are oxadiazon and two combination herbicides, pendimethalin oxyfluorfen. Newer granular herbicide premixes including oxadiazon plus prodiamine, and oxyfluorfen plus oxadiazon are becoming more popular for their broad spectrum of weed control. Flumioxazin, a relatively new chemical in the nursery industry is now registered for use as a preemergence and early postemergence herbicide in much of the U.S.

Generally, only preemergent herbicides are used in container production, however, glyphosate is commonly used as a postemergent in the container yard between crops and around shade structures. Glyphosate can also be used, with great care, around the plant in the container when some particularly difficult weed becomes established, like woodsorrel, bittercress, or liverworts. Glyphosate should be applied only at low pressure and low volume with a shield and with extreme care to avoid contact with the stock plant. Some nurseries that have adopted a zero-tolerance for weeds such as liverworts use glyphosate following the precautions indicated above. These nurseries do anticipate stock losses using glyphosate; however because of their zero-tolerance policy with weeds, they already consider the containers with liverworts not marketable, so death of this stock is a moot point. Once the woodsorrel, bittercress or liverworts are dead, nursery personnel will apply preemergence herbicides.

The multitude of plant species in a typical nursery makes it hard to find and even develop a postemergent herbicide that would not be phytotoxic to at least one of the species. Thus, postemergence control of weeds is not a viable option for many nurseries. There are numerous reports of species being tolerant to postemergence herbicides while still effective on target weeds. Bittercress can be controlled postemergence with isoxaben and imazaquin,

however, imazaquin was found to be phytotoxic to 'Midnight Flare' azalea. Oxalis can be controlled postemergence with diuron in container-grown 'Big Blue' lilyturf (*Liriope muscari*) and camellia (*Camellia japonica*). Flumioxazin, oxyfluorfen, pelargonic acid, acetic acid, and oxadiazon provided acceptable preemergence and/or postemergence liverwort and moss control; however, no product provided acceptable control of these weeds at all evaluations. Finding crops that are tolerant of postemergence herbicides would be very beneficial for growers. Preemergence herbicides are a "blind" control method. How is one to know if weed seeds are even present or are going to emerge in a given time frame? The weed species present may not even be in the control spectrum of the herbicide. With postemergence herbicides, it is possible to see what species are present where they are problematic, and when you have to apply the herbicide. There needs to more research in this area, as there are many postemergence herbicides with many different modes of action and weed control spectrums.

*Excerpted from HortTechnology – July-September 2005, 15(3).*

## **DIVERSE PLANT COMMUNITIES PROMOTE BENEFICIAL INSECTS**

**Paula Shrewsbury  
University of Maryland**

*Editor's Note: This article is summarized from a talk presented at the 2006 Delaware Horticulture Industry Expo on January 19, 2006.*

The goal for landscape designers, installation contractors and maintenance contractors is to create and maintain sustainable urban landscapes. Managed systems that sustain healthy plants are less likely to incur pest outbreaks and therefore require fewer inputs (such as pesticides and fertilizers).

Most landscapes are complex ecosystems that include the soil community (microbes and invertebrates); plants; herbivores (insects, pathogens, weeds, nematodes and vertebrates); and natural enemies (invertebrate and vertebrate). The sustainability of managed landscapes is reduced by

- Use of pest susceptible plants;
- Unwise planting design;
- Improper plant installation and maintenance;
- Disruption of natural enemy communities.

Cotoneaster and euonymus are examples of plants that are extremely susceptible to pests—hawthorn lace bug and euonymus scale, respectively. Planting trees in sites with extremely limited soil for root zones and piling mulch around the base of trees are examples of poor design, installation and maintenance. Research has shown that populations of sucking insects, such as adelgids and scale and some chewing insects, such as black vine weevils are favored by high levels of fertilization. Poor plant choices and management practices throw the landscape system out of balance.

Some pests can be effectively controlled with natural enemies, but these natural enemies are often disrupted by

- Vegetation changes (agriculture and urbanization)
- Pesticide applications
- Pest introductions (exotics with no natural enemies)
- Cultural practices (fertilization)
- Environmental stresses (drought)

Whenever possible, choose pesticides with low impact on natural enemies such as, insect growth regulators. In fact, the landscape should be managed to conserve the potential for biological control of pests by promoting natural enemy survival and reproduction; attracting and retaining natural enemies; and suppressing pest populations or preventing outbreaks.

Pest outbreaks occur more frequently in managed than in natural ecosystems. Research at the University of Maryland has shown that even within managed ecosystems, there are fewer azalea lace bugs in complex habitats than in simple habitats. Three possible explanations for this phenomenon include: host plant quality (healthier plants resist infestation), colonization/herbivore movement (azaleas easier to find in open environment) and natural enemies (greater number supported in complex environment). The often held belief that insects are more likely to attack stressed plants does not appear to be true, at least in the case of azalea lace bug. There are simply more natural enemies present in complex habitats. Generalist predators, like the hunting spider, thrive in complex environments because they have more areas for refuge, more acceptable microclimates, alternative prey available and more nectar and pollen that provide sources of food. In a complex environment there are early, mid and late season herbivores present, on other words, more alternative prey throughout the season.

Researchers wondered which has the greatest

effect—adding greater numbers of plants or adding more different species (i.e. increasing diversity). It turns out that structural complexity and plant diversity result in fewer arthropod pests. Azalea plots augmented with flowers (shasta daisy, which booms in hot weather and coriander, which blooms in cool weather) have a greater abundance of alternative prey, a greater abundance of natural enemies and a lower survival of azalea lace bug—the pest!

In another study, conservation strips were planted along the edge of golf course fairways in the rough. There were more natural enemies in the rough even without conservation strips as compared to the fairways because the rough itself provided a better environment for predators. But, researchers also found greater predation in the fairways with adjacent conservation strips as compared to fairways without conservation strips. Thus they concluded that conservation strips show potential as a pest management tool on golf courses. Conservation strips in this study were 23 feet by 7 feet. Further research is needed to determine optimal size, spacing and species composition of conservation strips.

In summary, landscape designers and managers should take the following steps to develop and manage landscapes that support greater numbers of beneficial insects in order to control common insect pests:

- Increase structural complexity – more plants at different vegetational strata, especially tree and ground cover layers.
- Increase plant biodiversity – more plant species and families
- Add flowers – vary architectural complexity and provide season long bloom.

## **HIRING THE RIGHT PERSON – IT'S CRITICAL TO YOUR SUCCESS**

**John Enselein, A I M Concepts**

Even though we try our best to hire the right people for our organization and job, more often than we would like, we are surprised and disappointed with the results. Hiring the wrong person has major negative effects on customer service, productivity, employee morale and profitability.

Let's take a look at a process that has been proven to help identify the right people, and can allow us to minimize hiring mistakes.

1. Critically examine your hiring process. Is it process of design or one that “just happened”? If you have problems here, you can't expect to be hiring right.
2. Determine what it costs to hire, and what hiring mistakes mean to your company. Chances are if you don't know the costs, you'll be slow to take action. The US Department of Labor estimates that replacing one \$8 an hour employee costs over \$5,300. Higher paid workers cost much more to replace.
3. Define what you are looking for. Create accurate and complete job descriptions and define the personal characteristics, skills and attitudes that make someone successful in the job.
4. Get creative in recruiting – use all of your recruiting resources. And, always be recruiting; don't wait until you have an opening. If you don't have an employee referral plan, consider starting one. Studies show that new hires that were referred by existing employees have a much greater chance of working out well.
5. Prepare for and conduct complete interviews. The entire interview process should be centered

on developing as deep an understanding of candidates as possible.

6. Do background checks. These can protect you from a variety of potential issues: including, employee theft, negligent hiring lawsuits, and employee morale issues.

7. Use assessments to test for true job fit. Psychology and technology have teamed to create instruments that measure pertinent characteristics that make top performers successful in their positions. Employers can compare characteristics of applicants with top performers, greatly increasing the odds for success in the job for the new hire.

8. And last, just because you've made the hire, doesn't mean you're done. Put in place an orientation plan that is effective in bringing the new employee on board. Lack of direction, inactivity, or making them feel like "a pain in the neck" will make good hires wonder if they made the right choice.

In review, if you want to increase your hiring success, slow turnover and increase productivity, begin to use the process outlined above. What have you got to lose...besides the headaches associated with turnover or the sleepless nights the wrong employees can cause?

*Excerpted from Free State Nursery News, Winter 2005. John Enselein, President of A I M Concepts helps organizations hire, manage, and develop their employees, and works with organizations' leaders to measure and improve management skills. He can be reached at 410-795-8474.*

## **CAN NEW NURSERY GROWING METHOD IMPROVE FALL TRANSPLANTING SURVIVAL?**

**Stanton Gill, Regional Specialist in Nursery, Greenhouse and Landscape Management, Central Maryland Research and Ed Center, University of Maryland Cooperative Extension**

Have you ever sold a Leyland cypress to a landscaper in the fall and they were back in the spring with a dead plant? If not, you have been lucky, so far. The Leyland cypress continues to grow very late into the fall with new growth still elongating well into November. The plant just doesn't seem to harden off in the fall before the really cold weather moves into the area.

In a verbal survey conducted of nursery managers this fall most told us that they don't dig field grown or sell Leyland cypress after October 15 unless the buyer wants to take the plant material without a guarantee. They tell us they have had too many unhappy customers who install on Oct 16 through December and end up with severely damaged or dead Leyland cypress.

### **Looking for a solution**

At the better container production seminar in October, several nursery managers discussed whether growing Leyland cypress in root containment bags, in pots, or in Amaroo boxes would enable a landscape manager to transplant Leyland cypress later into the fall without suffering winter injury or death of the plants. Landscape managers and nursery plant producers are always searching for the perfect production method that results in high tree transplant success rates. The search for the best method of tree growing and transplanting has been going on since people started moving trees into landscapes. The market drives the need for refinement and change in production methods.

This November we set up a trial involving Ruppert Nursery, Country Springs Nursery, Kurt Reiger of Root Control Company and Scott Loosen of Amaroo Company in evaluating a November 1<sup>st</sup> planting of Leyland cypress. We planted out three, completely randomized blocks of Leyland cypress. In each block we used 8-10 ft. tall Leyland cypress that were either grown in 24" Root Containment bags for 3 years, grown in the Amaroo Boxes for 3 years, grown in pot-in-pot systems, and field grown for 3 years and dug as balled and burlapped trees. The planting blocks were established at the Central Maryland Research and Education Center in three open, exposed sites. Each tree was staked using the T-Mate-O staking system from Emil Kleinert of T-Mat-O Company, Indiana. We will observe any winter injury on each of the plants in the spring and summer of 2006.

### **What are these growing methods?**

In the 1990s pot-in-pot showed up on the nursery production scene. This growing method enabled nursery producers to provide plant material at most times of the year. The number of Maryland nurseries moving into pot-in-pot production is increasing steadily each year. A well grown pot-in-pot plant is often a very good product. Landscape managers are picking between some of the common container sizes of 7 gallon, 15 gallon and even 30 gallon container grown trees and shrubs. The problem is that some very vigorous plant material rapidly fills the pot and results in circling roots. A plant with circling roots quite often just does not establish well in a landscape without a lot of pulling roots outwards.

### **Container grown plant above ground in Maryland?**

In the winter of 2002, Kurt Reiger of Root Control Company approached us at the Central Maryland Research and Education Center and

asked if we would consider trying out the new above ground root containment bags called the Smart Pot. The Smart Pot looks like a typical root containment bag with a few exceptions. The bag is coated with a chemical that inhibits the Ultraviolet (UV) light breakdown of the fabric material. Also, the bottom of the root containment bag consists of a fabric bottom that allows small roots to grow through the bottom of the bag. Typical root containment bags that are inserted into the ground have a plastic bottom on the inside that prevents roots from penetrating the bottom of the bag. When you are growing in the ground root growing through the bottom would make it difficult to pull the bag from the ground.

The Smart Pot is designed to grow above the ground, usually on top of a weed barrier. The small roots that grow through the cloth bottom give it some anchoring so it is less likely to blow over in the wind.

The idea of the Smart Pot is you can grow a plant above ground and when roots reach the outside perimeter of the fabric bag they air root prune and branch within the confines of the bag. Theoretically, the majority of roots are kept within the confines of the rootball so they should transplant well into the landscape setting. Root Control Company has been selling these pots to growers in the south, especially Florida, where this system works well. In Maryland, this has not seemed feasible since our cold winters kill roots of many landscape trees in pots that are sitting above the ground.

At this same time we had contact with Scott Loosen of Amaroo Enterprise Company of Temecula, California. Amaroo Company had designed a nursery growing box with open slits on the side and plastic ridges on the inside. The plastic ridges block circling roots from forming and the open slits cause air root pruning. The air root pruning creates a branched root system

within the rootball.

The box is made from recycled plastic that is colored black and consists of four sides and a bottom that are clipped and bolted together in about 5 minutes. The boxes come in a 35, 75 and 125 gallon size containers. The boxes are pretty substantial but are relatively light in weight, (12.5 lbs for one 35 gallon box). The Amaroo boxes were supplied through Worthington Farm of Greenville, North Carolina. Tod Williams was our contact with Worthington Farms. In 2002 they supplied 24" (35 gallon) Tree/Shrub boxes. These boxes are made of recycled plastic and are delivered in 5 sections that are easily clipped and bolted together. The boxes have a series of slotted holes on the side that create an air-pruned root system. The insides of the boxes have plastic ridges that prevent the formation of circling roots. The plants are grown in the container above ground. When you are ready to harvest just unbolt the wing nuts on the corners and pull the box sides off. The rootball can be slip into a daisy basket lined with burlap and easily star-laced for shipment. The 35-gallon Amaroo boxes cost around \$18/box. (More than 2000 and the cost drops to \$13/box). This sounds expensive but the box is re-useable and should last at least 10-12 years. You can expect to grow a tree in the box for 1-2 years and then move it into the market. The Amaroo box is designed for growing the tree then re-using the box for additional sets of trees. The plastic should hold up for 10 years according to Scott Loosen. The ones in our trial plots at CMREC are three years old and are holding up well.

The Amaroo boxes are filled with substrate and trees planted in the box. When roots expand and hit the side they air root prune and remain within the confines of the box. When a tree is ready to go to the landscape market the box sides are un-bolted and unclipped and the root ball is able to slide out. Most nursery managers

place the rootball into a burlap lined daisy basket which is star laced. You end up with a root system that is pretty much intact but of quality similar to root containment grown plants.

In the spring of 2002 we planted ten Leyland cypress of 4 ft height into 24" diameter Smart Pots from Root Control Company and ten Leyland cypress in the Amaroo boxes. We also planted 3 ft tall Thuja 'Green Giant' in the root containment bags. The substrate being a mix of 20% top soil, 40% leaf compost, and 40% milled pine bark. The plants in the Smart Pots and Amaroo Boxes were placed on weed barrier cloth. A trickle irrigation system was installed and the plants were fertilized with a slow release fertilizer of Nutricote 20-7-14.

Our intent in the winter of 2002/2003 was to surround the rootballs with wood chips supplied by a local arborist. Unfortunately, the arborist forgot about us until mid-January and we had been through a couple of very cold spells. We decided that the plant material root systems were probably already damaged by the cold weather and decided that the trial would conclude at this point. Science often involves serendipity. We planned to get rid of the plants later in the season. In June we started to remove one of the rootballs and found very little injury. In fact the tops of the plants looked pretty good. By late June the plants started producing new foliage and appeared to be growing as well as similar Leylands and Thuja growing in the ground at our research facility.

Temperature was recorded over the winter of 2002, 2003 and 2004 using a temperature data logger. In 2003 the ambient air temperature plunged to 3 F for 2 days and rose to 5 F for 3 days. In January of 2004 the temperature dropped to 4 F and maintained a temperature of 4-5 F temperature recorded at 7:00 a.m. on each of these mornings. In the spring of 2004 we

examined several Leyland cypress growing in the ground at nurseries in central Maryland and found that several branches suffered winter injury. We did not see similar injury on the Leyland cypress and Thuja 'Green Giant' growing in the Smart Pot.

We examined the root systems on the edge of the rootball after the winter of 2003 and 2004 and found a small amount of injury on perimeter roots. There was no scorching of leaves on any of the plants. Plant growth was strong during the summer months of 2003 and 2004. The plants in the Smart Pots and Amaroo Boxes had doubled in height over the 2 year period.

### **They grow well above ground but do they transplant well?**

We plan to grow the trees in the Smart Pots and Amaroo boxes for one more season. They will then be transplanted into the ground and evaluated for establishment. So far the root systems look good with little if any evidence of circling roots in either the above ground Smart Pots and Amaroo box grown trees.

We welcome anyone who wishes to visit the Central Maryland Research Center to take a look at the trial of fall transplanting of Leyland cypress. Give us a call at 310-596-9413.

*Excerpted from Free State Nursery News, Winter 2005. Stanton Gill, Regional Specialist in Nursery, Greenhouse and Landscape Management, Central Maryland Research and Ed Center, University of Maryland Cooperative Extension and Professor, Montgomery College Landscape Technology Program, Germantown, MD. and Suzanne Klick, and Shannon Wadkins, Agricultural technicians, CMREC, University of Maryland.*

## **Research Briefs**

### ***Container production:***

**Weed control for pot-in-pot production with preemergence herbicides.** Preemergence herbicides, when applied as a directed band application, were sage on several selections of ornamental trees. No visual damage was observed and height and caliper growth of ornamental trees was minimally affected by the herbicide treatments. Weed control in pot-in-pot systems can be achieved with herbicides currently labeled such as Barricade, Pendulum and Surflan provided acceptable control of grass and some broadleaf weeds, but when used in combination with Gallery or Princep, excellent weed control was achieved. (D.C. Fare, P.K.Knight, C.H. Gilliam and J. Aitland)

*Excerpted from J. of Environ. Hort. 23(4):204-211. December 2005.*

### ***Greenhouse production:***

**Advantages of hydrogel throughout bedding plant production.** Pansy canopy coverage was greater with hydrogels, and root growth early in production was enhanced with polyacrylamide (PAM, a specific hydrogel), but no such effect was observed for new guinea impatiens. PAM reduced the need for irrigation early in production for both species, but by the end of production, treated new guinea impatiens were smaller and required irrigation as often as plants grown without PAM. Theoretical analysis predicts benefits early in production with little to no benefit later in production and in post-production. While the use of PAM may be beneficial to growers desiring less frequent irrigations early in plant establishment; if used, watering techniques must change to accommodate sloer rewetting time.

Incorporating PAM into growing media will likely minimally decrease flower number, decrease some plant species' size, decrease media porosity with time, and lose its effectiveness after the initial 3 weeks of plant production. (J.M Frantz, J.C. Locke, D.S. Pitchay and C.R. Krause)

*Excerpted from HortScience 40(7):2040-2046. 2005.*

**Inducing the flowering of orchids.** A relatively low temperature induces the flowering of most commonly grown orchid genera, while a high temperature inhibits flowering. An inductive temperature for most orchids is about 12 C, but Phalaenopsis require about 25 C. For some species and hybrids of Cattleya, Dendrobium, Miltoniopsis and Zygopetalum, the combination of short photoperiod and low temperature induces flowering in the most complete, rapid and uniform manner. It may be possible for greenhouse growers to induce a variety of orchid genera into flowering using a common cool environment (12 C). However, for many orchids, the delivery of a cool temperature treatment must coincide with a developmental stage in which plants are sensitive to an inductive low temperature treatment. Once flower buds are initiated, flower development time is dependent on genotype and temperature. (R.G. Lopez and E.S Runkle)

*Excerpted from HortScience 40(7):1969-1973. 2005.*

**P requirements for bedding plants produced with subirrigation.** The optimum rate for growth of new guinea impatiens in subirrigation is 112N-53P<sub>2</sub>O<sub>5</sub>-94K<sub>2</sub>O (mg/L), which corresponds to a 2:1:2 fertilizer ratio (common commercially recommended fertilizer ratios for general greenhouse crops). These rates for subirrigation are about half the common

commercially recommended rates for top-watering. (C.L. Whitcher, M.W. Kent and D.W. Reed)

*Excerpted from HortScience 40(7):2047-2051. 2005.*

**ABA analogs as holding agents for bedding plant seedlings.** Long-lasting synthetic analogs of abscisic acid (ABA) were evaluated for their potential use in controlling growth and extending the marketing period of seedlings of tomato, snapdragon and nasturtium. ABA analogs, applied as root-dips, slowed moisture use and reduced seedling growth with no significant phytotoxic effects over the short term. ABA analogs were more effective at reducing moisture use by tomato seedlings than regular ABA and also had fewer negative effects on plant appearance. (N. Sharma, S.R. Abrams and D.R. Waterer)

*Excerpted from HortTechnology 16(1):71-77, January-March 2006.*

**Narcissus response to plant growth regulators.** 'Tete a Tete' plant height was not controlled by Florel foliar sprays, Topflor substrate drenches or Bonzi substrate drenches during greenhouse forcing. Only preplant bulb soaks of Topflor and Bonzi were effective in providing shorter 'Tete a tete' and 'Dutch Master' plants in the greenhouse. However, height control is often not a concern for commercial producers during greenhouse forcing, as the plants are shipped to consumers before stem elongation occurs. Plants treated with PGRs should be at least 15-20% shorter than the untreated control at postharvest evaluation. Stem stretch was controlled with Florel foliar sprays greater than or equal to 1000 mg/L, Topflor substrate drenches greater than or equal to 0.5 mg/pot ai and Sumagic substrate drenches of 4 mg/pot ai. Topflor preplant bulb soaks controlled postharvest stretch on 'Tete a

tete' and Dutch Master' at concentrations greater than or equal to 15 and 10 mg/L, respectively. Bonzi preplant bulb soaks greater than or equal to 75 mg/L controlled postharvest stretch of 'Tete a Tete' and 'Dutch Master' while 37.5 mg/L of Topflor controlled postharvest stretch of 'Sweetness'. Rates of PGR vary for different cultivars, therefore growers should conduct on-site trials to determine optimal concentrations. (B.A. Krug, B.E Whipker, I. McCall and J.M. Dole)

*Excerpted from HortTechnology 16(1):129-132, January-March 2006.*

**PEG-8000 reduced height in commercial marigold seedling production.** PEG-8000 concentrations from 15 to 30 g/L reduced growth and hypocotyls height of French marigold without negatively affecting germination. Concentrations above 30 g/L should be avoided. Rates of 2 to 83 g/L of PEG-8000 were undesirable because they reduced emergence and survival of seedlings. PEG-treated marigolds remained shorter than nontreated marigolds 2 weeks after transplanting. It is important to develop watering regimes for growing plants under osmotic stress, since PEG-8000 is highly water soluble and easily leaches out of the growing media. (S.E. Burnett, M.W. van Iersel and P.A. Thomas)

*Excerpted from HortScience 41(1):124-130, 2006.*

**Controlling plug height of verbena, celosia and pansy by treating seeds with Bonzi.** Soaking seeds in Bonzi solutions before sowing reduced growth and percentage seedling emergence of verbena and pansy but had little effect on those of celosia. Verbena seeds soaked in 50, 200 or 500 mg Bonzi for 5, 45 or 180 minutes produced fewer and shorter seedlings than controls. Osmopriming verbena

seeds with 10 to 500 mg Bonzi/L reducing seedling emergence. Seedling height and emergence percentage of pansy decreased with increasing Bonzi concentrations from 2 to 30 mg/L and with soaking time from 1 to 5 min. (S.V. Magnitskiy, C.C. Pasian, M.A. Bennett and J.D. Metzger.

*Excerpted from HortScience 41(1):158-161, 2006.*

**Recommended fertilizer concentrations for growth of Persian shield.** Frown as an annual in most of the United States, *Strobilanthes dyerianus* (Persian shield) has become increasingly popular in summer landscapes partially due to its superior performance in hot and humid conditions. This tropical perennial native to Burma in Southeast Asia, is grown for its foliage: large, sessile leaves marked with purple, green and silver. A nutrition regime consisting of 200 mg/L N from a complete fertilizer is appropriate for producing high quality *S. dyerianus* plants. (E.E. Gamrod and H.L. Scoggins.

*Excerpted from HortScience 41(1):231-234, 2006.*

**Iron form and concentration affect nutrition of container-grown bedding plants.** For Fe-efficient plants (geranium in this study) grown at low pH, the form of iron is less important than at high pH, because as pH decreases both inorganic and chelated forms of Fe are soluble. The potential for Fe toxicity at low pH depends on the total quantity of Fe supplied by fertilizer and a number of other potential sources. The most important conclusion regarding Fe form and concentration for Fe-efficient species regards the importance of maintaining media pH at an adequately high level (above 6) to ensure that Fe (as well as Mn, Cu, and Zn) from fertilizer and other sources is not accumulated to toxic levels. In the

production of Fe-inefficient plants (million bells in this study) growth at high pH, the quality of the iron source is very important. The acceptable pH range for growing Fe-inefficient crops, such as million bells, is pH 5.4 to 6.2. However, this conclusion was based on the use of Fe-EDTA as the iron source, because it is the most common source found in commercially prepared water soluble fertilizers. (R.M. Wik and P.R. Fisher, W.R. Agro and D.A. Kopsel) *Excerpted from HortScience 41(1):244-251, 2006.*

### **Landscape:**

**Mushroom compost to suppress artillery fungi.** Sticky spore masses of the artillery fungus that grows on decaying mulch can damage house siding and cars, resulting in costly replacement or painting. 100% aged mushroom compost suppressed sporulation of artillery fungus. In this study, mushroom compost mixed with landscape mulch, even at low percentages, suppressed artillery fungi, affording a possible solution for compost disposal and artillery fungus control. In addition to suppressing artillery fungi blending mushroom compost with landscape mulch adds beneficial nutrients later released from the compost as it decomposes. (D.D. Davis, L.J. Kuhns and T.L.Harpster)

*Excerpted from J. of Environ. Hort. 23(4):212-215. December 2005.*

**Herbaceous perennials evaluated as weed suppressive groundcovers.** 15 herbaceous perennials were evaluated for their ability to suppress weeds and their potential use as groundcovers in landscapes or along roadsides. Several groundcovers proved to be strong performers in full sun conditions, when challenged with weed infestation in field conditions across New York State. The ability to form a dense foliar canopy was associated

with reduction in weed infestation over time. Groundcovers that formed dense canopies, suppressed weed infestation and maintained their aesthetic appeal over the course of two growing seasons included lady's mantle (*Alchemilla mollis*), catmint (*Nepeta x faassenii*), moss phlox (*Phlox subulata*) and dwarf goldenrod (*Solidago sphacelata*). Groundcovers tended to be more highly weed suppressive if they emerged in early spring and formed a dense canopy. (S.H. Eom, A.F. Senesac, I. Tsontakis-Bradley and L.A. Weston)

*Excerpted from J. of Environ. Hort. 23(4):198-203. December 2005.*

**Composted yard waste use for establishment of roadside vegetation.** Compost mulch can effectively control erosion, but does not necessarily facilitate the growth and establishment of turfgrass. It can provide slope stability for periods of at least 18 months and probably longer with or without vegetative growth and may improve the visual quality of roadside slopes. This study was conducted during drought conditions, and seeding was mostly ineffective for any treatments. Greenhouse seeding studies showed that seed incorporation into composted yard waste mulch may not be necessary during periods of abundant rainfall. However, during periods of low rainfall, seed germination will be greater when incorporated into the compost either by hand raking or mixing the seed at depths less than 4 cm with the compost prior to application. (M.S. Harrell and G.L. Miller)

*Excerpted from HortScience. 40(7):2157-2163. 2005.*

**'Ace or Hearts' and 'Little Woody' redbuds.** 'Ace of Hearts' has a dwarf, compact habit, dome-shaped canopy, and small, shiny, heart-shaped leaves lacking the reddish-purple coloration. 'Little Woody' has a dwarf habit,

vase-shaped growth form, and bullate-rugose, small heart-shaped leaves. Information on the availability of these patented cultivars can be obtained from Paul Woody ( 1821 Indian Trail, Morganton, NC 28655). (P.R. Fanz and P. Woody)

*Excerpted from HortScience. 40(7):2209-2210. 2005.*

**Visiting outdoor green environments positively impacts self-rated health among older people in long term care.** A strong positive association was established between the reported frequency of visiting outdoors and self-rated health even when taking into account health related distresses measured using the Nottingham Health Profile (NPH). It might be possible to promote the well-being of older individuals living in nursing homes by providing them with opportunities to visit outdoor green environments. Results of this study indicate that there may be additional aspects of health-promoting effects related to visiting outdoors other than an increased amount of physical activity. (E. Rappe, S-L. Kivela and H. Rita)

*Excerpted from HortTechnology 16(1):55-59. January-March 2006.*

### **Turf:**

**TE applications influence putting green performance.** Trinexapac-ethyl (TE) is a growth regulator widely used to inhibit leaf growth on bentgrass greens. Although TE improved ball roll distances without turf injury, significant enhancements were only temporary. Applying TE rates greater than 0.017 and 0.033 kg/ha weekly and biweekly, respectively may be more effective for consistently enhancing ball roll distances. Routine TE use at these intervals may be applicable when turf managers apply liquid fertilizations every 7 to 14 days. (P.E.

McCullough, H Liu and L.B. McCarty)

*Excerpted from HortScience. 40(7):2167-2169. 2005.*

**Tall fescue seedling tolerance to herbicides.** Bromoxynil and carfentrazone have the potential to improve broadleaf weed control and complement siduron and quinclorac during seeded establishment of tall fescue. Both are contact herbicides with limited translocation that target annual broadleaf weeds. Carfentrazone and bromoxynil can be used at or after 35 DAE of tall fescue seedling with little injury and no delay in turfgrass groundcover. Increased injury should be expected when tank-mixing quinclorac and carfentrazone or bromoxynil, however, injury from quinclorac plus carfentrazone is more severe. Further, while injury from siduron fb bromoxynil did not occur, a delay in tall fescue cover can result from this weed control strategy. (J.S. McElroy and G.K. Breeden)

*Excerpted from HortScience 41(1):252-254, 2006.*

**Kentucky bluegrass control for renovation once glyphosate-resistant cultivars are used in the turf industry.** Herbicides that effectively control Kentucky bluegrass will be critical when glyphosate-resistant cultivars are introduced to the turf industry. ACCase inhibitors did not provide complete control with single applications and sequential applications provided erratic levels of Kentucky bluegrass control across locations. Clethodim had the least amount of efficacy on Kentucky bluegrass. Single and sequential applications of ALS inhibitors provided considerable Kentucky bluegrass control. Rimsulfuron applications provided inconsistent Kentucky bluegrass control across locations but trifloxysulfuron gave the greatest control of all herbicides other than glyphosate. From these experiments,

glufosinate and trifloxysulfuron possess the greatest potential for controlling glyphosate-resistant Kentucky bluegrass when renovation is desired. ACCase inhibiting herbicides do not appear to be viable alternatives to glyphosate for Kentucky bluegrass control. (P.E. McCullough, S.E. Hart, S. Askew, P.H. Dernoeden, Z. Reicher and D. Weisenberger)

*Excerpted from HortScience 41(1):2555-258, 2006.*

### ***Disease Control:***

**Powdery mildew control on flowering dogwood.** Banner MAXX®, Eagle®40W and Heritage® consistently provided excellent control of powdery mildew on dogwood. Phyton 27 ® and Sunspray Ultrafine Oil® were nearly as effective, but Sunspray Ultrafine Oil® damaged leaves on dogwoods growing in full sun. This product should only be used on dogwoods growing in heavy shade. Compass™ 50W was often as effective. The 1 oz/100 gal rate worked best when applied on a 1- or 2-week schedule, but the 2-4 oz applied monthly was as effective. Under higher disease pressure, higher rates at 2 week intervals are recommended. To guard against resistance, alternate classes of fungicides. Under heavy disease pressure, 3336™ 4.5F and Bayleton® WSP were considerably less effective. (A.K. Hagan, J.W. Olive, J. Stephenson and M. Rivas-Davila)

*Excerpted from J. Environ. Hort. 23(4):179-184, December 2005.*

**Resistance of dogwood species to powdery mildew.** Variation in susceptibility to powdery mildew is apparent both within and between species of the blue berry type dogwoods (infected with *P. guttata*) as has been previously reported for the red berry type dogwoods (infected with *E. pulchra*). Screening of

powdery mildew resistance requires the examination of both leaf surfaces and determination of orientation of cleistothecial appendages to ascertain the source of cleistothecia of either powdery mildew species known to infect *Cornus*. Generalizations for resistance within any species of *Cornus* is dangerous and resistance claims should be limited to the individuals tested. (M.T. Windham, R.N. Trigiano and A.S. Windham)

*Excerpted from J. Environ. Hort. 23(4):190-192, December 2005.*

# Publications

## NEW PESTICIDE INFORMATION WEB SITE ANNOUNCED

For the new Pesticide Information Web site, set your bookmarks to:  
<http://ag.udel.edu/extension/pesticide/index.php>

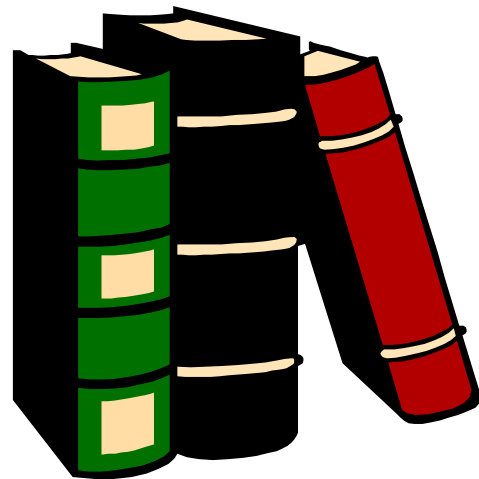
**Pocket guides and post cards.** The 38-page guide is being distributed throughout the Northeast. For a free copy, contact your state network project (NortheastIPM.org/about.cfm#program) or pesticide safety education coordinator ([www.IPMcenters.org/contacts/PSEPDIRECTORY.cfm](http://www.IPMcenters.org/contacts/PSEPDIRECTORY.cfm)).

**Worker Protection Standard for Agricultural Pesticides-How to Comply Manual.** A revised manual describing how to comply with EPA requirements to protect agricultural workers from pesticides is available. The revised manual provides detailed information to agricultural operators on who is covered by the standard and how to meet regulatory requirements. The updated information will facilitate better protection of pesticide workers and handlers in agriculture from the potential risks of pesticides. For more information contact: David Deegan, (617)918-1017.

**MSU – IPM Scouting Guides into Spanish.** (1) E-2720SP Guia de Bolsillo para la Inspección de Plagas de Manzanos en Michigan bajo Manejo Integrado de Plagas (A Pocket Guide for IPM Scouting in Michigan Apples) Price \$13.25. (2) E-2840SP Guia de Bolsillo para la Inspección de Plagas de las Frutas de Hueso bajo Manejo Integrado de Plagas (A Pocket Guide for IPM Scouting in Stone Fruits) Price \$15.50. More information is linked at the MSU IPM Program home page:  
<http://ipm.msu.edu/>

**Urban Wildlife Management,** Clark E. Adams, Kieran J. Lindsey and Sara J. Ash. This publication educated students in the fundamental principles of ecology required to understand how human –made environments lead to the need for urban wildlife management. Catalog #9645, January 2006, 328 pp. ISBN:0-8493-9645-X, \$79.95. Order online:  
[www.crcpress.com](http://www.crcpress.com)

**Container Weed Identification Guide.** For copies of this guide, please contact Ms. Beverly Gelvin of the North Carolina Association of Nurserymen. (919)816-9119, email: [bgelvin@ncan.com](mailto:bgelvin@ncan.com) and her address is 968 Trinity Rd., Raleigh, NC 27607. Cost of the publication is \$5.00 per copy, not including shipping.



# Calendar

**March 5-12** – Philadelphia Flower Show, Pennsylvania Convention Center, Philadelphia, PA. Contact: Pennsylvania Horticultural Society (215)988-8800 or [www.theflowershow.com](http://www.theflowershow.com)

**March 7** - HORT 101 - Session 4 - Turf/Weeds, Instructor: Susan Barton, 3-5 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**March 9** – IPM Scout Training, Brookside Gardens, Wheaton, MD, sponsored by: University of Maryland Cooperative Extension. For more information contact: Suzanne Klick, (301)596-9413.

**March 9-10** – 2006 AABGA (APGA) Conservatory Symposium, hosted by The New York Botanical Garden. Registration information will be available in the near future at [www.aabga.org](http://www.aabga.org).

**March 10** – Public Horticulture Matters: Connecting Purpose and Presence with Future Perspectives. The Longwood Graduate Program Symposium 2006 will feature speakers sharing ideas that connect public horticulture to individuals and communities through leadership, design and education. Registration deadline March 1, 2006. For more information visit [www.udel.edu/longwoodgrad](http://www.udel.edu/longwoodgrad).

**March 10-12** – International Greening Rooftops for Sustainable Communities Conference, Awards, and Tradeshow, Boston, MA. For more information please visit <http://greenroofs.org/boston/index.php>.

**March 15** – HORT 101 – Session 5 – Turf/Weeds, Susan Barton, 7-9pm, Research and Education Center, Georgetown, DE \$5, Contact Dot Milsom (302)831-2531.

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**March 16** - Educational Programs for the Green Industry: Back to Basics – Tree Planting, Chester County Government Services Bldg., West Chester, PA. contact: Cheryl Bjornson (610)696-3500.

**March 16-17**- Pesticide Applicator Training at Del Tech Owens Campus in Georgetown, DE

**March 20** (week of 3/20/06) Pesticide Applicator Training in Kent County

**March 27** (week of 3/27/06) Pesticide Applicator Training at the University of Delaware, Townsend Hall, Newark, DE

**Check the calendar of events at:**

[http://ag.udel.edu/WebCalendar/month.php?user=\\_NUC\\_DE\\_Pesticide\\_Info](http://ag.udel.edu/WebCalendar/month.php?user=_NUC_DE_Pesticide_Info)

**March 21**- HORT 101 - Session 5 - Insects and Using Pesticides Safely, Instructor: Susan Whitney, 3-5 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**March 22** - HORT 101 - Session 6 – Insects and Using Pesticides Safely, Instructor: Dewey Caron, 7-9 PM, Research and Education Center, Georgetown, DE \$5, Contact Dot Milsom (302-831-2531).

**March 28** - HORT 101 - Session 6 - Diseases, Instructor: Bob Mulrooney, 3-5 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**April 5** – Problems in New Developments – Classroom Session, Instructor: Gordon Johnson, 7-9 PM, Research and Education Center, Georgetown, DE, \$5, Contact Dot Milsom (302-831-2531).

**April 5**, - Educational Programs for the Green Industry: Pruning Woody Plants, Wilson Farm, Tredyferin Township, PA. Contact: Julianne Schieffer, (610)489-4315 or Cheryl Bjornson (610)696-3500.

**April 6** – The Ecological Landscape – Session 1 – Horticultural Ecosystems, Instructor: Gordon Johnson, 7-9 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**April 12** – Problems in New Developments – Twilight Session, Instructors: Gordon Johnson and Tracy Wooten, 5-7 PM, Research and Education Center, Georgetown, DE, \$5, Contact Dot Milsom (302-831-2531).

**April 13** – The Ecological Landscape – Session 2– Ecosystem Diversity from an Animal Perspective, Coordinator: Dewey Caron, 7-9 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**April 20** – The Ecological Landscape – Session 3– Ecosystem Diversity from a Plant Perspective, Coordinator: Susan Barton, 7-9 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-

2531).

**April 26** – The Ecological Landscape – Session 4– Managing Water in the Landscape: Wetland Creation and Rain Gardens, Instructors: Jim MacKenzie, Valann Budischak, Leslie Carter, 7-9 PM, New Castle County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**May 11-13** – American Boxwood Society (ABS) Annual Meeting, Memphis, TN. Contact: [www.boxwoodsociety.org](http://www.boxwoodsociety.org)

**May 12-15** – American Rhododendron Society Annual Convention, Rockville, MD. Contact: [www.rhododendron.org](http://www.rhododendron.org)

**June 1-3** – Native Plants in the Landscape @ Millersville-Plant Conference & Sale. Brochure and registration materials will be mailed in March. For more information contact: Millersville University, Professional Training/Education, PO Box 1002, Millersville, PA 17551-0302 or [www.millersvillenativeplants.org](http://www.millersvillenativeplants.org). Email: [npile@yahoo.com](mailto:npile@yahoo.com). Phone: (717)872-3030, Fax: 717-871-2022.

**June 13-14** – International Water Garden & Pond Show, Rosemont, Chicago, IL., phone (888)316-0226.

**June 13-16** – National Lawn & Garden Show, Rosemont, Chicago, IL., (888)316-0226, [www.nlgshow.com](http://www.nlgshow.com)

**June 15-17** – American Conifer Society National Meeting, Knoxville, TN (770)760-9528, <http://www.conifersociety.org/>

**June 21** – Native Plants in the Landscape, Instructor: Dot Abbott, 9-noon, Research and Education Center, Georgetown, DE, \$5, Contact Dot Milsom (302-831-2531).

**June 22-24** – Southeast Greenhouse Conference, Greenville, SC, contact: (540)231-7906, [jlatime@vt.edu](mailto:jlatime@vt.edu) [www.sgcts.org/](http://www.sgcts.org/)

**June 25-28** – GCA Summer Tour, Buffalo, NY, (888)658-6463, [info@gardencentersofamerica.com](mailto:info@gardencentersofamerica.com)

**June 29 and July 6** – Native Plants in the Landscape, Instructor: Jo Mercer, 7-9 PM, Fischer Greenhouse, Newark, DE, \$8, Contact Dot Milsom (302-831-2531).

**July 5** – Native Plants in the Landscape, Instructor: Dot Abbott, 9-noon, Kent County Extension Office, \$5, Contact Dot Milsom (302-831-2531).

**July 8-11** – educational seminars and **July 9, 10, 11** – all-industry trade show – 2006 OFA Short Course, Greater Columbus Convention Center, Columbus, Ohio. Contact OFA, 614-487-1117 • Fax: 614-487-1216 [ofa@ofa.org](mailto:ofa@ofa.org) • [www.ofa.org](http://www.ofa.org)

**July 25-27** – Penn Allied Nursery Trade Show (PANTS), Atlantic City, NJ. E-mail [www.plna.com](http://www.plna.com)

**August 10-12**- SNA 2006 The World's Showcase of Horticulture, Atlanta, GA. Call 1-770-953-3311, [www.sna.org](http://www.sna.org) for more information.

**August 17** – VNLA Annual Field Day at Bennett's Cree Nursery's Isle of Wight Farm, VA., [info@vnla.org](mailto:info@vnla.org), (800)476-0055.

**August 18-19** – NCAN Summer Green Show, Greensboro, NC [www.ncan.com/](http://www.ncan.com/) (919)816-9119.

**September 10-11** – American Conifer Society National Meeting, Washington, DC, [www.conifersociety.org](http://www.conifersociety.org). (410)721-6611

