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Editor: Susan Barton, Extension Specialist, University of Delaware
 The DNLA Newsletter is produced with the assistance of University of
 Delaware Cooperative Extension.

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

Greetings to all!! Summer has arrived---almost. The temperature has been vacillating some days by 20° or more. Mother Nature can't seem to make up her mind. However, she sure is doing a great job of bringing us some much-needed rain. Although we remain in a water deficit, the governor is not imposing mandatory water restrictions at this time. However, this could change if we receive a stretch of dry weather this summer. So stay tuned! In the meantime PGMS representatives Jamie Jamison and Charles Jenner, DSGA representative Paul Stead, and myself, continue to meet with officials to keep abreast of the situation. Please keep in mind that the DNLA funded "Dealing With Drought" brochure is a great tool to give to customers. It focuses on waterwise gardening. Contact Susan Barton or Dot Milsom for copies. They can be reached at (302)831-2531 or (302)831-1375.

The D.N.L.A. is busy gearing up for our 2002 and 2003 events. The Summer Expo and Annual Golf Tournament will be held on Wednesday, August 21st at Garrisons Lake Golf Club. As always, we will have the opportunity to visit with exhibitors and friends, hear from some outstanding speakers, obtain a pesticide credit, and indulge ourselves with the delicious pig roast. Back by popular demand, we will once again be able to witness the installation from start to finish of an E.P. Henry project. This year Paul Cimini (E.P. Henry) will construct a segmental retaining wall. Chuck Carpenter of Aquarius Irrigation Supply will demonstrate the basic layout and equipment needed for the installation of a residential irrigation system. Jay Windsor will challenge our insect and disease identification skills. Registration forms are forthcoming. Please join us for this fun-filled day!

Remember to keep the **Landscape Awards** in mind during the summer. Applications will be mailed in the beginning of Sept. We encourage any/every member to submit an entry!

On March 26th, fifteen individuals sat for the Certified Nursery Professional core and/or specialty exams. Congratulations are in order for the following individuals:

NEW CNP's:

Anne Berry
Lowe's Home Center & Self Employed
Garden Center Specialist

Christopher Gillim
Moon Nurseries
Garden Center Specialist
Nursery Production Specialist

Dean Johnston
Atlantic Landscape Company
Landscape Design Specialist
Landscape Specialist

Robert Kolasinski
Green Seasons Lawn & Tree Care
Turfgrass Management Specialist

Bill Sapp
Green Lawns
Turfgrass Management Specialist

Mark Sheme
W.D. Wells & Associates
Landscape Design Specialist

Christine Usher
Lowe's Home Center
Garden Center Specialist

Melody Young
Alexander's Lawn & Garden
Garden Center Specialist

NEW SPECIALTIES ADDED:

Paula Wright
Delaware River and Bay Authority
Landscape Specialist

Robert Owens
Delaware River and Bay Authority
Landscape Specialist
Nursery Production Specialist

Welcome New Member:

Richard Miller
11 Malvern Court
Wilmington, DE 19810
(302) 477-1307

The DNLA would like to extend our deepest sympathies to the friends and family of Jack Tingle of Tuel and Tingle's Nursery in Unionville, PA. Jack passed away on April 10th.



MARKETING OPPORTUNITIES
Melanie Rapp, Marketing Specialist
Delaware Department of Agriculture

“**First Rate from the First State**” is a slogan I really believe in and repeat often. As a Marketing Specialist with the Delaware Department of Agriculture (DDA), it’s my responsibility to market and promote Delaware commodities and value-added agricultural products to in-state, national, and international buyers. From promotions at the Agricultural Commodities’ Building at the Delaware State Fair to international trade shows and buyers’ missions, it’s my job to find marketing channels and contacts and get the information to those Delaware agribusinesses interested in looking for new markets or expanding existing ones.

I was most pleased to be invited to the April meeting of the Delaware Nursery and Landscape Association and have the opportunity to meet several of the Board of Directors. They allowed me to explain in-depth the marketing services and programs that the Delaware Department of Agriculture offers to agribusinesses and farmers. Here is the list of some of the assistance and programs that the DDA can provide:

Identify and provide market research information on the industry.

- *Reports from the USDA, Foreign Agricultural Service (FAS), and Food Export USA – Northeast.

Identify USDA/FAS/State of Delaware/private industry funds available for:

- *Market research.
- *Market introduction.
- *Market expansion.

Technical assistance and coordinated services with related agencies, organizations, and companies in the areas of:

- *Marketing tools, including brochures, trade show displays, and promotional materials.
- *Processing and packaging.
- *Handling, storage, and distribution.
- *Business/Financial Information.

Provide marketing opportunities through domestic and international programs.

- *In-state sales opportunities and demonstrations.
 - Farm markets and farmers' markets program.
 - Shore-to-Store or back-door delivery to stores.
 - Promotional Events.
- *Out-of-state opportunities.
 - Domestic and international trade shows.
 - "Delaware pavilion of companies.
 - Buyers missions, trade missions, and trade leads.

Two upcoming out-of-state marketing opportunities are:

PANTS (Penn Allied Nursery Trade Show) in Fort Washington, PA on July 23-25, 2002.

Nurseries Buyers' Mission at the PANTS show: Food Export USA-Northeast in conjunction with Northeast State Departments of Agriculture will lead a group of Japanese buyers to the show. If you are exhibiting at this show and are interested in meeting with potential buyers from Japan, please let me know, and I will arrange this.

Identifying new marketing channels has become more challenging in an increasingly competitive marketplace. Information on international trade relations, exporting potential, and marketing to new regions or countries are just a few of the ways that the DDA can help. If you are

interested, I encourage you to contact me to learn more about marketing opportunities for your business and for the association.

I can be reached at the Delaware Department of Agriculture at 320-698-4522 or 1-800-282-8685 or by email at Melanie@dda.state.de.us I wish you much success with all your business ventures.

NOTES FROM MEMBERS:

Moon Nurseries, an associate member of DNLA is growing rapidly and has a number of position openings. They are looking for the following:

- Sales representative
- Propagation manager
- Container production assistant
- Assistant field supervisor
- Site management foreman
- Landscape maintenance foreman
- Wholesale sales associate

For more information and detailed job descriptions contact

Moon Nurseries
Attn: Anna Martin
P.O. Box 672
Chesapeake City, MD 21915
(410) 755-6600
(410) 755-6253 (FAX)

U of D NEWS
Susan Barton
Extension Specialist

Fortunately the drought publicity seems to have eased lately with our normal compliment of spring rains and the proactive response from the nursery industry. Val Budischak, our DNLA executive director and Charles Jenner, president of PGMS, have played an active role in getting the green industry drought restrictions document accepted by the governor's office and have voiced the industry's concerns at numerous water board meetings. The "Dealing With Drought Brochure" funded by the DNLA several years ago has received a lot of press. After it was cited in my Delaware Gardener column in the News Journal, we received over 200 requests for copies. Copies have been mailed to all DNLA and PGMS members and a number of members have ordered additional copies for distribution to their customers. DNLA members can receive an additional 25 copies free of charge and can order more copies at .50/brochure. We have only a few hundred copies left and plan to reprint the brochure soon, if needed.

All this success should not breed complacency though, the spring rain we've received has not been enough to refill the reservoirs so if the weather turns dry (as it often does in Delaware), restrictions may be imposed. According to the green industry document, homeowners will be able to water newly established plantings (following appropriate watering procedures); public gardens will be able to water specimen plants; and industry professionals (garden centers, nurseries and landscapers) will be able to water their stock. Stay tuned and use the drought brochures to keep your customers informed of proper conservation procedures.

SHOULD YOU FERTILIZE TREES?
Jerry Bond

It was this question from an arborist named Leo that got me started. "What kind of fertilizer are you recommending these days? A client of mine has a young sugar maple that isn't growing too good, and I want to give it a shot of something." Good business, bad question. I told him how research indicates that the only limiting nutrient for most young trees on most soils is nitrogen. I added that because nitrogen is so mobile in the soil, and because trees only need it for certain periods during the year, that we highly recommended that the nitrogen be provided in slow-release form. Good science, bad answer. When I stopped later to think about that exchange, I realized I had failed to explore all sides of the question he asked me. In doing this, I had made him, and presumably his customer, happy without addressing the actual problem.

There were two better answers I should have given. A tree not growing well needs either to have growth inhibiting factors identified and removed, or to have growth promoting factors identified and supplied. The number of possible growth-inhibiting factors is, of course, very large. Diagnosing tree problems in the field can be tricky stuff, as anyone who routinely tries can attest. In an urban setting we usually look first to abiotic stress caused by soil, water, temperature, mechanical difficulties, or human disturbance.

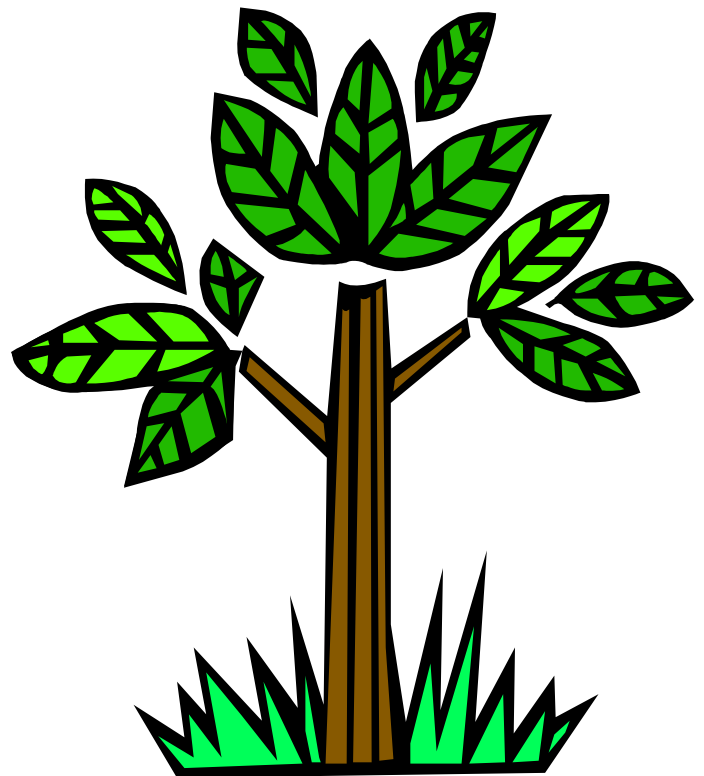
When I didn't explore these factors on the phone, I gave up on understanding the real problem. To make it worse, the answer I gave ignored the important distinction between "tree growth promotion" and "tree fertilization." Factors important for improving tree growth have been well established, though it seems to me that we often ignore them.

Light is an important factor. To promote sugar maples growing in forests some forest owners cut down some of the surrounding trees, in order to increase their ability to gain from photosynthesis. In second place is water. When sufficient light is present, adequate water keeps the tree from stopping photosynthesis during summer or other droughts. In that way, more photosynthates (including carbohydrates that provide energy for defenses against decay and pests) are produced over the growing season, and the tree is both growing and strong. Controlled studies have demonstrated that there is no difference in many cases between simply adding water, and adding water plus fertilizer. Surprisingly, air is third in importance, soil air, that is. Urban soils frequently lack air, they are compacted, because their macropores are either crushed (from traffic of some kind) or filled (with water). Without sufficient air, most tree roots cannot get the oxygen they need to burn sugar through respiration providing energy for defense, carbohydrate storage, and growth. For people who care about a declining tree's health and growth, soil aeration is a professional service well supported by research and well worth its cost.

Fourth, finally, is fertilization. But even here, mineral fertilization is less important in the long run than organic fertilization. Organic matter, such as provided by mulch, in addition to bettering soil texture by adding air, promotes the microbial life that is crucial to a healthy soil ecology. Also, it supplies organic acids that hold nutrients, especially micronutrients, in a form available for uptake by tree roots. A wide layer of composted mulch is a good start here. Don't get me wrong: mineral fertilizer has its place. But nitrogen is the element that primarily limits tree growth, especially for deciduous trees. Deciduous trees with high nutrient demands but planted (why, Lord?) on a soil with high sand content may need annual fertilization along with supplemental watering. A number of

trees grown on a soil with high pH levels have trouble getting the micronutrients they need, because the high pH of the soil solution renders nutrients like iron and manganese unavailable to the tree. Without the application of an acidifier (such as ammonium sulfate and elemental sulfur), or a chelator (such as EDDHA) such trees will grow weakly at best. But without sufficient light, water, and soil air, mineral fertilizer is unlikely to promote healthy tree growth by itself. And if it does, it will probably be the watering or soil aeration accompanying it that actually brings the benefit.

Article reprinted from Urban Forestry News, Vol. 10 Issue 1, Spring 2002



AMERICAN CHESTNUT TREES MAY SOON THRIVE AGAIN

Loretta Radeschi

Nearly a century after an exotic fungus began to decimate our tallest and most important eastern hardwood tree, researchers and volunteers are developing a blight-resistant American chestnut they hope will soon restore the majestic species to our forest and neighborhood landscapes. For hundreds of years, the American chestnut was a treasured hardwood in eastern forests. Settlers and later residents used timber from American chestnut trees, which grew to be 100 feet tall, to construct furniture, barns, and houses. They also used the decay-resistant wood to make railroad ties, telegraph poles, paneling, musical instruments, and tool handles. The wood was easy to split, did not warp easily, and was often knot-free and straight grained. American chestnut bark had high tannin content, making it an ideal raw material for the leather industry.

Its nuts were a staple for squirrels, chipmunks, wild turkey, bears, and deer. Chestnuts provided sustenance for livestock and rural families, as the nuts could be sold or bartered for goods and services. The trees beautified the landscape with displays of strongly scented creamy-yellow blossoms. Their wide spreading branches and broad crowns shaded both city streets and rural homesteads.

The culprit for the blight is the fungus *Cryphonectria parasitica* (formerly known as *Endothia parasitica*). In 1904, it was found on American chestnut trees in the New York Zoological Garden. Scientists believe the fungus was unintentionally brought to America on chestnut trees from Asia imported as nursery stock. By the mid-1950s, no American chestnut tree was spared. Some experts estimate that the blight destroyed 3.5 billion trees on nine million acres. This destruction had huge ecological consequences that are evident today.

Attempts to contain and eradicate the fungus in the early years were futile. The fungus uses two types of spores for reproduction. Some spores are sticky masses that can be splashed by rain and carried by animals, while other spores are dry and can be carried long distances by wind or on clothing. The fungus enters American chestnut trees through cracks or wounds in the bark, multiplies rapidly, and makes cankers that girdle the stem. Consequently, everything above the canker dies, usually in one growing season. Because the tree's roots survive the fungal attack and subsequent death of the stem, new stems continually sprout from the old root system. However, being genetically identical to the vulnerable stems that perished before them, the new sprouts have little resistance to the blight and die within a few years.

The American chestnut may soon be part of the forest landscape again. It might even begin to occur before the end of this decade, as Ann Leffel writes in her *The American Chestnut Foundation: A Landowners Perspective*. "The American Chestnut Foundation (TACF) and other organizations are making discoveries, answering questions, and solving problems related to the restoration of the American chestnut. One promising method is to inoculate trees with hypovirulence: a naturally occurring variant of a virus that attacks the fungus that causes Chestnut Blight."

In Virginia's Lesesne State Forest, three resistant American chestnuts were grafted in 1980. In 1982 and 1983, the trees were inoculated with hypovirulence. These trees are still thriving and making excellent annual growth. They have produced nuts for more than ten years, even while the nonresistant American chestnuts surrounding them are continuously killed back by the blight. In Pennsylvania experiments are underway in 42 orchards in 24 counties through joint efforts of TACF, Penn

State's School of Forest Resources, and Penn State's Louis W. Schatz Center for Tree Molecular Genetics. The research and experiments have been made possible through a \$50,000 endowment from Penn State alumnus David Robertson and his wife, Ruth.

The American Chestnut was once native from southern Main to Michigan, and south to Alabama. It was the "Queen" of American forest trees and reached heights of 100 feet with massive, wide spreading branches, and "deep broad-rounded crown." In Pennsylvania it occupied the steep slopes and shallow soils of our ridges, providing an eloquent and beautiful tree in these tough areas.

Article reprinted from Urban Forestry News, Vol. 10 Issue 1, Spring 2002

TWO DEER MANAGEMENT SUCCESS STORIES

Jerry Faulring, Waverly Farm

My first nursery consisted of 25 acres sited adjacent to the Potomac River in some of the best deer habitat available anywhere. After two years of production with the plant material either starting over each spring after the winter browse or having to destroy rubbed trees, I embarked on a deer management program. First, I found that shooting them would have no impact. One grower told me he shot 221 deer under permit one fall and did not diminish the problem noticeably. I talked to lots of folks about spray deterrents and decided to try Deer-A-Way to reduce the browse. We also hung bars of soap to prevent the rub. Deer-A-Way worked but provided only a short-term result at high cost. Hanging soap limits damage but also at a high cost of labor. I don't think a substantial nursery can be profitable if these two solutions are implemented.

Success Story I:

Next, I started investigating a fence as a physical barrier and settled on what some call a modified, vertical, Penn State deer fence. Penn State has researched deer management with particular interest in the establishment of timber crops. Simply stated, the fence had seven high tensile wires with four electrified. The first wire was six inches off the ground and subsequent wires were spaced every eight inches. We used a 'New Zealand' charger that delivered 350-500 volts of direct electricity. The voltage will vary depending on soil moisture; wet soils provided a better grounding system. I cannot explain it very well but the high voltage is delivered in very short pulses that will not kill you if you grab the wire. I can testify that if you grab the wire, you will be put down and momentarily knocked out...getting hit in the head with a baseball bat probably comes close. You know there is incredible temptation to see if that

invisible electricity is really there.

The field was remote so we had to charge a 12-volt battery with a photoelectric panel. It added to the cost as compared to having a 120-volt service available. The fence cost \$500 per acre for labor, equipment and materials. We used a professional installer. The total cost to keep Bambi at bay was \$12,500 – not an insignificant investment.

The physical fence requires some work. First, at startup and every fall, we ‘baited’ the fence with peanut butter smeared on heavy-duty aluminum foil attached to the third wire from the bottom, a hot one.

I walked the fence the first morning after the initial startup and found some well roughed up spots where the deer made a good connection. I was feeling very good. An unintended consequence was that small animals also go for the bait and often pull it off the fence. Thus we had to re-bait the fence for a couple of weeks at the initial startup. There was regular maintenance to keep vegetation off the fence. It would enhance the electrical ground, reducing the voltage below a satisfactory level on the upper wires. There was also the problem of stuff running into the fence and breaking posts or wires. The lesson is you need to leave a good roadway between the fence and the plants. It is also necessary to leave 10-15 feet of clear space outside the fence so that the deer can approach and find it while slowly grazing.

In summary, we achieved 99% deer control. Deer can jump vertically 10-11 feet. The fence will not prevent jumping, which was a limited problem during hunting season; a deer fleeing the slug will go over or through anything in its way. Yet a grazing deer will rarely expend the energy to jump an obstacle. It will always go under the obstacle first and through it second. I have seen deer crawl through a three rail fence, especially young animals.

Success Story II:

When I bought the land that would become Waverly Farm, I knew we would have to deal with deer again, but the circumstance is a little different. The farm is sited in an area of small grain and dairy farming, or open fields. Yet, there is ample surface water and some fairly good habitat within a short distance to the east and west. Our land is a rectangle, sited north/south on the long axis. We started in and waited to see what would happen. It took three years to develop enough habitat for deer to come and stay. They started bedding down overnight and would present themselves on a regular basis to those of us working in the fields. Plant damage was evident immediately; I knew I did not want to start building fences again. The cost per acre would have been lower because of the larger acreage; 200 acres would eventually have to be protected. I learned to hate the maintenance of the old fence and I did not want gates and physical barriers to hinder our productivity. My cost analysis assumed that an electric fence would cost between \$80,000 and \$100,000. The cost of money in that scenario would be up to \$10,000 annually over a 20-year useful life. Additional expenses for fence maintenance would be incurred but I do not have a dollar value for the upkeep costs. Therefore, I assumed that an alternative system costing in the range of \$10,000 or less annually, or \$50 per acre per year, would be satisfactory.

Previously, I became aware of the research Cornell University had engaged in with dogs to keep deer out of fruit orchards and vineyards. Then MNLA brought a dog system installed to the field day at Ruppert’s Nursery. He gave some pretty glowing success stories so I decided to try a 35-acre field. The basic concept is simple. A wire is buried 6 – 12 inches deep at the field perimeter that produces a signal for the collared dogs. The dog gets an audible signal that reminds him that the next step toward the wire will bring a blast of electricity to his neck.

It is basically the Invisible Fence system used by homeowners to keep their pets in the yard but on a larger scale.

Most any dog will work as long as it can get around the field well. The dogs really do not chase deer to any great extent. Their roll is to 'mark up' the nursery providing a scent deterrent for the deer. To be effective, two dogs can service 30-40 acres. Several factors such as deer pressure, topography, and crops grown will determine how many acres a pair of dogs can protect.

The cost of installation will vary, but \$100 - \$125 per acre protected is in the range. This includes labor, materials, dog acquisition, and dog training. All our dogs have come from rescue shelters or private individuals wanting to give up their dogs for various reasons. Some shelters will not knowingly give you a dog for this purpose. I really don't get it...they would rather destroy the dog than let it live the best life a dog could ever ask for. The shelter's position is that dogs should not have to work. Our veterinarian supports our use and says we have the healthiest dogs she sees. Ongoing costs include food and veterinary visits once a year. We are spending about \$500 per year per dog for those expenses. All of our dogs are 'medium' to 'large' animals and each can eat a 30 pound bag of premium food in a few weeks. We don't skimp on food costs so as to prevent having unhealthy dogs. Food costs go down in the summer with heat and a plentiful supply of live food available.

I like dogs so there is a lot of ear and belly scratching going on at Waverly Farm-- the dogs' ears and bellies. That reduces my productivity to some extent, which is offset by my better mood. By the way, one observer to the first installation actually asked me how hard it was to put the electric collars on the deer!

The dogs need food, water, and shelter. They never leave the field. We locate the three support functions at opposite corners of the field. This forces the dogs to travel for their needs. We currently have three pairs of dogs providing protection in three zones totaling 95 acres. I believe we will need one more 25-acre zone of protection to finish the farm.

We are learning that at our site, we may not have to protect all 200 acres. By installing a 'zone' of protection on the north/south axis perimeters, I think we are blocking the deer's travel lane from one side to the other. My evidence for this theory is that we grow some deer candy (*Taxus*) in unprotected fields that have not been eaten yet. From this observation, I currently plan to protect a total of 50% of the acreage. If this proves to be true, capital cost will be about \$13,000 and annual dog costs will be about \$4,000 for a total annual cost of \$5,200 or \$26 per acre.

Additional, incidental costs include delivering food and water. We use 'at will' feeders that require weekly filling. Water is changed daily except in freezing winter temperatures or during extreme heat spells of summer when we change water twice daily. This could be costing us an additional \$12,500 to \$2,000 per year for labor, although I have not tried to tally an exact number.

If my 'zone of protection' theory proves incorrect, we will have to protect an additional 80 acres. If that occurs, our annual cost will rise to about \$10,000 per year or \$50 per acre. An additional benefit derived from the dogs that cannot be achieved with a physical fence is the eradication of woodchucks, and near elimination of rabbits, and mice. My view is that even if the dog management system costs the same or a little more than a traditional fence, I would prefer to not have the physical barrier created by the wire fence. If the average sale price per

plant is \$100, I need to save 100 plants per year to come out even. Not much of a challenge with the increasing deer problem. I am currently losing three to five plants per year.

In summary, we have 99% deer AND critter control. I have seen fewer than six rubs a year and no browsing on the 170 acres we have planted. We will never achieve 200% control, as migrant deer will wander through unknowingly.

Nine-nine percent of our visiting customers seem not to mind the presence of dogs. On occasion, someone will say they don't mind, but I know better--so the dogs do bear some liability. If a retail yard were protected with dogs, I would recommend securing them during business hours. On the other hand an electrified fence also incurs potential liability problems.

Deer damage prevention is very expensive and the problem will likely grow as hunting decreases and a healthy herd expands, but I look at it as just another cost of doing business.

Additional information about the dog control system is available from Chris Bunker at Off Limits, (310) 663-0066, or me at (310) 874-8300. Physical fence systems are available from a large number of installers.

Reprinted from Free State Nursery and Landscape News, Spring 2002.

HEMLOCK WOOLLY ADELGID – WHAT'S THE LATEST ON THIS DEVASTATING PEST?

**Dr. Paula Shrewsbury
Extension Specialist, University of Maryland**

Hemlock woolly adelgid (HWA), *Adelges tsugae* Annand (Homoptera: Adelgidae), is native to Asia where it is found on several hemlock species (*Tsuga* spp.) causing little damage. The first observations of HWA in North America were in the 1920's in the west. In the west, it is currently found from Northern California to Alaska where it also does not reach pest status. However, the east coast is a different story. Hemlock woolly adelgid was first observed in Virginia around 1950. Since its introduction to the east coast, the HWA has spread to 12 states ranging from North Carolina to New England. In these eastern states, HWA is a serious and devastating pest of eastern hemlock (*T. canadensis*). It also attacks Carolina hemlock (*T. caroliniana*), a less common hemlock species.

There are multiple reasons for the rapid spread and devastation by HWA in the Northeast. Hemlock woolly adelgid has the capability to increase populations quickly; they have adapted to the environmental conditions of the east coast; eastern hemlock is a native to and abundant in our forests and common in our landscapes; and no natural enemies were introduced with the adelgid when it came to North America. These factors result in the rapid increase and spread of adelgid populations.

Hemlock woolly adelgid undergo two generations a year and they are parthenogenic, which means only females exist and all individuals reproduce (up to 300 eggs each). The adelgid overwinter as immatures on the twigs and begin their development to adulthood early in the season. In March you will find circular (~1/6th " diam.), black female adults

feeding where needles attach to the twigs. As adelgids lay eggs they cover themselves and their eggs with a white fluffy wax. First generation eggs are laid from about March to early June; second generation eggs from late summer to early fall. When the eggs hatch, the crawlers move to new growth where they settle and feed until they mature. Adelgids have sucking mouthparts that they use to remove sap and nutrients from the twigs of hemlocks. Feeding by the adelgids results in needle discoloration and drop and bud death, reducing plant growth. Heavily infested trees suffer from branch dieback and ultimately (within about 5 years) tree death.

Hemlock woolly adelgids attack hemlocks in both managed landscapes and native forests. Hemlocks in managed landscapes suffer significant damage. Infested trees that go untreated may die. Mature hemlocks and hemlocks under stress are preferred. Once infestations of HWA are detected, control options for these landscape trees include: avoiding high nitrogen fertilizers since this will promote adelgid population growth; dormant oil application by early March to target overwintering immatures (before they mature and begin laying eggs); horticultural oil application during the season (coverage must be thorough); on trees that are large and coverage is difficult, systemic insecticides such as imidacloprid (Merit) have provided very good control (applications in the fall will target immatures in the spring). In our managed landscapes, chemical controls have allowed us to keep HWA from killing our hemlocks. However, this management approach is not practical, economical, or environmentally sound for management of HWA in our forests. In natural situations, the USDA and University scientists have developed and implemented a management approach referred to as classical biological control.

Classical biological control involves researchers going to the pest's country of origin (China and Japan in this case), searching for natural enemies that keep the insect in check (below damaging levels) in its native country, collecting and bringing these natural enemies back to quarantine laboratory facilities in the U.S. where numerous studies are undertaken to study the natural enemies' biology, and potential to have detrimental environmental impacts if released. Once potentially successful candidates are identified, they are mass reared and released into the environment where their establishment, dispersal, and ability to suppress the pest insect are monitored.

The classical biological control program underway for HWA is progressing and appears promising to date. Efforts by a research team headed by Dr. Mark McClure at the Connecticut Agricultural Experiment Station has resulted in the collection of a predatory lady beetle, *Pseudoscymnus tsugae*, and oribatid mite from Japan. In addition, Dr. Mike Montgomery and his research team at the USDA Forest Service in Connecticut have imported 3 lady beetle predators (all *Scymnus* spp.) from China. A predatory beetle in the family Derodontidae has been imported to Virginia from the Western U.S. where it feeds on HWA. It is under study by researchers at Virginia Polytechnic Institute. To date, studies in quarantine indicate that the 3 *Scymnus* spp. of lady beetles from China and the derodontid beetle from the west look promising as biological control agents for HWA and these studies are continuing. Studies on the oribatid mite indicate it is not a likely candidate. Most progress has been made with *P. tsugae*, the lady beetle from Japan. Laboratory studies indicated it would be an excellent biological control candidate. It has been released into the field in 10 NE states. Monitoring of these release sites had determined that *P. tsugae* has overwintered, established, reproduced, and dispersed at several of the release sites. In some study sites, HWA

densities were reduced by 47 to 87%. It is unlikely that a single natural enemy will provide adequate control of HWA. Therefore studies continue with all of the imported natural enemies.

Although it is too early to claim success of this classical biological control approach for HWA, the program looks promising. From a landscape managers' perspective, suppression of HWA populations in our forests will likely result in reduction of populations in our managed landscapes. For more details on this program see the USDA Forest Service publication FHTET-2000-08-2001.

Reprinted from Nursery News, a newsletter from Maryland Cooperative Extension, Vol. 26, No. 1, Winter 2002.



DISPOSAL OF NURSERY WASTE – HAVE YOU CONSIDERED COMPOSTING?

**Chuck Schuster, Extension Educator
Maryland Cooperative Extension**

What does your nursery do with the material you prune from nursery crops during the dormant season? Depending on nursery stock size and amount of material removed, a large quantity may be left on the ground when pruning is completed. Many nurseries leave this material on the ground and “mulch” it when mowing starts in the spring. Some nurseries remove the woody material to a burn pile for later burning, and others chip this material and use it as mulch down the plant rows. An option worth considering is to use the pruned material to create compost.

Litter left on the ground becomes a potential over-wintering site for insects and disease. Pruning is done to shape a plant, but also to remove diseased and/or damaged plant material. Elimination of this material is an excellent way to prevent or lessen next season's insect and disease outbreaks and may reduce the need for pesticides in the nursery.

Some operators remove the pruned plant material and take it to a pile where, when time and weather allow, the material is burned. During drought open burning restrictions may be imposed preventing this practice. The piles then sit and allow pests to lay dormant until conditions are right for the pests to move back into the nursery. Even under ideal conditions most piles are not burned until the fall.

Many of these problems may be avoided if the material is properly composted. The material will need to be broken into smaller pieces, usually by a chipper or some other mechanical means. After chipping, there are several different methods of composting that can be used, depending on the amount of to be

composted. If only a small amount is available, consider using a composting bin, which can be turned to speed decomposition. If there are large amounts of material, use the windrow method. Whichever method is used, the addition of some yard waste material may be necessary to actually start the process. Proper composting involved the break down of material by aerobic organisms. This process does not create an odor and will not generate acids, which may be harmful to plants. During composting the pile will reach temperatures of between 120 and 160°F. These temperatures destroy weed seed, insects and disease organisms. Wood chips have a carbon to nitrogen ratio (C:N) of approximately 100-300:1. The optimum C:N ratio for composting is 25- 40:1, therefore you may need to add some higher nitrogen material, such as animal manure. Mixing or blending of the material is important in the composting process and will decrease the time needed to reach a finished material.

The moisture content of the pile or windrow also plays an important role. Moisture required for microbial growth and plant material decomposition. With too little moisture, below 40%, microbial action is slowed or goes dormant; with too much moisture, above 60%, nutrients are leached and lost. Measure moisture with the squeeze test method—a handful of material should feel damp to the touch, but shouldn't provide more than several drops of moisture when squeezed. Add moisture during prolonged dry periods.

Composting provides compost, which can be safely applied as a mulch material or used as a soil amendment without concern for disease, insect or weed seed being placed into the nursery.

Reprinted from Nursery News, a newsletter from Maryland Cooperative Extension, Vol. 26, No. 1, Winter 2002.

IMPROVED CHLORINATION FOR INACTIVATING PHYTOPHTHORA PATHOGENS IN NURSERY IRRIGATION WATER

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University**

As demand for water rises and its availability decreases, recycling irrigation runoff is becoming a common practice in the nursery industry. However, use of recycled water for irrigation without disinfection treatments can result in serious disease epidemics and crop losses as demonstrated by Phytophthora blight on annual vinca (*Catharanthus roseus* L.) in our field plots. Chemical control of Phytophthora diseases in fields with Aliette (fosetyl-Al) and Subdue (metalaxyl) is effective but it is also expensive. More importantly, healthy-looking plants under intensive fungicide programs may lose their battle to these pathogens soon after they leave the nursery and/or are planted into landscapes due to discontinued chemical protection, and environmental stress. This post-sale disease problem costs growers consumer confidence. As a result, emphasis has been shifted to disinfecting irrigation water and other preventive phytosanitary methods.

Current methods of disinfecting irrigation water include (i) filtration, (ii) ultraviolet irradiation, (iii) ozonation, (iv) use of nonionic surfactants, (v) chlorination, and other alternatives such as the use of acidic electrolyzed oxidizing water. The majority of these technologies were initially developed for purification of drinking water. None of them has been fully investigated for disinfecting irrigation water in nursery situations. For example, chlorination is widely used in the nursery industry nationwide. But our understanding of chlorine's efficacy and phytotoxicity is very limited.

To minimize the risk of incomplete

disinfestation and the potential for phytotoxicity, we have determined the efficacy of chlorine on a number of *Phytophthora* species. These species are commonly present in irrigation water. They are a group of very destructive pathogens that attack numerous nursery crops. We examined the effect of chlorine on the mortality of zoospores and mycelium, and on sporangium production. Chlorine levels used in this study are referred to as endpoint free chlorine concentrations, or chlorine readings that were taken from water collected at risers or sprinklers in nursery operations.

Zoospores are considered the primary, if not the sole, infective propagules of *Phytophthora* species in irrigation water. Only data of zoospore mortality assays in the lab are reported along with the levels of free chlorine in

irrigation water from which pythiaceae species, including both *Phytophthora* and *Pythium* species, were recovered at six commercial nurseries in Virginia over the past two years.

Zoospore morality assays. Experiments were conducted (i) to determine the effects of chlorine concentration and contact time on *Phytophthora nicotianae*, and (ii) to evaluate the sensitivity to chlorine of seven *Phytophthora* species that are common in recycled nursery irrigation water.

Zoospore morality of *P. nicotianae* increased with increasing chlorine concentration from 0.25 to 1 ppm, regardless of contact time (Fig. 1). No zoospores survived at 2 ppm of free chlorine. Similar data were obtained with all other species and isolates tested (Fig.2).

Levels of chlorine and recovery of pythiaceous species from irrigation water at commercial nurseries. Chlorinated and non-chlorinated water was collected monthly in 2000 and 2001 at two commercial nurseries, and quarterly in 2000 at four additional nurseries in Virginia. Levels of free chlorine of treated water were taken onsite using a Hanna chlorine meter and pH was also taken with a Watercheck pH meter. Water samples were tested in the laboratory using a filter-based isolation method. The isolation dishes were incubated at 23°C in the dark and examined daily for pythiaceous species. Water samples from which *Phytophthora* or *Pythium* was recovered were considered pythiaceous-positive.

For the 40 samples assayed, levels of free chlorine in chlorinated irrigation water ranged from 0 to 8.4 ppm (data not shown) and pH ranged from 4.2 to 8.5. Pythiaceous species were recovered from 10 of 40 samples assayed. The greatest level of free chlorine in irrigation water from which pythiaceous species was recovered was 0.77 ppm.

Recommendations. Our research data suggest that 2 ppm of free chlorine at discharge points will provide good control of *Phytophthora* species present in irrigation water. This recommendation is supported by both zoospore mortality tests with seven species (eight isolates) of *Phytophthora* in the laboratory and assays of chlorinated irrigation water collected at six commercial nurseries. Contact time evaluated in this study, which ranged from 0 to 4 minutes, was not a significant factor affecting zoospore mortality. Because chlorine sensitivity varies with pathogens, additional investigations are warranted to determine chlorine's efficacy on other groups of major plant pathogens present in irrigation water.

The threshold level of free chlorine at which pythiaceous species survived was lower in

assays of irrigation water than that determined by zoospore mortality tests. What caused this difference is unknown. Pathogen concentration may have contributed to the difference. Water assay data presented in this work were used to validate the findings in the mortality tests. Water assay data should not be used alone as guidelines for developing chlorination protocols.

It is very important to maintain the required chlorine concentrations over time to insure good control of *Phytophthora* pathogens. There are two types of chlorine colorimeters, both based on color change following chlorine reaction with a reagent such as N, N-diethyl-p-phenylene-diamine (DPD). Microprocessor-based chlorine meters such as the Hanna chlorine meter (Hanna Instruments, Woonsocket, RI) provide fast, reliable, and accurate measurements of chlorine concentrations in liquid samples. They are easy to use. A flashing error code makes it impossible to take an erroneous reading. We bought a Hanna meter two years ago. It worked well, although it measures only from 0 to 2.5 ppm. The improved Hanna unit measures from 0 to 9.99 ppm with a resolution of 0.01 ppm. The improved unit costs \$163.80. Hanna and several other microprocessor-based chlorine meters are available at Fisher Scientific (Phone: 1-800-766-7000, Fax: 1-800-926-1166, or www.fishersci.com). Pocket comparators were popular a few years ago. They are still available at Fisher Scientific. These units are slightly less expensive but are also less accurate than microprocessor-based chlorine meters. LED chlorine meters are recommended.

DPDs are common reagents for chlorine testing. They are available in powder or tablet form, sealed in waterproof material. There are several kinds of DPD powders or tablets. DPD 1 is for free available chlorine, while DPD 4 is for total available chlorine. It is very important to choose the right reagent for the chlorine testing. Some chlorine meters, such as the Hanna

chlorine meter, require specific reagents. Also it is important to use the reagent required for each unit to obtain accurate chlorine measurements.

Acknowledgements

This study was supported in part by the Virginia Nursery and Landscape Association, and the Virginia Agricultural Council, and by an Environmental Protection Agency/Virginia Department of Conservation and Recreation grand C9-00349901-0, and an USDA/Southern Region IPM Special Grants Program grant 00-34103-9052. I gratefully acknowledge the timely support from Bennett's Creek Nursery, Colesville Nursery Inc., Lancaster Farms Inc., Riverbend Nursery Inc., Saunders Brothers, Inc. and Waynesboro Nurseries during water samplings over the past two years.

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Excerpted from VNLA Newsletter, March/April 2002.

Publications

The New York/Mid-Atlantic Gardener's Book of Lists. By Bonnie Appleton and Lois Trigg Chaplin, this book contains vital information for gardeners in the unique climates of New York and the mid-Atlantic area. A list of hot and cold tolerance zones for each plant, web sites for information from state universities in the region, and a listing of botanical gardens and arboreta in which to view the listed plants. Publication cost \$17.95, ISBN 0-87833-261-8, 208 pages, B & W illustrations distributed by National Book Network.

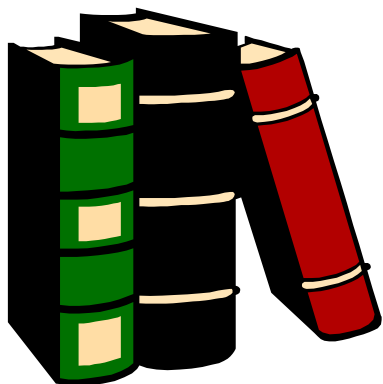
News for the Green Industry/Noticia para la Ecologia. It is estimated that 65% or greater of the Ohio nursery/landscape industry workforce is composed of Hispanic employees. News for the Green Industry and Basic Green Website (<http://hcs.osu.edu/basicgreen>) are some of the very few reference materials available to fulfill technical information needs to this audience. It is our long-term goal to provide basic technical information to English and Spanish speaking employees in the landscape and nursery industry. If you are interested in knowing more about the newsletter or website, call: Hannah Mathers (614)247-6195 or fax 614-292-3505, or e-mail mathers.7@osu.edu.

Greenhouse Engineering updated to meet need of modern industry. This publication will provide you with valuable information on planning, constructing and controlling a commercial greenhouse. Cost \$30.00 plus S&H/sales tax, 212 pages;1994. It covers the various aspects from site selection, layout, and growing systems to construction, remodeling and environmental control and many other sections and topics to meet the needs of today's greenhouse industry. Added topics include: insect exclusion screens, current technology for low-volume sprayers, ebb-and-flow watering

systems and the effect of air pollutant levels on plant growth. This publication is available from Natural Resource, Agriculture, and Engineering Service, cooperative Extension, 152 Riley Robb Hall, Ithaca, N.Y. 14853-5701. Contact NRAES for shipping and handling rates and possible quantity discounts at (607) 255-7654.

Turf Management for Golf Courses. James B. Beard has recently published a second edition of his greenskeeping bible (*Turf Management for Golf Courses: Second Edition*; Chelsea, Mich.: Ann Arbor Press, 2002, 793 pages, ISBN 1-57504-092-1, \$125). Contained in this larger edition are many more charts and graphs. The color images are an improvement, the latest data a comfort and the glossy paper and professional design will be appreciated by readers who have come to expect such in the new world order. Beard also details the scientific advancements in laboratory root zone analysis as well as sections on diseases and greens construction.

2002 Insecticide , Herbicide, Fungicide Quick Guide. This new revision is the best quick reference available! Pesticides are cross-referenced to registered usage, then the pests each individual product will control are listed in alphabetical order. If you need the answer fast whether in the field or the office, this is the book for you! Now available from Thomson Publications, P.O. Box 9335, Fresno, CA 93791, or call 559/266-2964, fax 559/266-0189 or www.agbook.com. Cost is \$23.95 each plus tax, if applicable, plus \$5.50 for UPS shipping.



Pesticide News

Dates for pesticide training are posted at:
<http://www.udel.edu/pesticide/Cal.htm>

Pesticide Applicator Training will start at 8:15 (instead of 8:30) each day:
June 12-13, 2002. Kent Co. Extension Office.
September 24-25, 2002. Kent Co. Ext. Office.
December 17-18, 2002. Kent Co. Ext. Office.

Insecticides:

ACETAMIPRID – Aventis – This new neonicotinoid insecticide has been registered in the U.S. It will be marketed as Assail on fruits and vegetables, Intruder on cotton, Tri-Star for ornamentals and Pristine for the homeowner market.

DIMETHOATE – EPA has cancelled the uses for this product in the following residential and public areas; in and around a structure used as a residence or domestic dwelling including households, home gardens and home greenhouses, use in any public or private building or areas associated with them such as landscaping and playgrounds. Also, agricultural usages for housefly treatment in farm buildings and use on farm animals and manure piles. (FR Vol. 67, 3-13-02)

EVISECT (thiocyclam) – Syngenta – The rights to this product have been purchased by Arysta Life Sciences and Nippon Kayaku both of Japan. It is used on vegetables, sugarcane and ornamentals.

MILBEKNOCK (milbemectin) – Sankyo/Gowan – Being registered for use on pome fruits such as apples, crabapples, loquat, mayhaw, pears and quince.

ORNAZIN (azadirachtin) – Sepro – this 3% EC

formulation is now available for usage on ornamentals.

ORTHENE (acephate) – Valent – Label changes include the dropping of all indoor residential uses including the use by pest control operators and the usage on residential turf. Turf uses can still be done on golf courses, sod farms and spot residential turf. Turf uses can still be done on golf courses, sod farms and spot treatments for any control. It can still be used on all its agricultural, nursery, landscape, ornamental and greenhouse uses. Also, it can still be used by pest control operators in commercial and industrial buildings.

PITON 15EC (acequinocyl) – Tomen Agro – A new miticide being developed for use on ornamentals and nursery crops.

PRISTINE (acetamiprid) – Aventis – EPA received an application to register this new active ingredient for use by homeowners on flowers, ornamentals, fruiting vegetables, cold crops, citrus and pome fruits. (FR Vol. 67, 2-15-02)

RIMON (novaluron) – Makhteshim – EPA has approved a conditional registration for the 10EC formulation to be used on container grown ornamentals in greenhouses. 9FR Vol. 66, 12-19-01)

SANMITE (pyridadben) – BASF – Marketing of this product into the ornamental market is now being done by Scotts Co.

TRISTAR 70 (acetamiprid) – Aventis – EPA received an application to register this new active ingredient to use on commercial and flowering plants grown outdoors and in greenhouses to control various insects. (FR Vol. 67-2-1502)

Fungicides:

ENDORSE 2.5WP (polyoxin D zinc salts) – Cleary Chemical – A new turf fungicide to control brown patch on cool season grasses and large patch on zoysia. They are attempting to add to this label the control of yellow patch, gray leaf spot, leaf spot, melting out, pink snow mold, gray snow mold, red thread, damping off and zoysia patch.

SIGNATURE (fosetyl-Al) – Aventis – Added to their the control of anthracnose and bentgrass dead spot on turf.

SPORODEX (*Pseudozyma flocculosa*) – Plant Products – A new biofungicide being developed for use on greenhouse grown roses and cucumbers to control powdery mildew.

TRITON (triticonazole) – Aventis – EPA received an application to register this new active ingredient to control diseases of commercial turfgrass, golf courses and sod farms. (FR Vol. 67, 3-14-02)

AT-EZE (*Pseudomonas chloroaphis* strain 63-28) – Agrium Inc – EPA has approved an application to conditionally register this new active ingredient to use as a soil drench to control various diseases on greenhouse ornamentals and vegetable crops (FR Vol. 66, 12-31-01).

CYGNUS (kresoxim-methyl) – BASF – Added to their label the usage on ornamentals.

MANEB – Griffin and others – Due to re-registration costs the usage on golf courses and all homeowner usages will be removed from the label.

MEDALLION (fludioxonil) – Syngenta – Added to their label the control of pink and gray snow mold on turf and the control of

rhizoctonia, cylindrocladium, fusarium and sclerotium diseases on ornamentals.

MEFENOXAM 2 – (mefenoxam) – Sipcam Agro – A new formulation being introduced for use on trees, turf, shrubs and flowers to control pythium and phytophthora diseases.

SILGARD (silver thiosulfate) – Gard Products – Proposed to EPA to register this new active ingredient to use as a growth regulator to protect cut flowers from ethylene effects. Comments must be received by 2-11-02. (FR Vol. 67, 1-10-02)

Herbicides:

BATTLESHIP (triclopyr/clopyralid/MCPA) – Helena Chemical Co – A new turf herbicide to control broadleaf weeds for use on sod farms, golf courses, parks, lawns, roadsides and cemeteries.

QUIKPRO (diquat/glyphosate) – Monsanto – A new non selective herbicide being developed for use in parks, recreational areas, residential areas and other non crop areas.

TRANXIT (rimsulfuron) – Griffin – a new turf herbicide to remove overseeded turf species from the basic turf species and to control poa annua. Apply during spring transition to provide gradual removal of ryegrass and poa trivialis.

WOW PLUS (corn gluten meal) – Gardens Alive – Proposed to EPA to register this new active ingredient for pre-emergence weed control in lawns. Comments must be received by 4-1-02. (FR Vol. 67, 3-1-02)

Research Briefs

Greenhouse Production:

Earthworm castings are useful substrate for poinsettia production. Castings were demonstrated to be a suitable substrate amendment for poinsettia production. Poinsettias produced in substrates with 25% casting from sheep or cattle manure (but not horse manure) were about twice as tall as the container they were grown in, had dark green foliage, and were of saleable quality. Poinsettia size was reduced when plants were grown in substrates with greater than 25% castings. (P.R. Hidalgo and R.L. Harkess)

Preceding brief excerpted from HortScience. 37(2): 304-308. April 2002.

Greenhouse production of *Angelonia angustifolia*. *Angelonia* Angel Mist series has potential as a bedding or potted flower crop. The lack of photoperiod response suggests that plants can be produced in all seasons, throughout the country. Flowering times from rooted pinched cuttings were as early as 45 d with supplemental light to 57 d with natural light in 20 to 22 C greenhouses, a crop time that did not deter growers from producing this crop. In areas with low winter light, supplemental irradiance in winter months can hasten growth and flowering and can be recommended if economically feasible. All cultivars responded similarly to ‘Angel Mist Pink’ to temperature, irradiance, photoperiod, and growth retardants, making the entire series amendable to greenhouse scheduling. (A. Miller and A.M. Armitage)

Preceding brief excerpted from HortScience. 37(2): 319-321. April 2002.

Treatments to break dormancy of gladiolus cormels. Ethephon at 400 mg/L was the most effective treatment for many of the growth parameters including days to sprouting, percentage sprouting, corm diameter and cormel production and weight. (R.Ram, D.Mukherjee and S. Manuja)

Preceding brief excerpted from HortScience. 37(2): 343-344. April 2002.

Media surfactant can improve shelf life of bedding plants and hanging baskets.

Growers have little or no control over the conditions their products are exposed to once they leave the production facility. Uneven or infrequent watering, high light levels, wind and extremes in temperature can lead to premature wilting resulting in poor plant quality and reduced sales. This research found that a pre-ship drench of 600 ppm AquaGroL can improve rewetting of soilless media in postproduction. The pre-ship drench was more effective when applied one day prior to finish than one week earlier. Media surfactant can be effectively applied via surface or subirrigation. If a maintenance program of media surfactant applications is followed during production, a late drench may not be warranted. (J. Million and J. Barrett)

Preceding brief excerpted from Greenhouse Product News. April 2002, p 38-42.

Germination of *Liatrix spicata* seed.

Stratification, BA, or thiourea overcame seed dormancy in *L. spicata*. The most effective treatment for enhancing and accelerating germination was stratification at 4°C for 10 weeks. However, infusion of BA via acetone appears to be a practical means of breaking seed dormancy and accelerating germination in *L. spicata*. Seeds can be permeated with BA and vacuum-dried within a 2-h period. Additional

studies are needed to 1) determine the effects of seed treatments (stratification and BA infusion via acetone) on growth and development of *L. spicata* seedlings, and 2) ascertain if the promotive effect of BA is retained when *L. spicata* seeds are stored for extended durations after acetone infusion. (C.A. Parks and T.H. Boyle)

Preceding brief excerpted from HortScience. 37(1): 202-205. February 2002.

Production recommendations for potted sunflowers.

Sunflower (*Helianthus annuus*) has potential as a potted flowering plant due to short crop time, ease of propagation, and attractive flowers but postharvest life is short and plants can grow too tall. Based on this research three cultivars were found to be most suitable for pot production, 'Elf', 'Pacino' and 'Teddy Bear', with one or three plants per 6-inch pot and sprayed with B-Nine at 8,000 ppm, or drenched with paclobutrazol (Bonzi) at 2 mg/pot a.i. (28,350 mg = 1.0 oz). (L.C. Pallez, J. M. Dole, and B.E. Whipker)

Preceding brief excerpted from HortTechnology 12(2):206-210. April-June 2002.

Production recommendations for german primrose.

German primrose (*Primula obconica*) has soft pastel colored flowers in shades of white, pink or orange, purple or lilac and is attractive as a flowering potted plant or in color bowls. This plant has not been produced up to its potential because the allergen primin is present in the leaves and may cause skin rash and dermatitis. The recently developed primin-free cultivars have reduced the risk for skin rash and renewed the interest in german primrose. These results suggest flowering of german primrose is faster under long day rather than short day conditions at the recommended production temperatures of 65 to 68°F. (M.T. Karlsson and J.W. Werner)

Preceding brief excerpted from HortTechnology 12(2):217-219. April-June 2002.

Microbial inoculant is not commercially beneficial in the production of container-grown tropical plants. Hibiscus, spathiphyllum and areca palm were treated with a microbial inoculant (Plant Growth Activator Plus). Only hibiscus had increased shoot dry weight and an enhanced color rating after treatment. From a commercial production point of view, increasing fertilizer rates in the substrate provided a stronger response in hibiscus than did addition of the microbial inoculants. Furthermore, use of the inoculant in this substrate did not compensate for reduced fertilizer inputs. (M.L. Elliott and T.K. Broschat)

Preceding brief excerpted from HortTechnology 12(2):222-225. April-June 2002.

Effects of paclobutrazol to control height of Poinsettia 'Freedom'. Application time is critical to control late stretch without significantly reducing bract area. Plant height and bract area were reduced excessively when paclobutrazol was applied anytime from start of short days to first bract color. Plant height was acceptably reduced without statistically significant reduction in bract area when paclobutrazol was applied at 1mg/L as a drench or 2 weeks after first bract color. Paclobutrazol had a larger effect when applied as a subapplication. This study indicated that application concentrations lower than 1 mg/L were inadequate, and concentration >2mg/L were unnecessary. (G. Niu, R. Heins and W. Carlson)

Preceding brief excerpted from HortTechnology 12(2):232-236. April-June 2002.

Effects of paclobutrazol and chlormequat on growth and flowering of lavender. One paclobutrazol (Bonzi) spray at 200 mg/L on lavender was found to be very effective in producing flowered plot plants that satisfied the 2 plant:1 pot height or volume conditions, using standard pots 14 cm tall. Applying 400 to 600 mg/L paclobutrazol concentrations once or twice in a 13-d interval, adequately reduced plant height but also significantly delayed flowering. Up to three applications of chlormequat with concentrations ranging from 4000 to 8000 mg/L were not sufficient to reduce plant height; however chlormequat treatments produced more uniform plants (possibly due to better partitioning of growth between competing shoots). (I. Papageorgiou, P. Giaglaras, and E. Maloupa)

Preceding brief excerpted from HortTechnology 12(2):236-238. April-June 2002.

The effect of Controlled Release Fertilizer (CRF) on rooting of three herbaceous perennials. Incorporating CRF into the rooting substrate of white sage, white gaura and catmint had no impact on adventitious rooting percentage and little influence on root number or root dry weight. It did increase shoot dry weight, but promoted shoot growth more than root growth resulting in an unfavorable root to shoot ratio. To prevent this imbalance, it is necessary to apply less N than the plants can potentially use. Otherwise, plants with small root systems will not grow as well after they are transplanted. (D.B. Rowe and B.M. Cregg)

Preceding brief excerpted from J. Environ. Hort. 20(1):1-6. March 2002.

Cut Flower Production:

Planting bulbs for cut flower production. For cut flower production, the 15-cm (6 in.) depth

was sufficient. 30% to 60% shade lengthened stems and precooling was unnecessary. To prolong the cut flower harvest period of a specific cultivar, bulbs can be planted both 15 and 30 cm (12 in.) deep. However, deep planting (45 cm; 18 in.) may reduce flowering percentage. Precooling, deep planting, and shade were not sufficient to encourage perennialization. The highest percentage of plants flowering in year 2 occurred with bulbs planted 15 cm deep. (T.J. Cavins and J.M. Dole)

Preceding brief excerpted from HortScience. 37(1): 79-83. February 2002.

Post harvest storage of cut flowers. The vase life of stock, gerbera daisies and sunflowers was maximized with storage as close to 0°C as possible. Gerberas are sensitive to water loss during storage, but wet storage had no moderating effect on the loss of vase life until temperatures reached 7.5 °C . (F.G. Celikel and M. S. Reid)

Preceding brief excerpted from HortScience. 37(1): 144-150. February 2002.

Solid matrix priming hastens germination of canterbury bells. *Campanula medium* ‘Champion Blue’ was specifically bred for cut flower production. It has a short crop time, typically flowering in 16 to 20 weeks. However, variable germination rates make production difficult and reseeding is often necessary. This study showed that solid matrix priming of ‘Champion Blue’ seeds for 5 days at 15% or 20% matrix moisture content (-18 or -16 bars, respectively) and 68°F will reduce germination time. Solid matrix priming combines seeds, water and either an organic or inorganic solid material at a certain temperature for a predetermined time period. Water is adsorbed to the solid material to create a low matrix potential, thus regulating seed water

uptake. Compared to other priming techniques solid matrix priming is inexpensive and can be used for large quantities of seed. Rather than separating seed from the matrix material, primed seed may be sown with the matrix material, making it easier to sow small seed like canterbury bells. (T.L. Bosma, J.C. Cole, K.E. Conway and J.M. Dole)

Preceding brief excerpted from HortTechnology 12(2):268-270. April-June 2002.

Container Production:

Using polystyrene beads as a substitute for perlite in container media. This study suggests that substitution of polystyrene for perlite is feasible and may result in a substantial propagation cost reduction. Rose-of-sharon, a broadleaved species rooted better with 100% polystyrene than with lower concentrations. The conifer species generally rooted better with lower concentrations of polystyrene. More rooted cuttings and more roots per cutting occurred on junipers when 100% peat (0% polystyrene) or 25% polystyrene were used than with higher rates of polystyrene. More arborvitae cuttings rooted with 50% or 75% polystyrene than with higher or lower concentrations. Individual species should be tested before routinely incorporating polystyrene in propagation substrate. (J.C. Cole and D.E. Dunn)

Preceding brief excerpted from J. Environ. Hort. 20(1):7-10. March 2002.

Thidiazuron increases shoot formation in nandina. *Nandina* cultivars form new shoots slowly during container production, often limiting the availability of cuttings and increasing production time, even when plants are pruned. Single foliar sprays of Dropp (thidiazuron or TDZ), a cotton defoliant with

cytokinin properties, applied at up to 4000 ppm promote shoot formation and fuller appearing plants of 'Harbour Dwarf' and 'Compacta' nandinas within 30 days of application with minimal phytotoxicity or effects on plant size. Substrate drenches, while effective in stimulating branching, resulted in foliar distortion, necrosis, and in many cases plant death, thus are not recommended. (G.J. Keever and D.A. Findley)

Preceding brief excerpted from J. Environ. Hort. 20(1):24-28. March 2002.

Roundup provides postemergence weed control in container-grown liriopie. Growers are often reluctant to apply preemergence herbicides immediately after potting up divisions of liriopie due to potential root inhibition. These data indicate that Finale (glufosinate) at 1lb ai/A or roundup (glyphosate) at 1.6 lb ai/A can be used as a cleanup treatment for postemergence spurge control in container-grown liriopie when growers have delayed their preemergence herbicide applications until plants are rooted or when failures in the preemergence weed management program occur. Finale caused slight initial injury, however plants grew past the injury in the normal production cycle. Roundup did not cause any injury. Growers should always conduct trials prior to treating their entire stock when applying Roundup or Finale to nursery crops. (J.E. Altland, G.H. Gilliam and J.W. Olive)

Preceding brief excerpted from J. Environ. Hort. 20(1):41-46. March 2002.

Nursery Production:

Production of Pawpaw seedlings. Pawpaw is a native American fruit tree that has potential for use as a new fruit crop or in landscapes. ProMix with a once weekly application of 100

mg/L N as Peters water soluble fertilizer served as an excellent substrate for the production of robust pawpaw seedlings for transplanting into the field or into larger containers. Pawpaw seedlings responded very favorably to root-zone warming to 32 C, by speeding seedling emergence, and increasing shoot, root, and total dry matter production in developing seedlings. (K.W. Pomper, D.R. Layne, S.C. Jones and J.G. Kwantes)

Preceding brief excerpted from HortScience. 37(2): 329-333. April 2002.

Container production of *Hakonechloa macra* Makino 'Aureola'. Manipulating division size and the density of shading can enhance production efficiency and quality of *Hakonechloa* grown in nursery containers. It is possible to obtain uniformly saleable plants in a 3-4 month growing season using initial divisions containing as few as 8-10 tiller buds. Though not saleable in one growing season, utilizing 1-2 tiller bud divisions doubles tiller bud production efficiency for propagation purposes. So, to obtain the greatest number of new growing points per initial growing point, use the smaller tiller bud divisions. Shade density of 50% is recommended for nursery production of *Hakonechloa macra* 'Aureola' to enhance growth and foliage coloration. (M.P. Harvey and M.H. Brand)

Preceding brief excerpted from HortScience. 37(1): 196-199. February 2002.

Seed size of Eastern redbud affects germination quality. A significantly higher percentage of large seed germinated than small seeds. Large seed produced seedlings with a greater peak value, indicating a higher level of vigor than small seed. The germination value, which combines rate and percent germination into a single index, was greater for large seed than small, indicating that large seed germinated

at a faster rate, which contributed to seedling uniformity. Eastern redbud (*Cercis canadensis*) seedlings derived from large seed are of greater vigor, have a higher percent germination, and are more uniform than seedlings from smaller seed. Separating redbud seed into seed weight fractions of various sizes and planting each seed size separately would provide growers with more uniform seedlings of various vigor levels and germination rates. Various inexpensive mechanical methods for seed separation by weight are economically feasible. (G.A. Couvillon)

Preceding brief excerpted from HortScience. 37(1): 206-207. February 2002.

Tolerance of alders and birch to drought and flooding. Alder and birch species were tested under stressed conditions (drought and flooding) in an effort to identify alternative species that will tolerate stressful urban conditions to increase the diversity of plants grown in urban areas. *A. maritima* was the most tolerant of flooding. *A. hirsuta* and *A. japonica* had reduced photosynthesis but their health score was not reduced. *A. incana* subsp. *tenuifolia* was the most sensitive to flooding but still less sensitive than any of the birches. All birches were sensitive to flooding, but data indicate that further screening of *B. davurica* and *B. uber* for superior flood resistance is warranted. *A. hirsuta* and *B. uber* exhibited superior drought resistance and their landscape use in droughty sites warrants further investigation. (W.R. Graves, J.A. Kroggel and M.P. Widrlechner)

Preceding brief excerpted from J. Environ. Hort. 20(1):36-40. March 2002.

Procedures to achieve high rooting percentages of Carolina Buckhorn softwood cuttings. Carolina buckhorn (*Rhamnus caroliniana*) is a small tree that grows to about 35 feet. It is native to the southeastern and south-

central United States. It tolerates a wider range of soil conditions and has ornamental value from glossy dark green leaves that become yellow, orange and red in autumn as well as from three-seeded drupes that progress from green to light yellow to coral-pink and red before becoming blueberry-blue to black when ripe in late autumn. Propagators seeding to achieve the highest rooting percentages with softwood cuttings should collect cuttings from juvenile plants and treat them with IBA in talc at 3 or 8 g/kg (3000 or 8000 ppm). Subtending cuttings (as opposed to terminal cuttings) did not result in a higher rooting percentage but did result in higher root dry weight (about 4 times that of terminal cuttings). (W.R. Graves)

Preceding brief excerpted from J. Environ. Hort. 20(1):57-61. March 2002.

Turf:

Seedling creeping bentgrass is variably tolerant to Quinclorac. Creeping bentgrass is often seeded on golf courses during spring and early summer in new construction projects or after winter damage of existing turf. Siduron can be used to control crabgrass that competes with spring-seeded bentgrass but siduron has short residual activity and must be reapplied for season-long control. Quinclorac has pre and post emergence activity on large crabgrass and provides control of a variety of broadleaved weeds. Quinclorac applications resulted in no long-term damage when applied to 'L93', 'Pennlinks', and 'Pencross' in Iowa and to 'L93', 'Putter', and 'Providence' in Indiana. However, results from North Carolina where quinclorac damaged creeping bentgrass seedlings indicate that caution should be exercised when using quinclorac on seedlings of creeping bentgrass. (Z.J. Reicher, G.A. Hardebeck F.F. Yelverton, N.E. Christians, B. Bingamann and J. Turner)

Preceding brief excerpted from HortScience.
37(1): 210-213. February 2002.

Turf performance of blends of tall fescue with Kentucky bluegrass and perennials ryegrass. These results show that tall fescue as a high percentage of the seeding mixture (90% by weight) will remain competitive after several years with Kentucky bluegrass in established turf. Perennial ryegrass as a low percentage of the seeding mixture will eventually dominate both tall fescue and Kentucky bluegrass in mixtures regardless of management. Disease influenced turfgrass quality and, on occasion, the advantage of mixing species for disease resistance was apparent. (J.H. Dunn, E.H. Ervin and B.S. Fresenburg)

Preceding brief excerpted from HortScience.
37(1): 214-217. February 2002.

Insect Control:

Japanese beetles don't necessarily seek purple leaved plants. There is a perception that Japanese beetles prefer purple-leaved plants because many of their preferred species have purple-leaved cultivars (i.e. Crimson King Norway maple or Thundercloud purple-leaved plum). In fact, other purple-leaved plants such as *Cercis Canadensis* 'Forest Pansy' and *Malus x hybrida* 'Jomarie' sustained little feeding damage. Therefore, purple cultivars of redbud, European beech, smoketree, or *Malus x ybrida* 'Jomarie' could be substituted for more susceptible hosts of the Japanese beetle in landscapes where purple-leaved plants are desired. (W.J. Rowe, II, D.A. Potter and R.E. McNiel)

Preceding brief excerpted from HortScience.
37(2): 362-366. April 2002.

Arthropod resistance to a glabrous leaved petunia. The glabrous leaved trait was introduced into the garden petunia from a single plant found in Brazil that had glabrous leaves (not covered with trichomes that have a sticky and foul-smelling exudates). It was believed that glabrous-leaved petunias might be more susceptible to arthropod pests. The new cultivar did not have reduced resistance to aphids but there was a lower resistance to spider mites. (R.J. Griesbach, J.W. Neal, Jr. and J. Bentz)

Preceding brief excerpted from HortScience.
37(2): 383-385. April 2002.

Control of aphids on *Asclepias* species. Data from this research indicates that the butterfly weeds, *A. tuberosa*, particularly 'Gay Butterflies' and gooseplant, *A. physocarpa*, maintained good plant quality under conditions of heavy aphid pressure. When milkweeds are being grown as larval food plants for Monarch butterflies, short-term aphid suppression with insecticidal soap is an option that may be least suppressive to butterfly larvae. (S.K. Braman and J.G. Latimer)

Preceding brief excerpted from J. Environ. Hort.
20(1):11-15. March 2002.

New Introductions:

'Morden Sunrise' Rose. 'Morden Sunrise' rose is a new, disease-resistant, semi-double, yellow-flowered introduction of the Parkland cultivar group. 'Morden Sunrise' combines hardiness, abundant flowering, disease resistance and excellent plant form in a hardy shrub-type Parkland rose. It is a low growing, continuous-blooming shrub rose. The name 'Morden Sunrise' was selected to reflect the yellow-orange color of an early morning sunrise. Exclusive propagation and distribution rights have been awarded to Bailey Nurseries, 1325 Bailey Road, Newport, MN 55055-9597 in the

US. (C. Davidson)

Preceding brief excerpted from HortScience.
37(2): 410-411. April 2002.

Stewartia ‘Scarlet Sentinel’. *Stewartia* ‘Stewart Sentinel’ is a unique tree that originated as a spontaneous, open-pollinated seedling at the Arnold Arboretum. The plant now known as ‘Scarlet Sentinel’ was originally collected in 1982 as one of a group of spontaneous seedlings growing beneath *S. pseudocamellia* (and near *S. ovata* f. *grandiflora*). It was not until the plant flowered for the first time in 1992 that its hybrid nature became apparent. ‘Scarlet Sentinel’ has a narrow, upright growth habit. It produces distinctive bark that exfoliates in thin strips. The most conspicuous feature of the 3-4 inch flowers is their scarlet-colored anther filaments. ‘Scarlet Sentinel’ has been successfully propagated by rooting softwood cuttings, by winter grafting of dormant scions onto seedlings of *S. pseudocamellia* and by summer budding onto seedlings of *S. ovata*. Growers interested in obtaining scion material under a licensing agreement should write to *Stewartia* Distribution, Arnold Arboretum, 125 Arborway, Jamaica Plain, MA 02130. (P. Del Tredici and J. Li)

Preceding brief excerpted from HortScience.
37(2): 412-414. April 2002.

‘Petite Wonder’ Mondarda. ‘Petite Wonder’ Monarda is the second dwarf hybrid of *Mondarda*, a summer-flowering, herbaceous perennial, to be introduced from the Morden Research Center. This clone combines flower qualities, dwarf stature, good winter hardiness, a high resistance to powdery mildew, and an adaptability to hot, dry summers. ‘Petite Wonder’ is a dwarf plant averaging 9-10 inches in height and width. Foliage is dense, shiny and

dark green. Flowers are light pink and last 6-8 weeks (beginning in late July in Morden, Manitoba). Flowers fade to a lighter color as they age and should be “dead-headed” after flowering to improve the visual appearance of the plant. Regrowth of foliage after flowering is good, providing a “fresh” green appearance later in the season and throughout the fall. Rhizome cuttings have been the most successful means of propagation so far. Tissue culture procedures are being developed. ‘Petite Wonder’ monarda is registered with the Canadian Ornamental Plant Foundation (COPF). Bailey Nurseries Inc. has exclusive propagation and distribution rights to this cultivar in the U.S. (C.G. Davidson)

Preceding brief excerpted from HortScience.
37(1): 235-236. February 2002.

Rhododendron ‘Mandarin Lights’, R. ‘Lemon Lights’, and R. ‘Tri-Lights’. ‘Mandarin Lights’ has an upright-rounded and somewhat open growth habit with a mature height of approximately 6.5 feet and an equal width. Flower trusses are ball-shaped (4-4.7 “wide and high). Flower color is orange with darker veining, and a lighter orange blotch on the upper lobe. ‘Lemon Lights’ has an upright-rounded habit and somewhat open growth; mature size is 5’ high and 4’ wide. Flower truss shape and size are similar to ‘Mandarin Lights’ but flower color is clear yellow with an orange-yellow blotch on the upper lobe. ‘Tri-Lights’ has a spreading habit and moderately dense growth. Its mature size is 5’ high by 6 1/2’ wide. Flower trusses are dome-shaped (4-4.7” long by 2.5-3” wide) and flowers present a tri-colored effect with marbled pink and white petals plus orange-yellow speckles from the throat to mid-petal on the upper lobe. All three cultivars are being produced commercially by tissue culture propagation of microshoots. They have been released through the royalty program of the Minnesota Nurseryman’s Research Corporation.

Growers interested in producing these cultivars should contact the authors or the Minnesota Nurseryman's Research Corporation, 1325 Biley Road, St. Paul, MN 55119.
(N. Rose, S.McNamara, H. Pellet and K. Zuzek)

Preceding brief excerpted from J. Environ. Hort. 20(1):62-63. March 2002.

News of Note

Clone of Wye Oak planted at Mount Vernon. Professor emeritus of horticulture from the University of Maryland, Frank Gouin, devised a new method of bud grafting and was successful in cloning the 460-year-old Wye Oak growing in Talbot County, MD. Several other efforts to propagate the ancient and now dying oak had failed. Dr. Gouin attempted to graft 100 budwood cuttings, and was successful with 97 of them. Because the original Wye Oak has never suffered from the fungal disease oak wilt, the cloned oaks are seen as potentially valuable by landscapers and researchers alike.

Calendar

June 12-13 – Pesticide training and exam sessions. Kent Co. Extension Office. Details are posted at: <http://www.udel.edu/pesticide/Cal.htm>

June 18 & 19 – Pre-exam Training. The two-day course is organized for individuals planning on taking the Maryland Nutrient Management Certification Examination for the nutrient management component of the Mid-Atlantic certified Crop Advisor Exam scheduled Aug. 2. For more information, call (410)841-5959 or visit the MDA Web site at www.mda.state.md.us

June 19-22 – Southeast Greenhouse Conference, Greenville, SC. June 1999-Industry Tour, June 20-22 – Educational Sessions, June 21-22 – Trade Show. For more information -Contact: 877-927-2775, to receive a \$15 discount coupon. www.sgcts.org

June 24-26 KAFMO Sports Turf Managers' School. Lebanon Valley College, Annville, PA; Contact Linda Kulp, Penn State Coop. Ext. – Dauphin Co., 1451 Peters Mountain Road, Dauphin, PA 17018-9504.

June 26 – Meet the Pests. Location: Temple, Ambler, PA. 3 to 5 PM. Contact: Dave Suchanic (610)489-4315.

July 9-14 – AN&LA Convention, San Diego, CA. Contact: 202-789-2900, www.anla.org

July 11 – Intermediate Soil Fertility. This workshop provides participants with a refresher course in the basic concepts of soil fertility and their management. For more information, call (410)841-5959 or visit the MDA Web site www.mda.state.md.us

July 17 – Nutrient Management for Grounds Management Personnel. This training course is aimed at individuals responsible for managing public grounds, parks, apartment complexes, common grounds area and other urban landscapes. For more information, call (410)841-5959 or visit the MDA Web site www.mda.state.md.us

July 19 – Conference on Woody Plants. Longwood Gardens, The Morris Arboretum of the University of Pennsylvania, the Pennsylvania Horticultural Society, The Scott Arboretum and Tyler Arboretum. The Scott Arboretum of Swarthmore College, Swarthmore. Call (610)388-1000, ext. 507.

July 23-25 – PANTS, Ft. Washington, PA, Contact: 610-544-5775.

August 2 – MD Nutrient Management Certification Exam. Anyone wishing to take the exam must apply two weeks in advance of the exam date and meet certain educational and experience requirements. Applying two months prior to the exam is recommended. For more information, call (410)841-5959 or visit the MDA Web site at www.mda.state.md.us

August 2-4 – Southern Nursery Association Trade Show, Atlanta, GA; Contact: 770-953-3311, www.sna.org

August 6-10 – APLD, (Association of Professional Landscape Designers, Summer Conference: Community Perspective – Point's of View, Seattle, WA. Contact: (717)238-9780, info@apld.org or www.apld.org

August 19-25 – Tour of Nurseries and visit to Far West show. Cost is \$1300 and includes airfare, hotel, transportation and most meals. Deposits are due by April 1. Space is limited to 25. Contact Dave Suchanic (610)489-4315 x 29.

August 21 – Summer Turf and Nursery Expo. Garrisons Lake Golf Club. Contact Valann Budischak (888)448-1203 or (610)274-2166.

August 22-24 – Virginia Christmas Tree Growers Association Annual Meeting. Airfield Conference Center, Wakefield, VA. Contact: (540)937-3934, secretary@vctga.com

September 4 – Practical Experience in Nutrient Management (location to be announced). This workshop will review the practical techniques, as well as present new concepts, used to make determinations in calculating yield goals for various crops corn silage. Things to keep in mind when soil testing and test labs, hay, manure sampling techniques, manure spreader calibrations, calibrating the PSNT and making recommendations. For more information, call (410)841-5959 or visit the MDA Web site at www.mda.state.md.us

September 12-16 – American Rose Society Fall National Convention "Let Roses Ring" Adams Mark Hotel, Philadelphia, PA. Contact: (609)267-3809, E-mail: jrsyrose@bellatlantic.net

September 18 – Phosphorous Site Index. (See April 3 workshop.) For more information, call (410)841-5959 or visit the MDA Web site at www.mda.state.md.us

September 18 – Ornamentals Research Expo – 4-8 PM at UDBG. Contact Susan Barton (302)831-2531.

September 30-October 2 – International Plug & Liner Conference. Disney Coronado Springs Resort, Orlando, FL; Contact: (919)785-0631, hamrick7@bellsouth.net

October 15 and 17 – Integrated Landscape Management. Taught by Gordon Johnson and Susan Barton from 7-9 PM, Kent County Extension Office, Dover, DE. Pre-registration required at (302)730-4000.

October 24 – Weed ID and Control in Turf and Landscape, Taught by Gordon Johnson, Jay Windsor and Steve Hart from 4-7 PM, Kent County Extension Office, Dover, De. Pre-registration required at (302)730-4000.

January 8-10, 2003 – MANTS, Baltimore, MD; Contact: (800)431-0066

January 15-16, 2003 – Delaware Horticulture Industry Expo, Modern Maturity Center, Dover, DE; Contact Valann Budischak (888)448-1203.

