

In This Issue

2	Association News
3	From the President
4	U of D News
5	Responding to the Labor Shortage
6	Fertilizer Application Tips
7	Reaction of Aster Cultivars to Powdery Mildew and Rust
8	Nutrient Management Plans
9	Control of Nuisance and Detrimental Molds in Mulches and Composts
13	Genetic Engineering – Out of the Laboratory and into the Nursery
16	New Pesticides for Combating Insects in the Nursery
18	Emergence Pattern of Two Early-Season Plant Pests
19	The Fischer Greenhouse Weather Station
21	Gray Leafspot on Turf Update
22	Managing Bittercress in a Container Nursery
23	Pesticide News
25	Research Briefs
30	Publications
31	Calendar
34	ANLA Washington Report

ASSOCIATION NEWS
Valann Budischak
Executive Director, D.A.N.

It's the "Good Old Summertime" once again—my favorite time of year. Since our last publication, the D.A.N. has been busy gearing up for our 1999-2000 events. The Summer Expo will be held on August 19th at Garrisons Lake Golf Club. We will once again have the opportunity to visit with exhibitors, hear from some outstanding speakers, and obtain a pesticide credit. This year will feature a Pig Roast for lunch, followed by our 2nd Annual Golf Tournament. Topics for discussion will include: "Safety with Pesticides," "Lighting the Outdoor Landscape," "Pruning with a Pro," and "Turf Management from Tee to Green." Registration forms are forthcoming. Please plan on attending what promises to be a great day.

The 1999 Ornamental and Turf Workshop and the 2000 Delaware Horticulture Industry Expo are currently on the drawing board. The Turf Workshop is tentatively scheduled for the week of November 8th and the DHIE will be held on January 12th and 13th at the Modern Maturity Center in Dover (note new location). More information will follow throughout the next several months.

The D.A.N. participates in several events each year that focus on the general public. These events enable us to help educate the public, as well as promoting the advantages of enlisting the services of a D.A.N. member. These events include Ag Days, held March 20th at the Dover Mall, the DE State Fair, and Tree Spree, hosted in part by the Delaware Center for Horticulture. If you find yourself attending one of these events, please make it a point to stop by our booth.

Last but far from least, please keep in mind our Landscape Awards Program. In order to be

eligible, the landscape must meet the following criteria: entry must be located in Delaware; must be designed and installed by a current D.A.N. member; and must have been completed in the past 24 months. A committee judges all landscapes. So take your photographs now and call me for an application. Applications must be submitted by September 28th with photographs and/or landscape plans.

Congratulations to our March CNPs

New CNPs:

Bruce Paulish
Paulish Lawn Care
Landscape Specialist and Turfgrass Specialist

Matt Reynolds
Ronny's Garden World
Landscape Design Specialist

Donavon Stout
Ruppert Landscape Co., Inc.
Landscape Specialist

Tammy Blades
Southern States Milford Co-op
Turfgrass Specialist

Carl Hill, Jr.
Hillcrest Landscape Services, Inc.
Landscape Specialist

ShIPLEY Allinson
W.D. Wells & Associates
Landscape Design Specialist

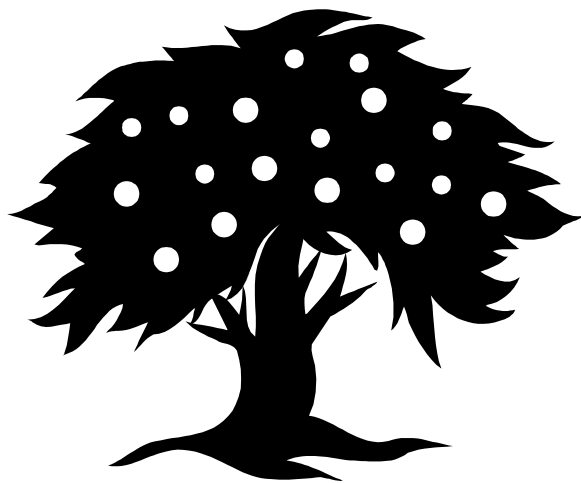
Cameron Beaver
Lord's Landscaping and Garden Center
Garden Center Specialist

Donald Halfen
Ruppert Landscape Co., Inc.
Landscape Specialist

Len Brinsfield
Delaware River and Bay Authority
Greenhouse Production Specialist

New Specialties Added:

Elmer "Skip" Bowman
Delaware River and Bay Authority
Nursery Production Specialist



FROM THE PRESIDENT
Naomi McCafferty
Delaware Association Nurserymen

Congratulations! You've made it through another spring. Everyone I've talked to has been busier than ever, myself included. I believe a strong economy and an increased interest in gardening are the contributing factors. The following is something that crossed my busy desk this spring. I found it amusing and memorable. I would like to share it with you.

Lessons from Trees

It's important to have roots.

In today's complex world, it pays to branch out.

If you really believe in something, don't be afraid to go out on a limb.

Be flexible, so you don't break when a harsh wind blows.

Sometimes you have to shed your old bark in order to grow.

If you want to maintain accurate records, keep a log.

It's OK to be a late bloomer.

Avoid people who would like to cut you down.

As you approach the autumn of your life, you will show your true colors. You could be brilliant!

Originally printed in the Spring APLD newsletter.

U of D NEWS
Susan Barton
Extension Specialist

We are into the summer schedule of ornamentals short courses for 1999. We have tried to focus on hands-on pest walks and troubleshooting workshops in each county. Look in the calendar section at the back of the DAN News for dates, locations and times in your county. John Frett will be teaching two plant ID classes this summer. Small flowering trees will be offered on July 6, 8 and 13 from 5-7 PM and Perennials will be offered on August 16 and 18 from 4-6 PM—don't miss them!

Three Delaware garden centers are sporting Trees Add Life banners, tree tags and trunk liners. This new promotional program for garden centers focusing on tree selection, planting and care, is being tested in 25 pilot sites across the country. We have conducted customer intercept surveys at two pilot sites this spring and will use those results to report on the effectiveness of this point-of-purchase program. If you get a chance, take a look at the banners, tree tags and trunk liners at the three pilot sites in Delaware (Farm Meadows, Lord's Landscaping, Nursery & Garden Center and Gateway Garden Center). Then tell us what you think!

I'm sure you've heard about the new house bill that establishes a commission to oversee and regulate nutrient applications in Delaware. Two members of the council will be appointed from the nursery and landscape industry—a nursery representative and a landscape maintenance representative. Some preliminary results from our nutrient management surveys of urban horticulture may have some real impact on this issue. We have not collected all the data or completed all the analysis but preliminary data looks promising. Our homeowner surveys reveal that people who are purchasing fertilizer

are applying on average 1.8 lbs of nitrogen per 1000 square feet. That is even below University recommendations of 2-3 lbs/1000ft². Similarly, golf courses contribute an insignificant amount of fertilizer when compared to commercial agriculture. There are some best management practices we can stress for sound nutrient management, but overall there seems to be little contribution to the problem from urban horticulture.

Delaware and Pennsylvania are working together to offer a great nursery and garden center bus tour this fall. We will travel to Connecticut and New York on Sept 27, 28 and 29—visiting three nurseries, four garden centers and a rewholesaler. The trip will include an overnight in historic Mystic Seaport. The cost is \$285 for double occupancy and \$365 for single occupancy. This includes transportation, accommodations, and meals (except dinner at Mystic Seaport). We will be sending out flyers in July. Here is the list of tour stops:

Shemin Nurseries
Twombly Nursery
Millane Nursery
Clinton Nursery
VanWilgen Garden Center
Salem Country Gardens
Matterhorn Nursery
Stew Leonard's

It should be a great trip. Hope we see you there!



**RESPONDING TO THE LABOR
SHORTAGE: RECRUITING AND HIRING
OUTSTANDING EMPLOYEES**

Jim Sargent

Penn State Cooperative Extension

Unemployment is very low in Delaware. That is one reason why “Green Industry” companies are having a difficult time recruiting, hiring and retaining quality employees.

In the most recent Sunday edition of the Philadelphia Inquirer, the paper boasted of having job listings for over 10,000 positions. The newspaper even went so far as to buy advertising time on one of the local TV stations to promote this special Sunday edition. In reality there were over 13,000 listings in the job section. It would appear that there are plenty of jobs in the area. Are these classified advertisements working to get these companies the quality candidates that they are looking for? The short answer is NO! Then why are all of these companies placing ads in the employment section of the newspaper? According to research done by Dr. Bernie Evan. at Ohio State University, many companies find the local newspaper the least expensive method of trying to recruit new employees. Their huge disadvantage is their total ineffectiveness. Traditional ads that do little to sell a job for your business are unlikely to attract high quality applicants.

Do your help-wanted ads look like these?

Wanted: Full-time worker for landscaping work.
Call 555-1234

or

Experienced and reliable person needed for local landscaping firm. Call: 555-0987

Help Wanted ads can be placed in newspapers and be very effective even in this tight job market. Only well-prepared and creative

advertisements are likely to succeed in attracting quality applicants. Dr. Evan’s seven step process should result in an effective ad.

1. Lead with a positive statement or job characteristic that attracts attention.
2. Give the job title.
3. Say something positive about your firm.
4. Describe the job.
5. Explain qualifications necessary for success in the position.
6. Provide information on wages and benefits, as appropriate.
7. Say how to apply for the job.

Following these seven steps leads to a more non-traditional ad but increases their effectiveness. Let us look at an example:

Looking for a change? Would you enjoy working outside? We are a local landscaping firm looking for an ambitious individual to work as a crew foreman. Responsibilities include training and supervising ten employees, operation and maintenance of equipment. Our excellent training program will help you succeed in this position. We offer an attractive wage and fringe benefit package that includes health insurance. Call Tony, personnel manager, at XYZ Landscaping, 610-555-9876.

The employer should be ready for telephone calls or visits from potential applicants. Each applicant should be asked to fill out an application form. Taking time to develop an application form or modify a previously used form helps you identify important characteristics of applicants. An application form provides a common base of information about all employees being considered. It also provides an important source of questions to be pursued during the interview. The application form should include an agreement section signed by the applicant that gives permission to check references, makes clear that false information on

the application form can be basis for dismissal and that the employment is at-will.

Creative Ways to Find that New Outstanding Employee

What happens when those help wanted ads don't attract the quality of applicants that you are looking for? It is time to get creative!

During a recent conference, a brainstorming session on recruiting new employees produced the following list of ideas.

- Word of mouth
- Pay current employees for finding new employees
- Job sharing
- Hire a family
- Walk-ins
- Posters and fliers
- Job agencies
- Retirees
- Organizations (Boy Scouts, Girl Scouts, 4-H, others)
- High school coaches
- Favorite teachers at the local schools
- Help wanted ads
- Work release programs from school
- College campus placement offices
- Job fairs
- Local military base
- Customers
- Local welfare offices
- Local job training programs
- Provide transportation
- Offer flex-time

Steps for Filling a Position

The following eight step process, described by Dr. Evan., can be the foundation for a successful hiring program.

1. Evaluate your labor and management needs and compare them to your current situation.
2. Write a job description.
3. Build a pool of applicants.
4. Review applications and select those to be interviewed.
5. Conduct interviews.
6. Evaluate candidates and check references.
7. Make a decision and inform all candidates of their status.
8. Hire the candidate of your choice.

Excerpted from Green Business Reporter, Penn State Cooperative Extension, March 1999, Vol: 10 No. 7

FERTILIZER APPLICATION TIPS Maryland Cooperative Extension

- Have soil tested before applying fertilizer, and retest every three to five years.
- Apply no more than 1 lb./1,000 ft² of quick release fertilizer at a time.
- Fertilize cool season grasses, such as tall fescues and Kentucky bluegrass, in the fall.
- Keep fertilizer off sidewalks, driveways, and streets. If fertilizer lands on these surfaces, sweep it onto the lawn or scoop it up for later use.
- Reassess the need for high maintenance lawn care. Consider using ground cover, shrubs, and trees, especially in shady areas and near streams or drainage areas in your lawn.
- Never apply fertilizer to swales or other drainage areas in lawns.
- Never apply fertilizer to dormant lawns or to frozen ground.
- Don't use fertilizer to melt ice, it doesn't work, and much of it gets washed into waterways.

Reprinted from Nonpoint Source News-Notes,

November 1998, #54

REACTION OF ASTER CULTIVARS TO POWDERY MILDEW AND RUST

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Forty-seven aster species and cultivars were planted April 28, 1997 in a demonstration garden at the University of Delaware Botanic Garden (UDBG) on the grounds of Townsend Hall in Newark, DE. An additional eleven cultivars from Green Leaf were planted August 1, 1998. The demonstration planting was designed to showcase the wide variety of asters available to the gardening public and to increase awareness of their use in the landscape. All the plants in the 1997 planting were donated by North Creek Nurseries, Landenberg, PA. The demonstration plot consisted of three plants of each entry grouped together. The soil was rototilled deeply prior to planting and three inches of compost were incorporated into the silt-loam soil during rototilling. The prepared planting area was covered with three inches of mulch and the plants were spaced 22-24 inches apart in the row. Rows were 3 ft apart. Most of the plants were transplanted from one-gallon containers. Plants were watered with overhead irrigation when needed to supplement rainfall. Weeds were controlled by hand weeding and spot applications of glyphosate.

The plots were evaluated for disease severity on Oct 9. *Aster dumosus* 'Biteliness', 'Apollo', and 'Peter Pan' had high levels of powdery mildew but were not aesthetically damaged by the infection because of the abundance of self-facing flowers that hid the heavily infected foliage. *Aster novae angliae* 'Memories of Alma Potschke', 'Hella Lacy', and 'Martha' were heavily infected and detracted from the appearance of the plants. *Aster puniceus* was very susceptible to powdery mildew and its

appearance was severely affected by the disease. Of the five plants infected by rust only infection on *Aster novae-belgi* 'Professor Anton Kippenberg' was noticeable at the time of the rating because the sepals and small stems in addition to the undersides of the leaves were infected. After the blooms had died, yellowing of the upper-surface of the leaves were infected. After the blooms had died, yellowing of the upper-surface of the rust infected leaves became obvious. Two nearby loblolly pines, *Pinus taeda*, provided rust inoculum from needle infections in early summer.

For more information about growth habits, flowering and ornamental success of the asters in this trial, please call 831-2531 to receive a full report.



**NUTRIENT MANAGEMENT PLANS:
SOME PRE-PLANNING ADVICE**

K. Marc Teffeau

John Lea-Cox

David Ross

University of Maryland

Editor's Note: Maryland passed nutrient management legislation even before Delaware. Here are some recommendations they have provided for nurseries subject to their legislation. These suggestions should hold for Delaware as well.

Here are some activities that both container and field growers can do now to prepare themselves for the planning process. Some of these activities are short-term, but others will probably fit better into your long-term strategic planning process. If you do not have a map or a drawing of the physical layout of your growing site, now would be the time to develop one. Check with your county USDA-Farm Security Agency (the old ASCS office) to see if they may have an aerial map of your area. If you do have plans, take some time to update them if needed. You will need this as a part of developing a nutrient management plan. If you are not already doing it, start keeping accurate records of your fertilizer use, based on crop species, field blocks or production houses. In many instances these records will be more detailed for container growers than field growers. Think about setting up a computer database that covers nutrient, pesticide and herbicide use, and update it regularly. Don't rely on your memory, even for the smallest of operations, and include it in somebody's job description.

Evaluate your operation for any potential nutrient management runoff problems. If all your surface runoff is contained on-site, you will have fewer problems with the planning process. For field producers, re-evaluate your growing operation for potential soil erosion problems.

After a heavy rainstorm, do you see a lot of sediment moving from your fields into streams or the roads around your location? A major focus of the proposed regulations is on phosphorus movement. Excessive amounts of phosphorus moves into surface waters primarily by soil erosion. Contact the USDA-NRCS office in your county about implementing BMP's - Best Management Plans - on your nursery to reduce soil erosion. Keep your valuable topsoil on the nursery site. If you apply liquid fertilizers to your container operation, consider how you might reduce these applications, and evaluate how much phosphorus you are actually applying. For most crops, if you are applying more than 1 part P to 5 parts N and K, you are probably overapplying P. Evaluate the use of slow-release materials, particularly for those species or varieties that you know grow more slowly. Think about reorganizing the layout of the species in your operation, so that the lowest nutrient users are next to streams or other sensitive areas. Evaluate your irrigation system. If you rely on overhead watering and a lot of your irrigation water is running off, consider reconfiguring your system or replacing your current sprinkler heads with more water efficient ones.

These are a few key points to think about in gearing up for dealing with nutrient and water management issues in your nursery or greenhouse operation. The focus of the nutrient and water management course that we are presently developing will be on writing plans, so that nursery operators are trained and certified to write their own nutrient management plans. As a part of that process, we will build up a database of various plans for the nursery and greenhouse industry, which will then be available to all nutrient management planners for review and use.

Reprinted from Maryland Nursery News, 1999.

**CONTROL OF NUISANCE AND
DETRIMENTAL MOLDS (FUNGI) IN
MULCHES AND COMPOSTS**

**J. Hoitink and Matthew S. Krause
Department of Plant Pathology
Ohio State University**

Mulches and composts are typically used to improve soils and plant health and for control of weeds. They improve drainage of soils as they decompose even though the ability of the soil to hold moisture increases. They lower soil temperature in the summer and insulate roots from cold weather conditions. Eventually they mineralize, release nutrients for plants and leave humic substances as residues. The beneficial side effects gradually disappear unless more mulch or compost is applied.

Generally, these organic materials inhibit undesirable microorganisms such as pathogens that cause diseases of plants. They stimulate the activities of many types of beneficial microorganisms, including mycorrhizae. Occasionally, however, microorganisms in these products cause a nuisance and sometimes even plant disease. Whether a mulch or compost provides beneficial or detrimental effects is largely determined by the type of organic matter from which it was produced and the degree to which it was decomposed and treated before its application in the landscape. The temperature and moisture content of the products just before application also have an effect. The severity of these fungal problems can be minimized if appropriate steps are taken in time.

Thick bark from large pine trees and of some other softwood trees sold as “nuggets” or “decorative bark” is very resistant to decomposition. Generally, mulch prepared from such bark does not support the development of fungal nuisance problems. Shredded mulch prepared from mature cypress trees has similar properties. Most mulch, however, is prepared

from hardwood tree bark (oak, maple, etc.) or other byproducts such as yard wastes or pallets. These products can support the development of many types of fungal problems when applied as raw materials. When applied as partially decomposed products or as compost, they are much less likely to cause such problems. Reasons for this are described below.

Fresh wood wastes contain cellulose (white material in wood), lignin (dark material in bark), waxes, tannins and some other minor compounds. The cellulose in most wood products breaks down rather easily through the activities of bacteria, fungi and many other types of microorganisms. Lignin and waxes decompose much more slowly and protect the cellulose in wood and more so in bark from decomposition. The fungi involved in this decomposition or rotting process are natural components of the mulch and compost environments.

Examples of Nuisance Fungi:

The shotgun or artillery fungus (*Sphaerobolus stellata*) causes the most serious problem. While it decays the mulch, it also produces fruiting structures that resemble tiny cream or orange-brown cups that hold a spore mass resembling a tiny black egg (1/10" diameter). This fungus shoots these spore masses high into the air. They stick as small tar spots to leaves of plants or to the siding of homes. They are difficult to remove, leave stained surfaces and cause major damage.

Slim molds, another nuisance fungus, start as brightly yellow or orange slimy masses that may be several inches to a foot or more across. They produce tiny spores that eventually dry out and blow away. These molds, like many others such as stink horns and birds' nest fungi, actually should be considered microbial ornamentals in the landscape. However, some fungi in mulches

and composts produce toad stools (mushrooms) and some of these are toxic to man. It is a good idea therefore, to destroy them when small children have access to the mulched area.

Another fungal problem and that often is not identified correctly occurs when mulches are applied too deep (4-6 inches) instead of to the ideal depth of 1.5 to 2 inches. Deep layers of mulch, particularly if prepared from fresh woody materials, actually may undergo high temperature decomposition in the summer. The result is that the mulch dries out to less than 34% moisture on a total weight basis and becomes a dusty mass.

Fungi often completely colonize such dry materials until it becomes a water-repelling moldy chunk of material. Young trees mulched this way sometimes die from drought even though the homeowner irrigates the area because water runs off the mulch.

Other Types of Problems:

Fresh mulches prepared from dead trees that were killed by diseases may be colonized by plant pathogens. *Verticillium dahliae*, a fungus that causes wilts and death of many shade trees and ornamental shrubs and also of some vegetables, can be disseminated with infested mulch and kill susceptible plants in the garden. *Rhizoctonia solani*, another plant pathogen that causes damping-off of many types of seedling plants, is actually stimulated by fresh mulches. This pathogen can utilize the cellulose in wood as food.

Short term composting of mulches in windrows under high temperature conditions (130-160° F) kills these plant pathogens. Six weeks of composting with turning of windrows is sufficient to avoid dissemination of plant pathogens with mulches or composts. These types of mulches and composts actually

suppress diseases caused by many plant pathogens.

Mulches and composts also affect mycorrhizae, fungi that take up nutrients for plants from soil through beneficial associations with roots. A shallow layer of wood chips (1-2") or compost improves tree establishment because mycorrhizae are stimulated by the slow release organic sources of nitrogen and carbon in organic matter. However a deep layer (4-6") of the same freshly chipped wood has been shown to inhibit the development of mycorrhizae during reforestation. Negative effects on mycorrhizae must be avoided because they are very important in the maintenance of healthy plants.

Compost and mulch producers, landscapers and homeowners can do a lot to minimize fungal problems in the landscape. The type of mulch used, fresh versus composted mulch, the moisture content of the mulch before and during its utilization, the temperature of the mulch before and during utilization, the depth to which the mulch is applied, all play a role. Each factor is described below.

Mulch Type and Fresh vs Composted Mulch:

Wood products from some trees are more resistant to decay than others and, therefore, have fewer nuisance problems. As mentioned above, bark chips (nuggets) from large mature pine or other softwood trees such as cypress trees contain mostly lignin (dark material in bark) and wax or protected cellulose that resist decay. On the other hand, wood wastes from these same trees species, but ground as your trees rot quite readily because the cellulose in such bark and wood products is not yet protected from decomposition by lignin waxes or tannins.

Hardwood bark, even from large trees (oak,

maple, etc.) contains a lot of cellulose that is not protected from rotting. Therefore, hardwood bark mulches, like ground wood from almost all tree species, decay readily and cause most of the mold problems in the landscape unless steps are taken to avoid it. The finer the product is ground, the more severe the problem can be. These materials are low in nitrogen content. The fine particles (less than 3/4" diameter) in such mulches cause nitrogen immobilization in soil after mulching. The microflora that decomposes the wood takes up nitrogen supplied by homeowners to feed plants. The plant loses this competition and the result is that it becomes starved for nitrogen. Some mulch producers screen all particles smaller than 3/8" out of high wood content or hardwood bark mulches to avoid most of the nitrogen immobilization problem.

The best way to avoid the problem and bring about beneficial effects by mulching is to add nitrogen to woody and hardwood bark products followed by composting to lower the carbon to nitrogen ratio. Blending of grass clippings with wood wastes before composting is one way to achieve this. Addition of poultry manure or urea to supply 1.2 lbs available nitrogen per cubic yard material satisfies the nitrogen need also. Some landscapers add 10 - 15% by volume composted sewage sludge to hardwood bark or wood wastes and this makes an ideal product that has performed very well in landscapes. These amended products should be composted at least 6 weeks. This process kills plant pathogens, eggs of insect pests and produces a nitrified product that releases plant nutrients rather than ties up nitrogen. As mentioned above, the product reduces the potential for growth of nuisance fungi and provides control of plant diseases, stimulates mycorrhizae, etc.

Temperature and Moisture Content:

Landscapers often apply quality mulch products from high temperature piles (140-160°F) directly into the landscape. The temperature of the mulch is high because of heat produced by growth of microorganisms during composting in the storage piles. These microorganisms die soon after the mulch is placed around homes (50-80°F) because they cannot grow and compete with soil microorganisms at the low temperature of mulches in the landscape.

The sudden temperature drop that often occurs during mulching creates what is known as a "biological vacuum." It also can occur during bagging of products at producers of mulches and particularly during dry seasons. Mesophiles (low temperature soil microorganisms) rapidly colonize such mulches. If the mulch is dry, or dies out to a moisture content below 34% during the first day after it is applied (mulches are dusty below this moisture content) fungi become the primary colonizers. This sets the stage for problems later and the problem becomes most severe in mulches that are applied too deep.

After prolonged heavy rains during humid weather, the dry material colonized by fungi eventually becomes wet. Dry products stored in bags also eventually become moister as water produced as a result of microbial activity accumulates along the outer surface in bags. Bacteria then rapidly colonize the fungal white mass to induce the formation of fruiting structures by the fungi. The nuisance toad stools and other fruiting structures appear a few days later.

Soaking the high temperature mulch with water as it is applied or bagged can reduce this problem. Bacteria then rapidly colonize the high moisture organic matter during the first three days. These bacteria compete with fungi to reduce the potential for the development of major mold problems. This strategy has been successfully applied over the past decade to

hardwood as well as softwood composts and mulches. It has controlled nuisance problems caused by many fungi in various parts of the US and abroad.

Mold problems occur also when dry products are applied to dry soils. Dry composts applied from high-temperature piles have frequently caused mushroom problems at nurseries and inhibited plant growth in field soils as well as in potting mixes. They also cause wettability problems if the dry conditions persist in soil for a few weeks to give fungi a chance to become the dominant colonizers. Plants do not grow well in such moldy soils. In summary, water applied at the right time during composting, storage and mulching can solve most of the fungal nuisance problems. It is best to maintain water content higher than 40% on a total weight basis. Again this allows bacterial as well as fungi to colonize the organic matter. The moisture content of most organic products actually can be raised above 50% and not present excessive weight problems during transport to customers.

What to do once the problems occur:

Sometimes very little can be done to control nuisance fungi other than to spade the mulch into the surface soil layer followed by soaking with water. Another option is to remove the mulch, place it in a heap after thorough wetting to allow for self-heating to occur (110-140°F). This will kill most nuisance fungi. If fresh dry mulch is placed on top of mulch colonized by nuisance fungi, the problems may occur again the following year or even earlier.

Fungicides are available that control some soil fungi if applied as soil drenches but they have not been labeled for most of these applications. Some beneficial fungi such as *Trichoderma* spp. that parasitize on other fungi in woody materials naturally colonize mulches after high

temperatures decline. Unfortunately, populations of this and other biocontrol microorganisms do not always peak in time to prevent excessive growth of nuisance fungi. Some of these beneficial microorganisms are not active as parasites in fresh mulches because the readily available food base in fresh woody materials inhibits the production of enzymes active in parasitism. After organic matter is fully colonized, parasitism begins. This shows again how important it is to avoid fresh woody materials in the landscape!

The best control strategy for homeowners and landscapers is to purchase products that are low in wood content, nitrified and composted. Fresh, finely ground woody products should be avoided for many reasons unless composted first. Coarse fresh woody products are much less likely to cause problems unless applied too deep. It is important to soak all mulches immediately after they have been applied. Generally, mulches should not be applied to a depth greater than two inches. Mulches and composts applied in this manner provide many types of beneficial effects rather than nuisance problems, or worse, plant diseases.

Reprinted from ONLA Education Update, June 1998

GENETIC ENGINEERING - OUT OF THE LABORATORY AND INTO THE NURSERY

Ruth A. Welliver

Pennsylvania Department of Agriculture

“Genetic engineering” used to be a term found only in science fiction horror stories. Today, “biotechnology” and “genetic engineering” are commonplace terms in conversations about medicine, animal science, or crop science. Genetic engineering is defined as the transfer of DNA from one organism to another, and a plant or animal modified by genetic engineering to contain DNA from an external source is called a transgenic organism. The same biotechnological tools that brought us transgenic sheep or corn are slowly being applied to nursery and greenhouse crops.

Historical background

Ever since humans first began farming, some ten thousand years ago, they have worked to preserve and increase those plant characteristics they considered useful. First, plants with desirable characteristics were singled out and given room to flourish. Then, breeding programs were initiated to move or combine desirable characteristics among members of the same species. As breeding programs became more sophisticated, methods were even developed to allow crosses of plants that would not normally cross in nature. But in most cases, natural barriers prevented us from succeeding with interspecific crosses.

The science of genetics had its modern foundation in the mid-1800s, with Gregor Mendel and his work with heredity in pea plants. That science eventually led to molecular genetics and the understanding that an organism’s characteristics are determined by its genes, bits of deoxyribonucleic acid (DNA) that act as blueprints for the organism. We learned

to break the DNA code and to assign functions to the DNA sequences. We found that DNA was fundamentally the same in all living things, and so ought to be interchangeable among plants, animals, and microorganisms. In 1973 came the first report using recombinant DNA technology, in which a single gene sequence was isolated, manipulated, and moved into another organism. With this work, the world of genetic engineering was opened to us, providing a new tool that allowed breeding to be precise, predictable and controlled to a greater degree than ever before.

Nuts and bolts

In any system for gene transfer, there are two keys needed to turn genetic engineering into a practical reality. First, a gene must be available that is known to have a useful function. Second, there must be a means to incorporate that gene into the host organism in a stable manner.

Isolation and identification of genes has proceeded quickly, and genes with useful functions continue to be catalogued. Some of the most common gene traits exploited in plant genetic engineering are herbicide tolerance and insect or disease resistance. Other genes have been used to enhance product quality such as increased oil production in a seed grown for its oils, or extended shelf life for fruits and vegetables. Still other genes have the potential to improve agronomic qualities, and to confer improved drought tolerance, salt tolerance, or cold-hardiness. Another use of plant genetic engineering is to introduce genes that code for products that have not traditionally been produced in plants, such as vaccines or polymers for plastic production. Gene usage is limited only by the imagination of the developer, who sees a role for a gene in enhancing the value of a crop. Certainly, many useful genes are available, while many others are yet to be identified.

The second requirement for genetic engineering, the ability to integrate the useful gene into a plant host, has been a stumbling block that has significantly slowed progress in genetic manipulation of plants. To create a stable product, the gene must be introduced into a single cell, and that cell must grow into a new plant. Each plant species has different requirements for growth from single cell to whole plant - some will grow easily, while others will not grow at all. Enough work has been done on major agronomic and food crops, such as corn, soybean, wheat, rice, and potato that systems have been developed and can be used now for any interesting gene. But for the smaller acreage crops, less time has been invested, and systems have been slower to develop. This is the case with many nursery and greenhouse crops.

Risks and regulations

With the long-imagined feat of introducing genes of one organism into another becoming technically possible, many questions arise about the potential for danger to human health or to the environment. Could a gene introduced into a food plant make that food toxic? Could an introduced gene enhance the weediness of a crop plant, allowing that plant to expand its range? Could a transgenic plant with a pesticidal action harm beneficial organisms as well as pests? The scientists who first succeeded in genetic engineering in 1973 recognized the potential and called for a moratorium on recombinant DNA research until those risks were identified and either decreased or eliminated. Such a moratorium existed until scientists could develop safeguards for research, and a regulatory framework could be developed to deal with the perceived risks. An ongoing public debate continues to identify and clarify the ethical issues raised by the new technology.

For plant genetic engineering in the United States, regulatory responsibility is divided among several agencies: the United States Department of Agriculture (USDA), the Food and Drug Administration (FDA), and the Environmental Protection Agency (EPA). State governments are also involved in the regulatory process. The Pennsylvania Department of Agriculture works in cooperation with the USDA and EPA to approve products to be grown or developed within the Commonwealth, and can voice concerns specific to Pennsylvania.

The USDA has a permitting system to monitor importation, interstate movement, or release into the environment of transgenic plants harboring any gene sequences that might enhance the “pest-like” qualities of the plant. Any such materials are evaluated for risks they might pose to the health of humans, animals, plants, or the ecosystem into which they are being released. USDA permit requests provide a measure of the pace of current research and development. In 1990, the USDA received 8 requests for permits to grow genetically engineered plants in the field. In the years since then, the USDA has received over 3,800 requests, covering 48 different plant species.

The FDA must approve transgenic products used as food or food additives. Concerns that a new gene might cause a plant to induce an unexpected allergic response, or that these new products might pose a health risk to the general population, are evaluated. In addition, the FDA handles questions about labeling of transgenic food products, for those with health or with ethical objections to this technology. For example, would a plant carrying a gene from an animal source be of concern to vegetarians or to a religious group with dietary restrictions?

The EPA monitors transgenic plants carrying genes that provide a pesticidal trait to the plant. Biopesticides, or pest-resistant transgenic plants,

are regulated by the EPA in the same way that they regulate chemical pesticides.

Transgenic plant products today

Because agronomic and vegetable crops offer a lucrative target for development, genetic engineering work has been concentrated in those crops. Corn tops the list of release permits granted by the USDA. Several transgenic products have been commercialized and are being grown in large acreages already, including herbicide resistant and insect resistant crops. Transgenic research on ornamental crops has not moved at the same pace, although there has been considerable progress. One reason for the slower pace is that most ornamental crops do not offer the same market share as corn or soybeans. Another drawback with ornamentals is that they have so many important, established cultivars. A new gene would need to be introduced into each appropriate cultivar, which would require a substantial commitment of time and money.

Developing transgenic ornamentals may be simpler than developing other transgenic crops in several respects. Since these crops are not intended for human consumption, they are more likely to have consumer acceptance and a streamlined regulatory approval process. In addition, *in vitro* culture technology is already in use for some floral and ornamental crops, and could pave the way for speedier development of the technology needed for regeneration and quick propagation of transgenic plants.

Many different nursery and greenhouse crop species are being genetically engineered. Tree species that have been successfully engineered include apple, larch, pine, plum, poplar, spruce, sweetgum, and walnut. In floral crops, carnation, chrysanthemum, geranium, gerbera, gladiolus, lily, petunia, rose, and tulip have been successfully engineered. The most common

alteration in these floral crops is in flower color such as producing a “true blue” rose. But many products are also being developed to incorporate herbicide tolerance or pest resistance into nursery and greenhouse crops. For example, resistance to impatiens necrotic spot virus has been developed in chrysanthemum. A good Internet source for keeping track of products under development is a USDA web site at <http://www.aphis.usda.gov/biotech/>

Genetic engineering holds a good deal of promise for nursery and greenhouse crops, enhancing their important qualities, providing pest resistance, decreasing the need for chemical pesticides, or expanding planting range. But there are still ethical, economic, and scientific concerns. Debate over proprietary rights to genes, gene functions, and transgenic products continues to rage, and the outcome will determine how accessible the products of genetic engineering will be. There are encouraging signs that the benefits may outweigh the costs, however, and the Green Industry could soon be gathering in a richer harvest enhanced by this new technology.

Reprinted from Regulatory Horticulture, Fall 1998, VOL.24

NEW PESTICIDES FOR COMBATING INSECTS IN NURSERIES

Stanton Gill

Maryland Cooperative Extension

Several new products for insect and mite control were introduced in 1998 and several additional products will be coming onto the market in 1999 that should prove useful to nurserymen. I want to start by thanking the Maryland nurserymen that have allowed us to conduct evaluation trials with these new products.

Mite Control

Hexagon

In trials conducted at the Central Maryland Research and Education Center, University of Maryland, in 1998, Hexagon (phexythiazox) gave excellent control of two-spotted spider mite on container grown buddleia plants. Hexagon is formulated as a 50 W by Gowan Corporation. Hexagon is listed as a possible chitin synthesis inhibitor. Hexagon is ovicidal (kills eggs) and kills immatures. The pesticide does not kill adults but eggs from sprayed females are sterile. Rates at 1 oz provide 5-7 weeks of control, while 2 oz rates provide season long control. Excellent on Tetranychid mites (2-spotted spider mites, southern red mite, spruce spider mite, boxwood mite, arborvitae mite). This miticide does not work on broad mites or beneficial Phytoseid mites. Keep in mind that this is not a knockdown material. There may be potential in mixing Hexagon with horticultural oil for knockdown and residual effect. This is a relatively expensive material but will give effective control of mites if applied early.

Floramite

Floramite (Bifenazate) by Uniroyal chemical is

in the process of receiving a label for sometime in 1999. We are planning to conduct field trials with this material this summer. Its mode of action is contact and ingestion. It is reported to work on all stages, eggs, immature and adults. In tests at other University Cooperative Extensions, researchers are reporting that this material has a 21-day residual. Uniroyal technical representatives say that this material does minimal injury to beneficial organisms. Uniroyal Company is planning to market the product in water-soluble bags. May receive EPA label in 1999. The proposed rates will be 2 to 4 oz/100.

The price not announced yet.

Imidazolin 10 FL

Valent Company is planning to market a new mite growth regulator sometime in 1999. The material is ovicidal and inhibits the molting process in immature mites. It has no activity against adults. It is reported to have some activity against some aphid species. The residual toxicity to mites is 30 - 40 days. Similar to Hexagon - use early, when population is young. Could combine with horticultural oil. The proposed rates will be 3 to 14 oz/100 gal. The price not determined yet.

Thrips

Effective Biological Control material

Mycotech of Butte, Montana has an ES (emulsifiable solution) and a WP (wetttable powder) formulation of *Beauveria bassiana* GHA strain, sold under the name BotaniGard. It has done well in our 1997 and 1998 greenhouse trials for thrips, whiteflies, foxglove aphids, green peach aphid, and melon aphid. The infective unit is a conidium that penetrates the insect cuticle and produces a toxin that kills the host. When applying, use a fine mist spray.

Repeated applications are necessary. The REI on the ES formulation is 12 hours (this formulation uses an oil carrier that is very similar to UltraFine Spray oil). The REI on the WP formulation is 4 hours.

Materials for herb and vegetable growers where few pesticides are labeled

The Garlic juice extract sold under the name Empower by Helena Company appears to agitate thrips. In our trial it did very little to control medium to large populations of thrips. If you are using Garlic by itself, plan to start using it when thrips populations are small. The biopesticide, *Beauveria bassiana* GHA strain (BotaniGard), can be mixed with Empower. The Empower should help drive the thrips out into the open where they are more likely to make contact with the conidium of the *Beauveria bassiana*.

Conserve

In 1997 and 1998 we conducted trials with a new class of chemical called Spinosyns. The product we have been testing is a natural occurring actinomycetes bacteria, *Saccharopolyspora spinosa*. The toxin kills insects by contact and ingestion. The product is sold under the name Conserve and is manufactured by Dow Elanco. We tested several rates and found the most effective rate is 1:100 ppm. Presently it has a label for use on western flower thrips in uncovered greenhouse. Dow Elanco has submitted a label expansion to include thrips control in greenhouses. It will hopefully receive federal registration sometime this summer. It has a 12 hour REI, which is very useful for greenhouse growers and nursery. It gave very impressive control of western flower thrips in our trials. It also works very well on caterpillars. Dow Elanco has proposed a label stating that it is to be used only three times before rotating to another class of

chemical. Once this product is labeled, take care and use it wisely. We don't want resistance to develop too quickly.

In 1998 we conducted trials with two new formulations of Acephate (Orthene). One is a 97% pellet and the other is a 15% tablet. Both formulations are applied to the soil and the roots uptake the material. Applied as a soil drench, it acts as a true systemic insecticide. We have been getting excellent control of western flower thrips. There are still some plant varieties that will show some burn. These two formulations need a little more investigation before they will be labeled in greenhouses, but they look very promising for thrips control. The negative side is that Orthene has a 24 hour REI.

Fungus Gnats And Shore Flies

What is new

Valent Company has just received registration from the Federal EPA for a new insect growth regulator called **Distance**. We have not had a chance to try it in Maryland greenhouses, but trials at Cornell University have shown it to be very effective in controlling shore fly and fungus gnat larvae. It is not effective on adults. It is reportedly very good on whiteflies and certain aphid species.

Zero Tolerance, a hydrogen dioxide, was tried both as wet sprays and applied through low volume sprayers with **no detectable effect** on whiteflies, green peach aphid, thrips, and fungus gnats. The material is labeled as a disinfectant and fungicide. In trials, it has reduced algae on substrate surfaces and on greenhouse floors. Since shore fly larvae feed on algae, then Zero Tolerance can be used to reduce the food source of the larvae and it is reasonable to think that this would reduce shore fly populations in a greenhouse.

**EMERGENCE PATTERN OF TWO
EARLY-SEASON PLANT PESTS
Dewey M. Caron
Delaware Cooperative Extension**

New Product: Arylpyrroles - chlorfenapyr - will be sold under the names: Pirate, Alert, and Pylon.

The label for greenhouse in 1999 will be Pylon. By American Cynamid. Fermentation product of Streptomyces.

Good for mite control (including tetranychid, broad mites) and lepidoptera. Also controls fungus gnats. Some control of thrips at higher rates. Pylon will be a 2 SC with a signal word: caution, and 12 hour REI.

The product is translaminar and no cross resistance for mites; quick knockdown and good residual; rainfast within one hour after application. This will make it ideal for greenhouse since they water often in greenhouse environment.

Mode of action is unique--called a pro-dug that requires activation by insect rejecting chemical. Selective for the pest, it is light on beneficials. No reported mammalian toxicity. They will go **after** an outside label after the greenhouse label.

The high rate used for thrips control may make their product too expensive for most growers.

For more information:

We keep an updated list of new pesticides, and control methods on the **IPMNET**.

Visit the site at url:

www.agnr.umd.edu/users/ipmnet.

Reprinted from Free State Nursery News, February 1999.

Two early season plant pests, the Eastern tent caterpillar (*Malacosoma americanum*) and adult Birch leafminer (*Fenusa pusilla*) can be accurately timed using Growing Degree Day (GDD) accumulations. Emergence date and GDD for these two early seasons from University of Delaware observations are shown below:

Eastern Tent Caterpillar emergence

Year	Date	GDD
1999	Mar.30	24
1998	Mar.27	16
1997	Mar.22	14
1996	Apr.4	34
1995	Mar.23	47
1994	Apr.8	47
1993	Apr.19	65
1992	Apr.15	31

Birch Leafminer emergence

Year	Date	GDD
1998	Apr.8	154
1997	Apr.14	100
1996	Apr.20	91
1995	Apr.20	138
1994	Apr.20	138
1993	Apr.24	86
1992	Apr.24	92

The 1998 season was very warm in January but cooler in February and March until the 26th when spring rapidly “sprung” - it stayed warmer than normal through April and May. With the rapid warming, the Eastern tent caterpillar emerged early (2nd earliest date and GDD in the

8 year record) as did the Birch leafminer adult. In the case of the latter, the highest GDD accumulation was noted for this pest (slightly outside the predictive GDD range of 90-140 GDD) but this was a result of the weather turning warm very rapidly and faster GDD accumulation in early April than in any of the previous springs.

The 1997 season featured a warm last week of February and a generally warm March. The Eastern Tent caterpillar emerged earlier and at a lower GDD due in part to the warm February (43 GDD accumulations in February - the largest of the 8 year record). So, too, the Birch leafminer adult emerged a week earlier than in the previous 6 years but within our predictive GDD range (90-140 GDD).

The greatest GDD accumulation and latest emergence date for the Eastern tent caterpillar was recorded in 1993. This spring was extremely slow to develop with no GDD accumulation in either February or March. Lower temperatures continued until mid-April. The Birch leafminer adult also emerged late (Apr. 24) in 1993. But this was the earliest GDD (86) figure in the 8-year record for this insect at our University of Delaware recording site.

Our 8-year record thus demonstrates that GDD accumulations, rather than calendar date, are a reliable predictor of these two early season ornamental plant pests. For the Eastern tent caterpillar, egg masses should be scouted beginning at 15 GDD accumulations - emergence should be evident by 50 GDD unless the season features prolonged cool temperatures. In the case of adult birch leafminer emergence, yellow sticky traps should be in position by the time 85 GDD's have accumulated and then monitored - in most seasons, unless the weather is extremely warm, adults will likely be seen on the sticky cards before 140 GDD's accumulate.

**THE FISCHER GREENHOUSE
WEATHER STATION
Dewey M. Caron
Delaware Cooperative Extension**

The weather station behind Fischer Greenhouse contains a Biophenometer (Model TA51PF) and temperature sensor. This instrument began accumulating Growing Degree Days GDD on base 50, 47, 43, 40 and 32 degrees F beginning March 1. The instrument provides the current temperature in degree F and then an upper (U120) and lower temperature (LO50) followed by a 4 digit number. This number is the accumulated degree days.

Calculating GDD are an increasingly important tool used in Integrated Pest Management (IPM) programs. IPM requires detection and monitoring of pest populations so necessary spray applications may be accurately timed. Simply put, the biophenometer senses daily temperatures above the minimum temperature and converts them into heat units every 10 minutes. Heat units are then accumulated in a running total of GDD. These can be useful in predicting the appearance of a controllable stage of a pest, allowing pest control strategies to be planned and sprays timed for maximum control.

In predicting insect development, the GDD is compared to a reported range of GDD for the event of interest, e.g., egg hatch, adult emergence, etc. In conjunction with a southeast PA IPM program, Delaware is developing GDD lists for common insect pests. For example, according to Cornell University recommendations, the eastern tent caterpillar (*Malacosoma americanum*) is best controlled as young larvae in the period from 90-190 GDD; the white pine weevil (*Pissodes strobi*) should be controlled when the adults begin to feed in spring at range 7-58 GDD. Some insects which can be controlled at several different times throughout the season, have more than one

GDD range as for example Cooley spruce gall adelgid (*Delges cooleyn*) at 22-81 GDD and again from 1500-1775 GDD, when the overwintering nymphs are present.

The Southeastern Pennsylvania IPM Research Group, has gathered 6 years of GDD information on common ornamental pests in our geographic area. Weekly SE PA IPM reports are available on a subscription basis and the Delaware Horticulture Hotline, also available on a subscription basis, provides GDD information and control recommendations.

How can this information be used? We know for example, bagworm (*Thyridopteryx ephemeraeformis*) can best be controlled when the caterpillars/bags are small. The SE PA IPM cooperators Bob McMullin of Keystone Tree reported bagworm egg hatch as follows:

June 1, 1991	660 GDD
June 14, 1992	645 GDD
June 15, 1993	710 GDD
June 5, 1994	545 GDD
June 6, 1995	457 GDD
June 5, 1996	441 GDD
June 6, 1997	364 GDD
May 26, 1998	460 GDD

It appears that GDD helps to predict egg hatch over calendar date that may vary by 2 or more weeks for this insect.

Birch leafminer (*Fenusa pusilla*) needs to be controlled after adults hatch and before the larvae enter the leaves to begin to mine. The University of Delaware information for adult emergence is as follows.

May 24, 1992	92 GDD
May 4, 1993	86 GDD
May 20, 1994	138 GDD
May 25, 1995	123 GDD
May 20, 1996	91 GDD

May 14, 1997	100 GDD
May 28, 1998	154 GDD

A third example is mimosa webworm (*Homadaula anisocentra*). This insect overwinters as a pupa and adults emerge in spring. Females lay eggs that hatch in midsummer when control is most appropriate. The SE PA IPM data shows the following GDD/calendar date relationship for egg hatch:

June 12, 1991	875 GDD
June 29, 1992	880 GDD
June 11, 1993	694 GDD
June 27, 1994	1006 GDD
June 27, 1995	822 GDD
June 18, 1996	89 GDD
July 1, 1997	956 GDD
June 17, 1998	900 GDD

Included with GDD, the SE IPM group also is recording plant phenological events such as bloom, bud break, etc. for key indicator plants. For mimosa webworm, full bloom of smooth hydrangea (*Hydrangea arborescens*) at 877 GDD is an excellent correlation. Such phenological correlations are explained in the book COINCIDE by Donald Orton. Plant phenology together with GDD are powerful tools to pinpoint insect development and timing of control measures.

As straightforward as the growing degree day concept may seem, there are problems when it is used as the sole method of timing pesticide applications. The practice of ornamental IPM, including use of GDD, is still in its infancy. We are working on and can expect systems to be refined and improved. Relying on GDD exclusively for timing controls is no better than the antiquated calendar approach. GDD does offer some advantages in helping pinpoint the appropriate time to begin looking for a pest. It is the monitoring itself that make an effective IPM practitioner.

GRAY LEAFSPOT ON TURF UPDATE
Bob Mulrooney
Delaware Cooperative Extension

Gray leafspot is a relatively new disease on turf in the mid-Atlantic region. It has been common on southern grasses such as St. Augustinegrass. In 1997 and again in 1998 gray leafspot caused severe losses of perennial ryegrass on golf courses throughout the south, mid-Atlantic and northeast.

Gray leafspot is caused by the fungus, *Pyricularia grisea*. Its favorite host is St. Augustinegrass, but infects bermuda, crabgrass and now perennial ryegrass. *Poa annua* is resistant. Tall fescue was thought to be resistant, but it too is being infected in the south, although not here in the mid-Atlantic yet. Hopefully it will stay to the south on tall fescue. On a positive note, resistance does occur in tall fescue and can be incorporated into new varieties, but there have been no resistant perennial ryegrasses identified yet. Breeding for resistance is underway.

Symptoms: Under conditions of high temperature (80-90F) and humidity, lesions appear as small brown spots that often can be found on the margins of the leaf blades. Numerous spore producing structures grow from the infected leaves and give the dead turf blades a gray color, thus the name. Often the dead tips are curved in a characteristic “fish hook”. The disease moves rapidly under ideal conditions and large spores can be killed in a week. If in doubt, submit turf samples to a diagnostic lab, or your local Cooperative Extension office.

Control: The disease can be managed by a combination of cultural methods and preventative fungicide applications.

Cultural Control

- Avoid high nitrogen rates and summer applications of nitrogen.
- Don't irrigate at dusk. High humidity favors infection.
- Avoid applying plant growth regulators and herbicides in July and August.
- Mow turf when dry. Spores are spread on mowers when wet.
- Remove clippings if disease pressure is low. Ineffective if disease is severe.
- Higher cut increases disease severity. To reduce disease, cut shorter.

Fungicide Control

- The best control to date under conditions of high disease pressure has been with the strobilurins (Heritage) and thiophanate-methyl (Cleary 3336). Preventative applications should begin in late July or early August, and continue as long as conditions are favorable for disease. Heritage can be used at 0.4 oz/1000 on a 28-day schedule or 0.2 oz on a 14-day schedule. Cleary 3336F should be used at 8 fl. Oz every 14 days.
- Under low to moderate disease conditions chlorothalonil (Daconil), mancozeb (Fore), DMIs (Banner, Sentinel) will provide some control.
- No meaningful control has been observed with iprodione (Chipco 26019) or flutalonil (Prostar).

Material for this update was presented at a recent symposium held in Annapolis, MD by research/Extension turf pathologists from Maryland, New Jersey, and Kentucky. March, 1999.

**MEMORIES, MILESTONES &
MIRACLES NATIONAL
HORTICULTURAL PROMOTION TO
RAISE FUNDS FOR BREAST CANCER
RESEARCH**

Goldsmith Seeds, Inc. in conjunction with *Ladies' Home Journal* is proud to announce the second year of our nation-wide cause marketing campaign to celebrate "Memories, Milestones & Miracles." This unique partnership has expanded due to the outstanding efforts of last year's participants. In 1999, our objective is to help increase breast cancer awareness in North America with additional retailers and growers within our "miracle" network. The "miracle" network also includes corporations that have been extremely generous in their time, effort and service, i.e., Landmark Plastic Corporation, The John Henry Company and Sunrise Marketing. We are confident that our contributions to this program will be heightened to raise funds for breast cancer research for The Susan G. Komen Breast Cancer Foundation.

Goldsmith Seeds, one of the world's largest breeders of hybrid garden flowers, is coordinating this fundraiser throughout the horticultural industry. A mixture of impatiens, especially created for this worthy cause, has been named the "Accent Miracle Collection." The "Accent Miracle Collection" impatiens, which features three different shades of pink will be offered in Spring 1999 at select garden centers throughout the country. Customers will learn about this promotion in the June 1999 issue of *Ladies' Home Journal*.

From the manufacturer providing materials to the greenhouse operations growing the impatiens and ultimately the garden center, which sells the flowering "Accent Miracle Collection," everyone involved in creating this flowering product is donating materials and/or

proceeds to The Susan G. Komen Breast Cancer Foundation.

"Memories Milestones & Miracles" will run throughout Spring 1999. The "Accent Miracle Collection" impatiens will be available in a 12 inch hanging basket, flats, packs and/or 4 to 6 inch containers. Ten percent of all retail sales will be donated to The Susan G. Komen Breast Cancer Foundation.

For more information contact: Nancy Jacks-Montgomery, Goldsmith Seeds, Inc., phone: (48)847-7214; Fax: (408) 847-2833; e-mail: nance@goldsmithseeds.com; website: www.miracleplants.com

**MANAGING BITTERCRESS IN A
CONTAINER NURSERY**

**Jeffrey Derr
Virginia Tech**

Based on my results, a good strategy for managing bittercress in woody nursery stock is using a preemergence broadleaf herbicide in late summer of early fall. Since annual bluegrass can also germinate at this time, I would add a preemergence grass herbicide for improved weed control. The treatment should be repeated in spring after a hand weeding. Reduce excessive irrigation and maintain good drainage around containers since this weed grows best in moist conditions. Bittercress control in herbaceous plants becomes more difficult since we are generally limited to grass herbicides. Use Gallery or Snapshot where tolerance exists. Otherwise hand weeding will be necessary for control in plants that escape the preemergence application. Selective postemergence control of bittercress can be accomplished in dormant conifers using Goal. Due to injury concerns with available products, postemergence control will not be an option for most other nursery crops.

*Excerpted from VNLA Newsletter,
January/February 1999.*

Pesticide News

Insecticides

ASTRO (permethrin) - FMC - As a result of the IR4 project, this manufacturer can now add to their label the usage on freesia, poinsettia, azalea and pines.

CINNAMITE (cinnamon oil) - Mycotech - A new insecticide registered on ornamentals to control mites and aphids. It also controls the eggs.

CONSERVE SC (Spinosad) - Dow AgroSciences - Received an EPA label to use on ornamentals grown in greenhouses.

FICAM (bendiocarb) - AgEvo - As a result of the IR-4 Project they can now add to their label the usage of holly.

FURADAN (carbofuran) - FMC - As a result of the IR-4 Project they can now add to their label the usage on azalea, rhododendron and yew.

LINDANE TECHNICAL - Kanoria chemical - Due to the high cost of re-registration, EPA has received a request to delete a number of uses including ornamental plants from its label (effective 7-26-99).

ORTHENE (acephate) - Valent - As a result of the IR-4 Project they can now add to their label the usage on ornamentals, arborvitae, aster, balsam, birch and chrysanthemum.

SANMITE (pyridaben) - BASF - As a result of the IR-4 Project they can now add to their label the usage on holly, juniper, rose and euonymus.

SUNSPRAY (petroleum oil) - Sun Co. - As a result of the IR-4 Project, they can now add to their label the usage on ageratum.

TEMPO (cyfluthrin) - Bayer - As a result of the IR-4 Project they can now add to their label the usage on the ornamentals balsam, calendula, carnation, chrysanthemum, geranium, poinsettia and primrose.

MACH 2 - RohMid LLC - Will be available in fertilizer formulations for the 1999 application season. Used by lawn care operators and golf course superintendents to control grubs and caterpillars, including Japanese beetles, Oriental beetles, black turfgrass ateniens, European chafers, cutworms, sod webworms, armyworms and more. It can be applied at low use rates and its mode of action does not affect plants, earthworms, honeybees and other beneficial insects and poses very little risk to fish, birds or mammals.

ECOGEN - Signed an agreement with Plant Health Care for them to take AQ-10, Cruiser, Crymax and Lepinox under a PHC label into the turf and ornamental market.

MORESTAN (oxythioquinox) - Bayer - EPA received a request from the manufacturer to voluntarily cancel the registration for this product. Unless withdrawn this will be effective on 9-13-99. (FR Vol. 64, 3-17-99).

PERMETHRIN PRO - TopPro/Micro Flo - A new formulation is being marketed to control termites in structures and other insects in turf and ornamentals and as a premise spray.

Fungicides

BRAVO (chlorothalonil) - Zenica - As a result of the IR-4 Project they can now add to their label the usage on poinsettia.

KOCIDE (copper hydroxide) - Griffin - As a result of the IR-4 Project they can now add to their label the usage on nephthytis, rose of Sharon, snapdragons and umbrella trees.

MEDALLION (flutolanil) - Novartis - As a result of the IR-4 Project they can now add to their label the usage on azaleas, balsam and begonia.

TERRAGOLE (etridazole) - Uniroyal - As a result of the IR-4 Project they can now add to their label the usage on the ornamentals scarlet sage, marigold, petunia and shrub verbena.

TOPSIN-M (thiophante-methyl) - Elf Atochem/W.A. Cliary - As a result of the IR-4 Project they can now add to their label the usage on 39 additional ornamental species.

SPOT-LESS (*Pseudomonas aureofaciens* strain TX-1) - Eco Soil Systems - Received EPA registration to use as a bio-fungicide to control turfgrass diseases.

HERITAGE (azoxystrobin) - Zeneca - Received EPA registration to use on ornamentals, both landscape and production, including nurseries and greenhouses. Injury has been noted on apples, crabapples and Yoshino flowering cherry. Also can now be used on all turf areas including home lawns.

ROVRAL/CHIPCO 26019 (iprodione) - Rhone-Poulenc - The registrant has voluntarily cancelled all residential uses for this product including ornamental residential turf and residential use in vegetables and small fruit gardens. Existing stocks must be sold by 2-1-2000 (FR vol. 64, 3-3-99).

CHLOROTHALONIL - Zeneca/Sostram - The registrants have voluntarily cancelled the home lawn use of this fungicide to address EPA's concern about potential post application

exposure to toddlers around the home. Existing stocks must be sold by 2-1-2000. (FR Vol. 64, 3-3-99).

CYGNUS (kresoxim-methyl) - BASF - EPA approved an application to register this new active ingredient on greenhouse ornamentals (FR vol. 64, 3-3-99).

Herbicides:

BARRICADE (prodiamine) - Novartis - As a result of the IR-4 Project they can now add to their label the usage on maple, oak and weigelia.

BASAGRAN (bentazon) - BASF - As a result of the IR-4 Project they can now add to their label the usage on non-bearing crabapple.

CLOPYRAID - Dow Agro Sciences - As a result of the IR-4 Project they can now add to their label the usage on 18 additional ornamental species.

DIMENSION (dithiopyr) - As a result of the IR-4 Project they can now add to their label the usage on 10 additional ornamental species.

ENVOY (clethodium) - Valent - As a result of the IR-4 Project they can now add to their label the usage on ageratum and snapdragon.

GALLERY (isoxaben) - Dow Agro Sciences - As a result of the IR-4 Project they can now add to their label the usage on 13 additional ornamental species.

GOAL (oxyflourfen) - Rohm and Haas - As a result of the IR-4 Project they can now add to their label the usage on spruce, crabapple, crape myrtle, dogwood and flowering cherry.

KARMIX (diuron) - DuPont - As a result of the IR-4 Project they can now add to their label the

usage on ash trees.

PENDRELUM (pendimethalen) - American Cyanimid - As a result of the IR-4 Project they can now add to their label the usage on 40 additional ornamental species.

RONSTAR (oxadiazon) - Rhone-Poulenc - As a result of the IR-4 Project they can now add to their label the usage on 17 additional ornamental species.

RONT (oxfluorfen/oryzolin) - Scotts - As a result of the IR-4 Project they can now add to their label the usage on honeysuckle.

DRIVE 75DF (quinclorac) - BASF - Received EPA registration for use as a post-emergence and pre-emergence turf herbicide to control broadleaf weeds and grasses. It can be used on both warm and cool season turf. It will be marketed by Top Pro Specialties, the joint venture of BASF and Micro Flo Co.

FINALE VM (glufosinate-ammonium) - AgrEvo - Due to the high cost of re-registration the company has petitioned EPA to delete from their label the application in right-of-way, industrial site, ornamental and Christmas tree planting. Unless withdrawn this will be effective on 9-7-99. (FR Vol. 64, 3-10-99).

Miscellaneous:

A-REST (ancymidol) - SePro - As a result of the IR-4 Project they can now add to the label the usage on 8 new ornamentals for this growth regulator.

HORMODIN - The Geiger Company - has received approval from the EPA to reduce the restricted entry interval (REI) for Hormodin to zero. This approval makes Hormodin the first full line of root-growth compounds to be labeled with a zero REI for greenhouse and nursery

applications. Previously, the product had been labeled with a four-hour REI for commercial use.

Research Briefs

Propagation:

Propagation of *Magnolia virginiana* ‘Santa Rosa’ by semi-hardwood cuttings. ‘Santa Rosa’ sweetbay is an evergreen form of the native sweetbay. Production has been hindered by propagation difficulties. In this study, semi-hardwood cuttings were rooted in high percentages (>80%) when treated with 12 or 25 mM (0.25% or 0.5%) IBA in 50% isopropanol. J.J. Griffin, F.A. Blazich and T.G. Ranney.

Excerpted from Journal of Environmental Horticulture 17(1):47-48. March 1999.

Germination of *Stewartia pseudocamellia* seeds. Japanese stewartia is sensitive to desiccation. Seeds germinated rapidly and at a relatively high percentage (51%) when given a 24-hour aerated water soak in 1mM GA₃ solution followed by three months warm and seven months cold stratification periods. B.A. Oleksak and D.K. Struve.

Excerpted from Journal of Environmental Horticulture 17(1):44-46. March 1999.

Container Production:

Growth retardants promote flowering in Mt. laurel. Spray applications of Sumagic (50 and 75 ppm) promoted flower bud initiation when applied to most cultivars two years from propagation. Results were most consistent when treatments were applied in the spring following the first growth flush. This growth inhibition had the effect of making the flowers more visible over the surface of the plant. T.J. Banko & R.E. Bir.

Excerpted from Journal of Environmental

Horticulture 17(1):11-17. March 1999.

Water stress affects growth of woody ornamentals. Reducing water stress had a greater impact on growth than increasing fertilizer concentration. Using lower concentrations of fertilizer (50 mg/L N) and maintaining low media moisture tensions (sufficient water) may be an effective strategy to reduce nutrient runoff. Water stress may reduce yield without visible wilting, so growers should consider using a mechanical switching tensiometer to time irrigation to minimize water stress. The instrument will not function well in a coarse medium. M.A. Rose, M. Rose and H. Wang.

Excerpted from HortScience 34(2):246-250. 1999.

Propazine has little effect on growth of containerized woody ornamentals.

Containerized rose of sharon, Japanese boxwood, butterfly bush, Emerald N’Gold euonymus, forsythia, firethorn, Japanese spiraea, crape myrtle and pfitzer juniper were tolerant to propazine applied at the recommended rate of 1 lb/acre. A label for use of this product for weed control in woody ornamentals is anticipated. J.C. Cole.

Excerpted from HortTechnology April-June 1999, 9(2).

Comparison of micronutrient sources for container rhododendron production.

Micronutrients applied in three forms: uncoated micronutrient fertilizer, slow-release, NPK-plus monors fertilizer and biosolids compost (15% v/v) did not increase growth or plant quality compared to the control. The pine bark-hardwood bark-peat-sand medium provided adequate levels of micronutrients. M.A. Rose and H. Wang.

Excerpted from HortTechnology April-June 1999, 9(2).

Herbicide tolerance of fall annuals. Herbicides are often required to control weeds in containers of fall-flowering ornamentals. Chrysanthemum (*Dendranthema x grandiflorum*) 'Lisa', 'Linda', and 'Jennifer'; *Viola x wittrockiana* 'Bingo Blue with Blotch' and 'Crystal Bowl Yellow'; *Aster dumosus*, *Aster nova-belgii* 'Jenny', *Aster nova-belgii* 'Celeste'; and *Brassicacn oleracea* 'Osaka Red' were treated with single applications of the following herbicides: prodiamine 65 WDG (1.5lbs./a a.i.), oryzalin 4AS (2.0 lbs./a), dithiopyr 1EC (0.5 lbs./a) and pendimethalin 60 WDG and 2G (2.0 lbs./a). The results indicate that prodiamine, when applied by spray or pellets was the best-tolerated treatment by all species. Dithiopyr, when sprayed, caused significant injury to all plants. This treatment was considerably safened however, when dithiopyr was applied on paper pellets. Pendimethalin spray injured all plants except for two chrysanthemum cultivars, 'Lisa' and 'Linda'. This herbicide was also safened when applied as 2G or on pellets. These data suggest that while some preemergence herbicides may be fairly well tolerated when applied as sprays, a greater degree of safety can be obtained if the herbicides are delivered as granules or on paper pellets. D. Gilrein and L. Siracusano.

Excerpted from VNLA Newsletter, March/April 1999.

Shortening production time for 15-gallon pot-in-pot trees. Growing a tree to landscape size and transplanting bare-root into a short term pot-in-pot containerization system may be a viable production alternative for some growers. Larger, better-shaped trees can be offered to commercial and municipal landscapes. However, intact rootballs were not produced before the spring growth flush. Trees must be held at least until mid-late summer before sale.

There is no advantage to early fall (trees still with foliage) transplanting. The suggested protocol is to transplant at leaf drop or later. Trees can be sold the next summer or fall. They should not be held longer than the following (2nd) spring. J.R. Harris.

Excerpted from VNLA Newsletter, January/February 1999.

Greenhouse Production:

Cooling accelerates flowering of *Lysimachia clethroides*. Rhizomes harvested in October were cooled for 0, 4, 6, 8, 10 or 12 weeks at 4°C in either crates of sphagnum peat moss or in pots with soilless mix. As cooling increased from 1 to 12 weeks, days to shoot emergence, visible bud formation and anthesis decreased. Flower production per plant was maximized between four and ten weeks of cooling. P.M. Lewis, A.M. Armitage, J.M. Garner.

Excerpted from HortScience 34(2):239-241. 1999.

Subirrigation vs. hand watering of two bedding plants. Subirrigation produced similar sized 'Ultra Red' petunia as hand watering but with lower fertilizer application rates and with on NO₃-N leachate loss. However, 'Super Elfin Violet' impatiens plants were larger with the hand watered system than with subirrigation. K.A. Klock-Moore and T.K. Broschat.

Excerpted from HortTechnology April-June 1999, 9(2).

Bedding plant production in compost. 'Oasis Scarlet' begonia and 'Super Elfin Violet' impatiens were grown in substrates containing compost made from used greenhouse substrates and yard trimmings (GHC) and in compost made from biosolids and yard trimmings (SYT). Although begonia and impatiens were larger in

substrates containing SYT compost (probably due to increased N), substrates containing GHC compost also produced commercially acceptable plants at all compost concentrations (100%, 60%, 30%). K.A. Klock-Moore.

Excerpted from HortTechnology April-June 1999, 9(2).

Landscape:

Landscape design enhances quality of life.

Certain factors in landscapes are universally appealing (such as water, neatness and color), and the more the landscape contains human-made elements, the greater the variance in preference. Good design was defined as landscapes that feel comfortable, function well and look/smell good. This result indicates a bias toward design factors that enhance looking at or experiencing a landscape rather than creating a living/socializing/entertaining space. Designers need to ask clientele more pertinent questions associated with living styles, family needs and site conditions in order to provide designs with a better “fit.” S.N. Rodic and E.T. Paparozzi.

Excerpted from Journal of Environmental Horticulture 17(1):18-24. March 1999.

Landscape quality increases price of single family homes. By analyzing 218 home sales in Greenville, SC, it was found that selling prices were 6% to 7% higher if landscaping quality was judged excellent rather than good. The price premium obtained by upgrading landscaping from average to good was approximately 4% to 5%. M.S. Henry.

Excerpted from Journal of Environmental Horticulture 17(1):25-30. March 1999.

Wheat Gluten Meal (WGM) inhibits weed germination. WGM was evaluated on 17

species of monocots and dicots. Shoot growth of all species was inhibited at rates $>2 \text{ g/dm}^2$ and at the highest rates (9 g/dm^2) no shoots developed. On the basis of these growth chamber tests, WGM will be tested in the field to see if it can be developed as a organic alternative to commercial herbicides presently used in home gardens and small commercial plantings. R.E. Gough and R. Carstrom.

Excerpted from HortScience 34(2):269-270. 1999.

Imidazolinone herbicides reduce weed interference in wildflower plantings.

Imazethapyr and imazapic can reduce weed interference and improve establishment of some native wildflowers in areas with high weed infestations. Black-eyed susan, upright prairieconeflower and spiked liatris stands were not reduced when treated with imidazolinone herbicides in weedy sites. Many warm season grasses (i.e. big bluestem, little bluestem and indiangrass) have exhibited tolerance to these herbicides. D.D. Beran, R.E. Gaussoin, R.A. Masters.

Excerpted from HortScience 34(2):283-286. 1999.

‘Chickasaw’, ‘Kiowa’ and ‘Pocomoke’

Lagerstroemia. All three cultivars released by the USDA in 1997, 1994 and 1998 respectively, are top hardy to zone 7b and root hardy to zone 6. The unique growth habit of ‘Chickasaw’ and ‘Pocomoke’, which retain their compact mound-shaped habit without pruning makes them well suited to diverse landscape uses. ‘Chickasaw’ and ‘Pocomoke’ have fine-textured foliage, compact branching structure and resistance to powdery mildew. ‘Kiowa’ was selected for its brilliant exfoliating cinnamon-brown bark, large white-flowered inflorescences and overall vigor. The cultivars are not patented and rooted cuttings are available from cooperating

wholesale propagation nurseries. A list of nurseries is available from Margaret Pooler at USDA Agricultural Research Service, United States National Arboretum, 3501 New York Ave, NE, Washington, DC 20002. M.R. Pooler and R.L. Dix.

Excerpted from HortScience 34(2):361-363. 1999.

Flood Tolerance Ranking of Red and Freeman Maple Cultivars. Red maple (*Acer rubrum*) is often recommended for use in wet soils, yet its extensive native range suggests there may be genetic variation for traits associated with flood tolerance. Likewise, genetic variation for flood tolerance may be captured within red maple cultivars, making some more appropriate than others for use in wet or low oxygen soils. Seven red maple cultivars (2-year-old trees)—‘Autumn Flame’, ‘Bowhall’, ‘Karpick’, ‘Northwood’, ‘October Glory’, ‘Red Sunset’ and Schlesinger—and 4 Freeman maple (*A. x freemanii*) cultivars—‘Armstrong’, ‘Autumn Blaze’, ‘Morgan’, and ‘Scarlet Sentinel, were ranked for flood tolerance by flooding the trees and characterizing photosynthesis, lenticel intumescence and survival. The cultivars were separated into 3 overall flood-tolerance rankings: high (‘Schlesinger’, ‘Red Sunset’ and ‘Bowhall’), intermediate (‘Armstrong’, ‘Morgan’, ‘October Glory’, ‘Scarlet Sentinel’, and ‘Autumn Blaze’), and low (‘Karpick’, ‘Autumn Flame’ and ‘Northwood’). L.B. Anella and T.H. Whitlow.

Excerpted from the Journal of Arboriculture, Vol. 25, No. 1, January 1999.

Insect Control:

Brushing reduces insects. Eight conditioning treatments were applied during greenhouse

production to columbine, New Guinea impatiens, marigold and ageratum. Mechanical conditioning (brushing 40 strokes, twice daily) was the only treatment that consistently reduced thrips and mite populations. Aphids were lower on low-N plants than high-N plants. Plant growth regulators did not affect pest populations. JG. Latimer and R.D. Oetting.

Excerpted from HortScience 34(2):235-238. 1999.

Drought stress increases two-spotted spider mite density on Buddleia. The populations of mites were the same on stressed and non-stressed plants but the non-stressed plants had 14% more non-infested leaf area. Apparently the greater amount of growth on non-stressed plants dilutes the mite populations. J.H. Gillman, M.W. Rieger, M.A. Dirr and S.K. Braman.

Excerpted from HortScience 34(2):280-282. 1999.

Miticides for control of spruce spidermite. Single applications of several new miticides were compared with Avid for control of spruce spider mite on field-grown 6-7’ Hinoki cypress. Sanmite and Plictran provided very good control of spruce spider mite within one week after treatment. Mite numbers significantly decreased in the Avid treatment, but were higher than in the other miticide treatments. Abamectin tends to work best on tender foliage and less so after foliage has fully hardened off, which may explain why it did not perform as well compared with other treatments in this trial. D. Gilrein and L. Siracusano.

Excerpted from VNLA Newsletter, March/April 1999.

Control of two-spotted spider mite on outdoor potted roses. Several new miticides

were evaluated for control of two-spotted spider mite on potted miniroses. Six treatments were used: Avid 0.15E (abamectin), three rates of Floramite 50W (bifenazate), Sanmite 75W (pyridaben), Plictran 5F (cyhexatin) and water. All treatments provided very good control of two-spotted mites by three days after treatment (DAT) and for the duration of this trial. Mite populations in the Avid treatment appeared to be recovering by 28 DAT, although numbers were still low. D. Gilrein and L. Siracusano.

Excerpted from VNLA Newsletter, March/April 1999.

Control of oriental beetle grubs with insecticide drenches. Several insecticide drenches were evaluated for control of oriental beetle grubs in container-grown plants. Pots were drenched with either water or one of three insecticide treatments: Marathon (imiacloprid), Talstar Flowable (bifenthrin) and Mach II (halofenazide). Although grub survival was poor overall (around 50%), results indicate that Talstar provided at least partial control, and no grubs were found in pots treated with Marathon. Mach II was not effective as used in this trial. As an insect growth regulator, it would be more likely to have an effect when applied to younger instars. D. Gilrein and L. Siracusano.

Excerpted from VNLA Newsletter, March/April 1999.

Publications

1999 OSU Extension Agents' Handbook of Insect, Plant Disease and Weed Control. This huge resource covers all agricultural commodities including animals, agronomic crops, household pest control and horticultural crops. May be ordered at a cost of \$25 from University Mailing Services, Publishing and Printing East, OSU, Stillwater, OK 74078. Make payment to the OSU Cooperative Extension Service.

Urban Trees: Site Assessment; Selection for Stress Tolerance Planting. 1998. Dr. Nina Bassuk, B.Z. Marranca, and Barb Neal. It can be downloaded as a file or printed from: <http://www.cals.cornell.edu/dept/flori/uhi/urbantrees.pdf>

Grounds Maintenance Management Guidelines. The updated Guide has 40 pages fitted into a standard ½-inch vinyl binder. Some major areas include: Specific maintenance program guidelines, landscape materials, hard surface areas, safety regulations and procedures, insurance, list of cooperative extension service information specialists for each state, directory of key magazine and other publications in the industry. Prices for guide is \$25 plus \$1.50 postage/handling. Can only be ordered directly from the Professional Grounds Management Society, 120 Cockeysville Road, Suite 104, Hunt Valley, MD 21030. Tel. (410)584-9754.

Grounds Management Forms & Job



Descriptions Guide. Comprising 52 pages, this

Guide is involved solely with representative forms and other record keeping tools needs by grounds professionals, plus detailed position descriptions. Some areas include: Contract documents, work orders, personnel job description, government landscape superintendent, irrigation specialist, grounds trainee, horticulturist. Prices for guide is \$25 plus \$1.50 postage/handling. Can only be ordered directly from the Professional Grounds Management Society, 120 Cockeysville Road, Suite 104, Hunt Valley, MD 21030. Tel. (410)584-9754

Landscape Plants for New Jersey. This 54 page color publication has been completely revised and expanded. Please contact: New Jersey Nursery & Landscape Association 605 Farnsworth Ave., Bordentown, NJ 08505, Tel: 1-800-314-4836, Fax: (609)291-1121, for more information regarding the distribution date for this publication.

Manual for Nursery Producers who are Growing Herbaceous Perennials Plants. Manual includes information on nutrient management, weed control, irrigation, pesticide application equipment, disease management, insect and mite management, and keys from herbaceous perennial cultural, insect and disease problem diagnosis. Cost: \$10. Contact: University of Maryland Cooperative Extension publication office or Stanton Gill at the Central Maryland Research & Education Center, University of Maryland, 11975 Homewood Road, Ellicott City, MD 21042.

Diseases in Irrigation Water Website. <http://zoospore.okstate.edu/nursery>. This web site mentioned by Sharon Von Broembsen at the 1999 Delaware Horticulture Industry Expo is now up and running.

Calendar

June 28-29 - Environmental Concern. Wetland Ecology, Environmental Concern, St. Michaels, MD. 9:00 AM-3:00 PM, cost \$150. Instructor: Renee Wilson. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.org. Check Website: www.wetland.org.

June 30 – Integrated Landscape Management, Ornamental Horticulture Short Course Series, 9 am – 3 pm, Kent County Extension Office, Dover, DE, Contact (302) 831-2531.

June 30 - Environmental Concern. Wetland Plant Identification, Environmental Concern, St. Michaels, MD. 9:00 AM-300 PM, cost \$75. Instructor: Doreen Dudek and Cindy Boyle. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.org. Check Website: www.wetland.org.

July 1, 1999 - MGGA Conference - Focus on bedding plants and hanging baskets. Contact: Suzanne Klick (301)596-9413.

July 10-14 – Ohio Florists’ Association Short Course, Greater Columbus Convention Center, Columbus, Ohio. Contact 614-487-1117.

July 6, 8, 13 – Small Flowering Trees, Ornamental Horticulture Short Course Series, 5-7 pm, UDBG, Newark, DE, Contact (302) 831-2531.

July 10-14 – Ohio Florists’ Association Short Course, Greater Columbus Convention Center, Columbus, Ohio. Contact 614-487-1117.

July 12 - Environmental Concern. WOW!: The Wonders of Wetlands, Environmental Concern, St. Michaels, MD. 9:00 AM-3:00 PM, cost \$75. Instructor: Cindy Boyle. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.org. Check Website: www.wetland.org.

July 13-14 - Environmental Concern. Wetland Creatures, Environmental Concern, St. Michaels, MD. 9 AM-4:00 PM, cost \$150. Instructor: Karen Ripple and Spencer Smith. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.org. Check Website: www.wetland.org.

July 14 – Landscape Troubleshooting Workshop,

Ornamental Horticulture Short Course Series, 5-7 pm, New Castle County, DE, Contact (302) 831-2531.

July 20 – Summer Landscape Maintenance Meeting, Berks County Ag Center, Leesport PA. Contact Judith Schwank (610) 378-1327.

July 20 - De Native Plant Society - Monthly on the third Tuesday evening from 7-9 pm at the Aquatics Resource Education Center on Route 9 east of Smyrna, DE. For more information, contact Kith Clancy at (302)674-5187.

July 20, 21, 22 and August 3, 4, 5 - Greenhouse Management Short Course. Wye Research and Education Center, Queenstown, MD. Contact: Ginny Rosenkranz (401)749-6141 or Suzanne Klick (301)596-9413.

July 22– Landscape Troubleshooting Workshop, Ornamental Horticulture Short Course Series, 5-7 pm, Kent County, DE, Contact (302) 831-2531.

July 22 – The Eternal Vernal Pool, The Holiday Inn, Kulpsville, PA. Contact Julianne Schieffer (610) 489-4315.

July 23-29 - American Nursery & Landscape Association/PANTS Convention & Trade Show, Philadelphia, PA; Contact: (202)789-2900.

July 26-28 - Environmental Concern. POW!: the Planning of Wetlands, Environmental Concern, St. Michaels, MD. 9:00 AM-3:00 PM, cost \$225. Instructor: Karen Ripple. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.org. Check Website: www.wetland.org.

July 30 - August 1 - SNA '99 - The World's Showcase of Horticulture. Atlanta, GA; contact: SNA, (770)973-9026.

July 31 – LCA Landscape Certification Test, Agricultural History Farm Park in Derwood, MD. Contact (301) 948-0810.

August 6 – Nursery Manager Field Day, Ellicott City, MD. Contact Stanton Gill (301) 596-9413.

August 9-11 - Environmental Concern. Field Wetland Botany, Environmental Concern, St. Michaels, MD. 8 AM-4:30 PM, cost \$435. Instructors: Doreen Dudek and Karen Ripple. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.org. Check Website: www.wetland.org.

August 11 - Four-Farm Tour in Southern Maryland.

Maryland Cooperative Extension and the Association for Specialty Cut Flower Growers are co-hosting this event. Contact: Suzanne Klick for details, phone: (301)596-9413.

August 17 - De Native Plant Society - Monthly on the third Tuesday evening from 7-9 pm at the Aquatics Resource Education Center on Route 9 east of Smyrna, DE. For more information, contact Kith Clancy at (302)674-5187.

August 17 – Landscape Troubleshooting Workshop, Ornamental Horticulture Short Course Series, 5-7 pm, Sussex, DE, Contact (302) 831-2531.

August 17-19 – Perennial Plant Identification, Ornamental Horticulture Short Course Series, 4-6 pm, UDBG, Newark, DE. Contact (302) 831-2531.

August 23 & 24 – Penn State Flower Field Days, Landisville and University Park, Contact Alan Michael (717) 921-8803.

August 24, 26, 31 and September 2 – Introductory Landscape Contractors School. Penn State Great Valley, Malvern, PA. Contact Rick Johnson (610) 690-2655.

August 26 & 27 - Cut Flower Short Course in SE Pennsylvania. Contact Steve Boogash for details; phone: (814)693-3262.

August 31 - September 3 - “Building Cities of Green” National Urban Forestry Conference, Seattle, Washington. For more information contact Cheryl Kollin at (202)955-4500 ext. 221 or check out the American Forests web site at www.amfor.org

September 9 – Pest Walk, Ornamental Horticulture Short Course Series, 9 am – 12 pm, UDBG, Newark, DE, Contact (302) 831-2531.

September 9 – Profiting in the Interior Landscaping Business. Neshaminy Manor Center, Doylestown, PA. Contact Jim Sargent (215) 345-3283.

September 9, 16, 23 & 30 – Growers Excellence Program. Chapter 1: Water, the Plant and Irrigation Methods. Contact Dave Suchanic (610) 489-4315.

September 13-17 - Environmental Concern. Wetland Delineation, Patuxent NWVC, Laurel, MD for classroom instruction, participants will then meet at various sites in the DC metropolitan area for field work. 9:30 AM-5:30 PM, cost \$875. Instructors: Albert McCullough, III, P.E.;

Doreen Dudek; Deborah Herr, ASA; and Spencer Smith. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.ord. Check Website: www.wetland.org.

September 14 – Pest Walk, Ornamental Horticulture Short Course Series, 9 am – 12 pm, Research & Education Center, Georgetown, DE, Contact (302) 831-2531.

September 15 – HRAREC Annual Field Day and Auction, Virginia Beach. Contact (757) 363-3906.

September 15-18 – Eastern Region Annual Meeting of the International Plant Propagators' Society, Minneapolis Airport Marriott, Minneapolis, MN. Contact Margot Bridgen (860) 429-6818.

September 21, 23 and 28 – Identification and Control of Diseases on Ornamental Plants, Ornamental Horticulture Short Course Series, 4-6 pm, Fischer Greenhouse, Newark, DE, Contact (302) 831-2531.

September 21 - Environmental Concern. Wetland Horticulture, Environmental Concern, St. Michaels, MD. 9:00 AM - 3:00 PM, cost \$75. Instructors: Doreen Dudek. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.ord. Check Website: www.wetland.org.

September 21- De Native Plant Society - Monthly on the third Tuesday evening from 7-9 pm at the Aquatics Resource Education Center on Route 9 east of Smyrna, DE. For more information, contact Kith Clancy at (302)674-5187.

September 23 – Tree Protection: Is it really protecting? Montgomery County 4-H Center, Creamery, PA. Contact Julianne Schieffer (610) 489-4315.

September 27, 28, 29 – Nursery & Garden Center Bus Tour. Visit nurseries and garden centers in Connecticut and New York. Cosponsored by DE and PA. Contact Dave Suchanic at 610-489-4315.

September 27-28 - Environmental Concern. Wetland Horticulture, Environmental Concern, St. Michaels, MD. 8:00 AM-4:30 PM, cost \$290. Instructor: Doreen Dudek. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.ord. Check Website: www.wetland.org.

September 27-29 - Environmental Concern. Wetland Mitigation, Patuxent NWVC, Laurel, MD. 9:30 AM-5:30 PM, cost \$575. Instructor: Edgar Garbisch, Ph.D. For

more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.ord. Check Website: www.wetland.org.

September 29 – Turfgrass Establishment Update, Montgomery County 4-H Center, Creamery, PA. Contact Nancy Bosold (610) 690-2655.

October 2 - Environmental Concern. WOW!: The Wonders of Wetlands, Environmental Concern, St. Michaels, MD. 9:00 AM-3:00 PM, cost \$75. Instructor: Cindy Boyle. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.ord. Check Website: www.wetland.org.

October 5 and 7 – Diagnosis & Control of Insects and Weeds on Woody Ornamental Plants, Ornamental Horticulture Short Course Series, 3-5 pm, Research & Education Center, Georgetown, DE, Contact (302) 831-2531.

October 14 & 15 – Pesticide training and certification exam. Department of Agriculture, Dover, DE. Contact Susan Whitney (pesticides@udel.edu)

October 19 - De Native Plant Society - Monthly on the third Tuesday evening from 7-9 pm at the Aquatics Resource Education Center on Route 9 east of Smyrna, DE. For more information, contact Kith Clancy at (302)674-5187

October 19-23 – Tree Climbing School, Smedley Park, Delaware County Extension Office. Contact Rick Johnson (610) 690-2655.

November 16 - Environmental Concern. Wetland Planting Techniques, Environmental Concern, St. Michaels, MD. 8:00 AM-5:00 PM, cost \$145. Instructor: Deborah Herr, ASLA. For more information call: (410)-745-9620, fax (410)-745-3517, or e-mail: order@wetland.ord. Check Website: www.wetland.org.

November 16 - De Native Plant Society - Monthly on the third Tuesday evening from 7-9 pm at the Aquatics Resource Education Center on Route 9 east of Smyrna, DE. For more information, contact Kith Clancy at (302)674-5187

December 1 & 2 – Pesticide training and certification exam. Kent County Extension Office, Dover, DE. Contact Susan Whitney (pesticides@udel.edu)

January 5-7, 2000 - MANTS, Contact: (800)431-0066.

January 12 & 13 – Delaware Horticulture Industry Expo,
Dover, DE.

February 3-6, 2000 - WNGA/NLA/GCA Management
Clinic, Louisville, KY, Contact: ANLA (202)789-2900.

