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

Greetings to all! I hope each and every one of you has been able to survive the heat and drought of this summer. The DNLA, PGMS, and the DSGA have been trying to best serve our members interests despite the given situation. We've been actively participating in meetings of the Drought Advisory Committee and Water Supply Coordinating Council. We've also been meeting and talking regularly with DNREC officials. Take note of recent changes in the Drought Emergency bullets listed daily in the News Journal.

The Summer Turf and Nursery Expo and Golf Tournament was held on August 21st at Garrisons Lake Golf Club in Smyrna. Once again, Mother Nature provided us with a picture-perfect day. As a matter of fact, it was probably the least humid day of the summer. More than 130 people enjoyed the exhibits, interesting seminars, and pig roast. It was a special treat to see a retaining wall installation from start to finish. This complemented last year's walkway installation. Chuck Carpenter from Aquarius Irrigation Supply provided us with many new tricks of the trade with regards to the installation of residential irrigation systems. As always, Jay Windsor stumped many of us with his insect and disease examples. Following the delicious pig roast, a record-high nineteen foursomes revved up their carts and took to the golf course to participate in our 5th Annual Golf Tournament. DNLA president, Bruce Paulish, and I drove the very popular beer/beverage cart for our thirsty golfers. It amazes me how much our golfers can drink! Our winning foursome, this year, consisted of Joe Wick, Jr., Kimberly Wick, Bob Anderson, and Jim Remaily. Second place went to the Lord's Landscaping foursome consisting of Bill Lord, Stan Taylor, Tom Lowe, and Ken

Crooks. Mark Babbitt of Burke Equipment was our "Closest to the Pin" winner, and Mike Stead of Quail Run Nursery was our "Longest Drive" winner. Congratulations to all!! Thanks to our many tournament sponsors and program advertisers. An additional thanks goes to Al Sonchen of Jade Run Turf Farms for supplying the complementary golf sleeves, and Red Lobster and the Olive Garden for their donations of tee packs and some gift certificates. Their continued support is what makes the Expo and Golf Tournament a success.

The Ornamental and Turf Workshop and Delaware Horticulture Industry Expo (DHIE) are quickly approaching. The Turf Workshop will feature topics such as the "Ecology of Tree Establishment"; "Using Lower Toxicity Materials"; "The Facts about Mulch"; "Fundamentals of Organic Lawn Care"; etc. It will be held on Thursday, November 14th at Hockessin Memorial Hall. The DHIE will be held on January 15th and 16th at the Modern Maturity Center in Dover. It will, once again, join forces with the Delaware Pesticide Conference. More information on both of these events will soon follow. Be sure to join us!

The Certified Nursery Professional Exam will be offered on Monday, October 21st at the Department of Agriculture in Dover. If you haven't received, or have misplaced your application, please call the DNLA office.

Welcome New Members:

Garden Renovations

319 South Walnut Street
Milford, DE 19963
(302) 422-0654

Norpoint Holding Enterprises

DBA Harmony Farms

6757 Harmony Road
Preston, MD 21655
(410) 477-5653

MBNA America

Wilmington, DE 19884-2003
(302) 457-5763

Fisher & Son Co.

675 Independence Boulevard
Dover, DE 19904
(302) 736-3080

**Congratulations are in order for DNLA
President Bruce Paulish, and his wife Selina,
on the birth of their daughter, Sara!!!**



U of D NEWS Susan Barton, Extension Specialist

It is time for fall classes, workshops and events offered by Delaware Cooperative Extension. The Ornamentals Research Expo was held on Wednesday, September 18, 2002 at the University of Delaware Botanic Gardens. The event included tours of biorational fungicide trails for flowering dogwood powdery mildew and rose black spot; displays about Asian longhorn beetle, growing degree day measurements, plant problem samples, managing and conserving water in turf and landscapes, and daylily rust and the ever popular UDBG plant giveaway. As always, it was a great time to catch up on research at the UD and to talk with industry friends.

Fall workshops also include

- Diseases of Landscape Ornamentals, taught by Bob Mulrooney on Tuesdays, October 22 and 29 from 4 to 6 PM in the Kent County Extension Office.
- Weed Identification and Control taught by Stephen Hart, Gordon Johnson and Jay Windsor in the Kent County Extension Office on Thursday, October 24 from 4 to 7 PM.
- Integrated Landscape Management taught by Gordon Johnson and Susan Barton in the Kent County Ext. Office on October 15 & 17 from 7 to 9 PM.
- Pruning Workshop taught by Jay Windsor at the Research and Education Center in Sussex County from 4 to 6 PM on October 16 and a similar workshop taught by Susan Barton at the Fischer Greenhouse in Newark on October 28 from 4 to 6 PM.

There will be no registration fees for these workshops but preregistration is required (call Dot Milsom at 831-2531).

BETTER COMPOSTING
Francis R. Gouin, Professor Emeritus,
University of Maryland, College Park

Understanding the significance of carbon to nitrogen (C/N) ratios in the organic soil amendments and mulches you use in landscaping can make the difference between success and failure. The difference between a flourishing installation and a stagnating installation can often be traced back to nutrient immobilization due to an improperly balanced C/N ratio in the materials you used.

All organic materials contain carbon, however, not all carbon compounds are similar. We know from experience that fats are different from wood (a blend of cellulose, hemicellulose and lignin). Because all organic materials have different levels of stored energy and are structurally different. They have very different rates of decomposition. For instance, lignins are very resistant to decomposition and are found in high concentrations in the barks of coniferous trees (pine, spruce, hemlock and so forth), in redwood and cypress trees and others. The high lignin content of these trees is the primary reason the wood of these species does not decompose readily.

As organic materials decompose, they release the minerals contained within their structures. Since oils, fats and sugars are high-energy compounds, they contain relatively few minerals, are easily oxidized and do not decompose readily.

As energy levels in organic compounds decrease – that is, from starch to cellulose and hemicellulose – as commonly found in leaves, grasses, the sap-wood of plants and the bark of hardwood trees, they tend to hold more minerals and require a greater diversity of microorganisms and enzymes to digest the carbon compounds present.

Although lignins are carbon compounds, they have a complex structure that is not easily attacked by microorganisms and enzymes. The brown residue that you see in compost is mostly lignins.

Microorganisms need nitrogen and other minerals with which to reproduce and for building their bodies. Their affinity for nitrogen and minerals is greater than that of roots of plants and this is where conflicts exist between the needs of plants the needs of microorganisms. This is why newly planted plants or shallow rooted plants turn yellow when you mulch them with raw wood waste or incorporate un-composted organic waste into soil just prior to planting.

For organic materials to decompose efficiently the C/N ratio must be near 30:1. In addition to N, microorganisms need the other nutrients that are equally essential for plant growth. Thus, if you incorporate a rich source of carbon materials, it is likely that microorganisms will be competing with plant roots for those nutrients available in the soil.

The rate of decomposition of organic compounds is as different as night and day. Some have a very short life period while others may last for several years. Apply sugar to the soil, and there will be a rapid demand for N by invading microorganisms, but it will not last long because sugar is very soluble and easily digested. The N stress of surrounding plants would be of very short duration depending on the amount of sugar applied. Incorporate green grass clippings into the soil and you will quickly see a beneficial effect. Unlike sugar which contains no N but is easily solubilized and easily digested, green grass clippings contains a C/N ratio of 20:1 or less, which means there is an ample supply of N for the microorganisms and within a week or less, plants will be utilizing the N being released. This is why grass clippings in

piles or stored in plastic bags release pungent odors within days. There is so much N and so little C in grass clippings that microorganisms quickly utilize all of the available oxygen (O), making the piles anaerobic, thus causing odors. Also, most of the carbon is in sugars, starches and cellulose, which are easily decomposed.

Place straw or fallen leaves gathered in the fall into the ground or into a pile, and depending on the incorporated amount, surrounding plants stop growing and their older leaves turn yellow. Depending on the season and the amount of material incorporated, the plants may die. Or, place the leaves or straw into a pile or into a plastic bag at 50 percent moisture and nothing much will happen. It will take more than a year for the incorporated materials to decompose sufficiently so that plant growth will not be affected. It will take a couple of years for those placed in piles or in a plastic bag to decompose.

The difference between fallen leaves and grass clippings is due to C/N ratio. Leaves and straw have a C/N ratio of 80 to 100:1 and an insufficient amount of N and other nutrients to support microorganism activity. Most of the N has drained back into the branches or the root system.

Because pine bark and redwood sawdust contain mostly lignins, they can be incorporated into the soil or used in formulating potting mixes without composting and without causing a nutrient stress.

Composting destroys the organic compounds that are readily decomposed and release the nutrient contained within. However, depending on uses, not all organic compounds need to be thoroughly composted before they can be used.

Reprinted from 'What's Cooking' Winter 2002, a publication of the Mid-Atlantic Composting Association.

FERTILIZER RUNOFF CONTROL MEASURES

Thomas M. Blessington, David L. Clement, and Susan M. Tater, Central Maryland Research and Education Center, University of Maryland

Introduction

- Alternative irrigation and fertilization technologies are being developed to minimize nutrient runoff from greenhouse and nursery operations.
- Currently 10 – 50% of the applied fertilizer solution leaches through container grown plants as runoff.
- Lighter and better draining soilless mixes being used today have increased the leaching of fertilizer as runoff.

Controlled-Release Fertilizers (Crf's)

- Sole or supplemental nutrient source
- Applied into or on top of the growing substrate
- Minimize fertilizer loss between containers from hand watering and overhead sprinkler systems
- Minimize the amount of fertilizer leached since small amounts are released over a time in response to temperature and moisture
- Disadvantage: grower has no control over environmental conditions or plant nutrient demands once the fertilizer is incorporated into the container

Minimizing Fertilizer Runoff

- Fertilizer is lost through and between containers
- Collection areas to treat & recycle runoff
- Modify the production area for zero runoff

Open Treatment And Recycling Systems

- Collects excess irrigation solution
- Removes colloidal matter and suspended particles

- Eliminates pathogens
- Blends with a fresh water source
- Treats for proper pH and salinity
- Solution denitrification:
 - Denitrification is an anaerobic process that is still in the experimental stage
 - Pump irrigation solution through bioreactor columns containing lava rock
 - The lava rocks contain bacteria that reduce the nitrate to nitrogen gas
- Constructed wetlands
 - Water velocity is slow allowing for settling of sediment
 - Aquatic plants are used that tolerate high nitrate levels and low-oxygen
 - Microscopic organisms use and transform dissolved fertilizer contaminants

Closed Systems To Minimize Runoff

- Capillary mat systems are used to fertigate plants in smaller containers while reducing runoff collection site
- Trough systems have container grown plants set in flat troughs that are sloped to allow fertilizer solution to flow to the plants and into a collection site
- Ebb-and-flow is a recirculating subirrigation system for container grown plants on bench tops or on specially designed floors

Zero-Leach Drip Irrigation

- Emitters are placed in each container
- Microtensiometers are used to sense moisture tension in the growing substrate
- Microtensiometers are connected to a computer that turns the irrig. system on when the substrate dries to a certain level
- System turns off after saturation of growing substrate and before any leaching occurs

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WATER, SOIL, AND PLANT RELATIONS

Russell Balge, Professor Emeritus

University of MD Cooperative Extension

By all accounts, this summer is going to see the continuation of the drought we experienced last summer. The first step to comprehending and dealing with drought is understanding the relationship between soil, water, and plants.

The respective portions of sand, silt, and clay particles that comprise a soil determine its type or texture. How those particles are arranged determines the structure of the soil in question. No matter how compacted a given soil may become, it still remains the same type or texture of soil but differs greatly in its water/plant relations. Soil structure has a lot to do with how readily water percolates into a given soil, how much of the water is retained, and how available it is to the plant.

When water falls on a soil as rain, melts as snow, or is applied during irrigation, a certain amount of it will run off the surface. This water is runoff water. If there is a steep slope to the soil surface, there is no vegetation or mulch to intercept or soften the impact of the rain or irrigation water, the soil is already saturated, or the water is applied or falls rapidly, a greater proportion of the water will run off. This is why a good soil structure is so vital and a gentle rain or trickle irrigation is so important.

Mulch soil to reduce the traffic and retain good structure. Terrace moderate slopes and plant steep slopes with ground covers instead of utilizing them as a lawn, vegetable garden, or flower or shrubby border. Improve soils with little or no structure such as sands or those with a somewhat impervious structure such as clays with the incorporation of organic matter. Do not add sands to clay, instead improve the structure by adding organic matter.

Some of the water will percolate into the soil and be retained by it. As the surface of the soil becomes saturated, the water will move deeper into the initial stratum of soil. A given amount of water will move deeper into sandy, than loamy, than clayey soils. When a given layer or stratum of soil becomes saturated and can no longer retain water against the pull of gravity it will move into the next layer or stratum of the soil. This water that moves on through the soil and cannot be retained by it is gravitational water. If the next stratum of soil or the underlying parent rock is impervious to the continued percolation of water a perched, supersaturated stratum of soil called a perched water table might occur.

Once water is in the soil some of it will evaporate from the surface of the soil. Mulching the soil reduces soil water evaporation, but not to the degree previously thought.

If a soil has too loose a structure or none at all such as sand, most of the water that enters the soil becomes gravitational water. If the initial stratum of the soil is homogenous and deep, the amount of water that will be held is greater. However the amount of water that can be held per unit of soil for a given stratum is inversely proportional to the depth of that stratum.

To illustrate this, take a sponge and saturate it with water. Hold the sponge flat and level. After a while no more water will drip from the sponge. Then, tip the sponge on its side. The sponge will again drip water until no more gravitational water is left in the sponge. Tilt the sponge on its long axis. Water will again drip from the sponge until the sponge retains no more gravitational water. The longer the capillary column of water created by the space between the soil particles, the better drained a soil will become.

It is important to till the soil deeply, increasing the depth of the homogeneous layer of the bed. When adding topsoil to an existing bed or adding organic matter to improve structure it is again important to till the topsoil or organic matter deeply into the soil to increase the total amount of water that can be held by the initial stratum of soil.

When a soil stratum becomes saturated and water that is added to it becomes entirely gravitational water, it is said to be at field capacity. At this point the soil is holding the maximum amount of water that it can hold.

When a soil is at field capacity, plants absorb water with relative ease. However since absorption of water from the soil by plants is an energy expending process fueled by the presence of oxygen in the soil, soil structure is again important. If soil water exceeds field capacity, oxygen may be excluded to the extent that the plant wilts in the presence of a surfeit of water.

As the water is absorbed from the soil the remaining water becomes more difficult to absorb. When the plant can no longer absorb water from the soil, the remaining water is said to be hygroscopic. The water in a soil between field capacity and the hygroscopic point is the available water for that soil.

As soil water level reaches the hygroscopic point plants must expend more energy to take up the remaining available water. When transpiration from the plant and evaporation from the soil surface exceeds the uptake of water from the soil plants may experience a temporary wilt. A temporary wilt is a wilt from which the plant recovers. With some plants, such as *Ligularia*, temporary wilt occurs even though the soil is moist because its leaves lack a good waxy covering or cuticle.

A temporary wilt is often overcome if more

water is added to the soil or the plant catches up with transpiratory loss in the evening. Repeated temporary wilts or even a single experience with temporary wilting may irreversibly impact the well being of the plant. Temporary wilt easily leads to bitter tasting carrots or cucumbers and may stop the normal growth of *Celosia* in its tracks. When the plant can no longer recover from low soil moisture the wilt is irreversible and the wilt becomes permanent.

Over the eons of time, many plants have adapted to droughty conditions by evolving hairy, waxy, or shiny leaves; narrow, more water-efficient leaves; reduced and or deeply sunken stomates; deep soil-penetrating, waterseeking, or conversely, a shallow, wide-spreading root system that greedily grabs briefly-available water; or by going dormant during droughty periods.

Drought can be dealt with best by planning a design that works well with the wind, sun exposure, soil and topography of the site. If moisture-requiring plants are planted in normally moist sites, it is easy to provide supplemental water to those plants only during a severe drought.

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THE LATEST IN THE BATTLE AGAINST MITES

**Stanton Gill, Regional Specialist
University of Maryland
Central MD Research and Education Center**

A record drought year has caught everyone's attention. We have not had such an extended period of drought since 1870. If mites were to pick a year to be born this would be it. These tiny plant-feeding pests are some of the most damaging arthropod pests of nursery and landscape plants. Container grown nursery plants often are more susceptible to spider mite injury than field grown plants. Unfortunately most growers know this group of pests all too well – plant damaging spider mites. The most well known mite attacking nursery plants is the two-spotted spider mite. They are a double threat in that they cause severe damage to a wide vary of plant species as well as having the ability to develop resistance to miticides. With their piercing/sucking mouthparts, the mite easily penetrates the epidermis of the leaf, feeding on the spongy mesophyll and pallisade layers of the plant tissue. The end result is stippled, chlorotic foliage that drops from the plant when the damage is extensive.

Two-spotted spider mite

Two-spotted spider mites not only feed on plants in a field or greenhouse but will also feed on weeds under the greenhouse bench such as chickweed, oxalis, bittercress, and henbit.

Two-spotted spider mites prefer warm, dry conditions with low relative humidity. When the temperatures are cool, early in the season, it takes 14 days to go from egg to adults. When the greenhouse temperature rise to 85 F the mites take only 7 days to go from egg to adults. Populations can literally explode overnight at these higher temperatures. Monitor plants growing in the hotter parts of the field or

greenhouse, usually along the side walls of the greenhouse. Growers should develop their own list of plants that commonly have spider mite problems and concentrate on closely monitoring those “highly susceptible” plants. Monitor by looking closely at the leaf undersides of susceptible plant species using a 12X magnifier. Tap plant foliage over a white piece of paper then examine the paper for the presence of the mites. The mites are oval shaped and adult females and males will have two large dark spots on either side of the abdomen.

Non-chemical controls for two-spotted mites

A small midge called *Feltiella acarigusa* is an excellent predator of two-spotted spider mites and Lewis mite. The adult midges are fragile-looking with long mosquito-like legs. The adults are active at night, mating and laying eggs at this time. The female midge lays eggs near spider mite colonies. The larvae hatch in a couple of days and vary in color from yellow to orange. The larvae consume nymphs and adult mites. They pupate on the leaves and readily reproduce in greenhouses. These midges are available from commercial insectories and can be combined with releases of predaceous mites. Select one of the new miticides that have minimal impact on predators and try a combination of biological and chemical control for two-spotted mite control.

Cyclamen mite

Cyclamen mites are a major challenge to control when this pest moves into containers or greenhouses. Cyclamen mite causes injury to cyclamen, gerbera daisy, snapdragon, and chrysanthemum. The feeding injury is distinctly different from Tetranychid mites. Typical symptoms include distorted leaves and flower buds. On gerbera the mites cause bronzed patches along the midrib vein and curling of the foliage. Control with chemical sprays is

especially tough because the nymphs and adults feed in tight, hidden parts of the plant where contact with chemical applications is less likely. A chemical application should be made with a good wetting agent. The silicon-based wetting agent Silwet has given us improved control with cyclamen mite. The female cyclamen mite lays eggs between young leaves or at the crown of the plant. Each female lays ten to forty eggs over a 14-16 day period. To find the mites, dissect plant parts and examine the damaged areas using a 30 X magnification. A pocket microscope can be used for this close-up examination. The female is yellowish while the males are usually colorless to yellowish brown.

Biological control of cyclamen mites

Since this mite feeds in areas that are difficult to hit with chemicals, biological control might be worth considering. The best control is using the predacious mite *Amblyseius cucumeris*. This predacious mite feeds on 1st and 2nd instar thrips but will also feed on nymphs and adult cyclamen mites.

New materials for mite control

Growers are generally looking for long lasting and effective miticides that have short REIs. Long lasting materials make reapplication unnecessary and short REIs mean that workers can be brought back into the field or greenhouse in a relatively short time. Most miticides have contact activity, so thorough coverage, especially hitting the undersides of leaves, is essential. Most new miticides state on the label that after 1 – 3 applications growers should rotate to another class of chemistry to avoid development of resistance. What is different with several of the new miticides is that they give control of mites for several weeks and many are “easy” on beneficial organisms.

A relatively new product for mite control is

Floramite (bifenazate) by UniRoyal Company. Floramite is a new class of chemistry called “Carbazate.” Bifenazate acts as a gamma-aminobutyric acid antagonist in the nervous system at the neurotransmitter synapse. Wow! Aren’t you glad you asked? Since this is novel chemistry there is no reported resistance. Rates range for 2 – 4 oz/100 gallons of water. In trials conducted in Maryland we obtained 27-30 days of control of two-spotted spider mite on mondo grass. (See chart #1). Floramite is relatively non-toxic to several species of predacious mites (*Amblyseius fallacias* and *Phytoseiulus persimilis*) and lacewings (*Chrysopela carnea*).

Akari 5SC (fenpyroximate) by SePRO gives excellent control of spider mites for residual control of 21-28 days. Prior to knockdown and death, mites treated with Akari are rapidly paralyzed. Some mites have been observed spinning down off the plants before they die. Akari miticide recently received a federal EPA label as a miticide for use in greenhouses and interiorscapes and is now pursuing label for individual states. Akari is reported to be non-toxic to several beneficial predacious mites.

Hexygon 50 WP (hexythiazox) has been labeled for use in landscapes for several years but recently received expansion of the label to include use in greenhouses. It is in the thiazolidinone chemical family and I do not know of any other miticides in this same chemical family. Hexygon is a mite growth regulator that works best on eggs and immature forms of spider mites. Residues on treated surfaces are effective for 30 days or more. Like Akari and Floramite, it is considered safe on several species of mite predators. Hexygon can be mixed with 1% horticultural oil or Sanmite or Floramite to give control of adult spider mites. Hexygon has performed well on potted plant trials in Maryland for two-spotted spider mites when applied to early building populations of mites.

Ovation SC (clofentezine) by Scott Company kills immature mites and eggs. It belongs to the chemical class called tetrazines and kills planting feeding spider mite immatures and eggs by affecting respiration. The interesting thing about Ovation is that it very effectively kills two-spotted spider mite and European red mite and can safely be used with predatory mite releases. The chemical has a residual of up to 45 days. This material should be used early when spider mite populations are first detected. It could be used in combination with Akari if adult mites are present. Restrictions in use allow one application/crop cycle in the greenhouse and one/crop cycle/year for outdoor production.

Avid (avermectin) has been around for over a decade but is still effective for two-spotted spider mite control in many areas of the United States. Avid has translaminar activity, which means that the active ingredient moves from the upper to the lower leaf surface where the mites feed. In some greenhouses where this material has been used repeatedly, mite resistance may be a problem.

The Gowan Company is planning to register **Milbemectin 1% EC** which is also derived from microorganisms and is chemically related to Avid. It gives excellent control but should not be rotated with applications of Avid.

Sanmite (pyridaban) provides excellent control of adult spider mites when used at 4 oz/100 gallon. Sanmite is also effective in controlling whiteflies. Triact 90 E.C. (Neem oil) and 1% Horticultural oil by themselves gives good levels of control of spider mites. Both of these materials control eggs, immatures and adult stages of spider mites.

Pylon 2SC (chlorfenapyr) is a miticide that just recently received EPA labeling for greenhouse use and is distributed by Olympic Horticultural

Products. Pylon is in the chemical class pyrrole and it kills by contact and also acts as a stomach poison. Pylon is reported to give control for up to 2 weeks. The verdict is still out on whether it can be safely used with beneficial organism releases.

As with any pest population, early detection is the best way to control mite problems. Be sure to monitor mite prone plants closely. Look for mites in warmer locations in your greenhouse, and carefully examine hanging baskets in the upper canopy of the greenhouse closely. Early detection and applications to “hotspots” of mite

infestations will keep mites from causing major economic losses. Make sure that you follow the directions for the number of applications of the miticide before rotating to another class of chemistry. This will help reduce the chance of developing resistant populations of spider mites. Mites can be effectively managed through a combination of good cultural practices, monitoring of plants, and early intervention.

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ADVERTISING: HOW MUCH?

How much should I spend on advertising? One of the oldest adages in the advertising biz is “I know that half of my advertising budget is wasted, I just don’t know which half!”

Measuring a return on investment for advertising expenditures is extremely difficult, but billions are spent annually on promoting goods and services because it works. The overall advertising industry is cyclical and very sensitive to economic gyrations. As we emerge from our current economic doldrums, the more optimistic predictions state that overall advertising expenditures will increase 6.7% in 2002 when compared to last year. (Source: Schonfeld & Associates).

A question we are often asked is “Do we spend enough on advertising?” That is probably one of the hardest questions to answer so we often rely on industry benchmarks. The following information was extracted from research conducted by Schonfeld & Associates, a research company located in Riverwoods, IL. (www.sailbooks.com).

Among the retailers selected, merchants in the building materials, hardware, and gardening sector spend the second largest portion of total sales on advertising (15%). Much of this can be attributed to the enormous dollars spent by Lowe’s and Home Depot in battling for market share. In the home improvement industry, advertising also consumes 15 cents out of every dollar of gross margin. Year-over-year growth in advertising expenditures, however, is expected to be modest compared to other promotion-dependent sectors like grocery stores and apparel shops.

One reason consumption has held up in this recession economy is that homeowners have tapped into the wealth created by rising home values. Home equity lines of credit and second

mortgages could be leading indicators for expenditures on home improvements such as decks, patios, water features, fencing, and landscaping. You may be asking, “Where do these homeowners live?” You can now tap into our MortgageBase database for these prospects. (Note: not all areas of the country are covered.) MortgageBase is updated weekly with new mortgage, refinance, and second mortgage information down to the county level. You can select address, some telephone numbers, mortgage amount, and much more. Use this information to target homeowners in your area who may have the cash (and home equity) to finance large-scale renovations and home improvement projects. Pricing for the database starts at \$35 per 1,000 names. Each additional select (loan amount, phone number, et al.) costs

an additional \$10 per 1,000 names. Email kcreel@pkdata.net and reference MortgageBase in the subject line if you'd like for more information on this service.

The average U.S. household received 3,000 coupons for store purchases last year but used only 40, according to the trade group Promotion Marketing Association. Marketers spent almost as much handing out the coupons as consumers saved. It is for this reason that many retailers are moving toward electronic coupon dissemination via email and Internet websites. P.K. Data's solution is Grapevine Member, an electronic surveying tool and customer loyalty program for specialty retailers. Click here for more information about Grapevine Member or by contacting kcreel@pkdata.net.

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MANAGING SCALE INSECTS: WHEN ARE THOSE VULNERABLE CRAWLERS ACTIVE?

**Paula Shrewsbury, Dept. of Entomology
University of Maryland**

Many species of scale insects feed on woody ornamental plants and become pests in nurseries and landscapes. Two of the most common groups of scales associated with ornamental plants are the armored or hard scale and the soft scale. In general, scales are somewhat sedentary insects. Female and male scales often differ in appearance (shape, size, and color) as immatures and adults. Female nymphs and adults have soft, sac-like bodies and they do not have wings. Male immatures also have sac-like bodies whereas adult males have wings and resemble tiny wasps. Armored scales produce a waxy "cover" under which the soft-bodied scale itself can be found. If you flip the cover off, the scale remains on the plant. Soft scales do not produce a "cover" but the scale itself has a somewhat hardened exo-skeleton. If you flip over a soft scale, the entire insect flips over.

Some species of scales may settle and develop on wood, while others on needles or leaves. Scales are sucking insects that may tap into their host plants' phloem, cambium, or leaf cell tissue depending on the species. Therefore, the different feeding habits and locations of scales can result in varying types of damage. For example, Euonymus scale, an armored scale, feeds on the foliage and stems of Euonymus resulting in yellow spotting of the foliage and branchy dieback when infestations are heavy. Obscure scale, another armored scale, feeds on woody tissue, which results in branch dieback. Feeding by soft scales on the other hand, often results in leaf yellowing and drop, stunted growth, and dieback. Soft scales also produce honeydew (with its associated sooty mold), often at very objectionable levels.

The life cycle of armored and soft scales differ. Armored scales have one or multiple generations per year depending on the species whereas soft scales have only 1 generation per year. Armored scale females and males have a 1st and 2nd instar that are the immature stages. The 1st instar is known as the crawler stage and is mobile. The crawler finds a favorable location where it settles to feed and mate. The scale spends the remainder of its life there. Females have a young adult stage that the males mate with, and a mature adult stage that produces eggs. The male has a pre-pupa and pupal stage, and finally becomes the winged adult. The overwintering stage varies with armored scale species.

The typical life cycle of soft scales is to overwinter as nymphs on the bark of their host plant; in late winter resume feeding; mature males (winged) and females (sedentary) mate in early spring; males die within a few days; females then grow rapidly and begin laying eggs; females develop a characteristic color pattern. These maturing females feed and often produce abundant honeydew. Around June, eggs hatch; crawlers move from stems to leaves and settle for the summer; adult females die on stems. From July to September, settled immatures feed on the lower leaf surface sucking sap from the phloem tissue and produce honeydew. Before leaves drop from trees in the fall, immatures move from the leaves back to the stems where they spend the winter. This is the typical life cycle for soft scales such as calico scale, oak leucanium scale, or cottony maple scale. Wax scales have a similar life cycle but remain on branches of their host plant. Two common soft scales whose life cycles differ are the Magnolia scale and Tulip tree scale. These scales remain on the stems their entire life cycle and crawlers are active in the fall rather than the spring.

When developing a management strategy for

scales, remember that the crawler stage is the most vulnerable to many control measures. The key is to properly identify the scale type and species and determine when crawlers are active. See the table below to assist with this. Applications of horticultural oil targeting crawlers can give very good control. Follow up applications may be necessary for scale species where eggs hatch over an extended period of time or they have multiple generations. For scales that spend part or all of their life cycle on the foliage a systemic insecticide like acephate (Orthene) should provide control. Imidicloprid, another systemic insecticide, has been found to work on some soft scales but generally not on armored scales. Dormant oil applications targeting overwintering stages will also reduce scale populations. Many of the scale species have an abundance of natural enemies that attack them. Monitor for signs of parasitism (circular holes in scale covers) or predation (chewing of scales) and the presence of natural enemies. It has been found that many parasites of armored scales tend to be most active when male adults are active and when crawlers are active. If natural enemy activity is present you may not need to apply controls or choose products, like horticultural oil, that will have the last impact on the natural enemies.

In the table below, you will find a list of armored and soft scales that sometimes reach pest levels in nurseries and landscapes. The table includes information that will help to effectively monitor for scale activity and optimize control measures. This includes when the crawlers are active and which host plants they attack.

Managing Scale Insects

Scale Name	Time of Crawler Activity				Common Host Plants
	June	July	August	Sept.	
Armored Scales					
Euonymus scale	X		X		Euonymus, Celastrus
Japanese maple scale	X		X		Maple, pyracantha, several others
Cryptomeria scale	X		X	X	Hemlock, pine, and fir (rarely Cryptomeria)
Maskell scale	X		X		Cryptomeria, Sciadopitys, black pine
Elongate hemlock scale	X			X	Hemlock, spruce, fir, Douglas fir, yew
Juniper scale	X				Juniper, Leyland cypress
San Jose scale	X	X	X	X	Rosaceous plants (Prunus and Pyracan-
White peach scale		X		X	Peach, mulberry, others (not lilac or privet)
White prunicola scale	X	X	X	X	Prunus spp., flow. Cherry, lilac, and privet
Gloomy scale		X			Red and silver maples
Obscure scale		X	X		Pin and willow oaks
Oystershell scale	X				Fruit trees, pyracantha, many others
Pine needle scale	X	X			Mainly pines, also other conifers
Soft Scales					
Calico scale	X				Dogwood, maple, holly, many others
Euro. Fruit lecanium	X				Flowering fruit trees and maples
Pine tortoise scale	X				Scotch, Jack, and Virg. Pine and others
Terrapin scale	X				Maple and fruit trees, some others
Cottony camelia scale	X				Camellia, holly, yew, euonymus, maple
Wax scale	X				All hollies (except American), many others
Fletcher scale	X				Yew and arborvitae
Magnolia scale				X	Magnolia
Tuliptree scale				X	Magnolia and Tulip poplar

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**DRIP IRRIGATION:
THE ONLY WAY TO GO**
Jerry Faulring, Waverly Farms

In the current cycle of drought, it is important to review irrigation practices to determine if current systems are meeting our needs and the needs of the community. Recently, I heard about a report (second hand) that said the eastern Shore water table was approximately 8 feet below normal in March 2002. (We would be concerned if it were only a few feet below normal.) Now that the drought situation has forced the government to regulate water usage, it is the right thing to do for exempt agricultural users to make a noted effort to reduce water consumption.

While drip irrigation may not be practical for every nursery, my past experiences have shown that overhead irrigation is not the right method.

At River Farm nursery, my first nursery, we used overhead irrigation with water from the Potomac River. With all that water rushing by, it seemed logical to crank up the diesel pump and push 500-600 gallons per minute into the field. We set up a solid set system of 3, 4, and 5" aluminum pipe with 6-foot risers and 40 gpm sprinklers. More sprinklers at a lower volume would have been better, but would have doubled the number of lateral pipes. Needless to say, I did not receive good advice on the system.

I would never do it again. The soil was a heavy silt loam, containing a high percentage of clay that would become a gooey gumbo for several days after irrigation—making it almost impossible to walk in the field, let alone work. The topography was relatively flat but the irrigation caused some erosion. In turn, the erosion wreaked havoc on my pre-emergent program, causing an enormous problem. Surface-applied fertilizer washed away to some extent and roadway ruts became a constant

hazard. Holes from digging retained water for days and became a breeding site for mosquitos.

In retrospect, I did not enjoy being in the fields during irrigation season. Being that the nursery was a small site, I did not have the option of irrigation a block and working 100 acres away until the soil dried.

When I purchased Waverly Farms, I knew there was no surface water in the immediate vicinity. We would not face the devastating floods that River Farm nursery did. I correctly assumed that the vast Frederick Limestone Aquifer lying beneath would support our needs.

This is our sixth year using drip irrigation. The advantages are astounding.

1. Based on my calculations, drip irrigation consumes approximately 10% of the water used by that of an overhead system without sacrificing plant production. Water savings will vary depending on soil type.
2. Both water and fertilizer are focused at the growing zone. In preparing our Nutrient Management Plan, we determined we would be irrigating and fertilizing only 32% of our total production acreage as a result of the targeted affect of drip irrigation and fertigation.
3. Soil erosion from drip irrigation is non-existent.
4. We install a \$1.45 valve on every tube. This allows us complete flexibility in both water application and fertility rates. For example, if we plant a small block in a large zone, we can concentrate water on the new plantings, not wasting it on more established plants nearby. In

addition, digging during any season can benefit from the ability to focus water on a single row. Two years ago, we needed water in March to assist us with digging. It took about 20 minutes to get the system up and running. An overhead system might require a day or more. Another benefit is that I can discourage growth by not irrigating certain plants for which demand has slowed (e.g. pears).

5. We are able to spray, prune, stake, harvest and provide tours while the irrigation is running.
6. Weed production is significantly lower. In addition, the drip irrigation does not create the pools, ponds and small streams caused by overhead irrigation.
7. Fertigation saves tremendous amounts of capital. My analysis shows that our fertigation system saves enough capital to purchase new drip tube every 5 years; we expect the tubing to have a minimum life of 20 years. Economically speaking, we buy less fertilizer, have no need for application equipment, except for injectors, and do not need labor to apply the fertilizer. An additional advantage of fertigation is that we can provide our plants with smaller amounts of fertilizer over several months; this eliminates the potential for run-off and at the same time allows for an averaged dosage of nutrients over a broad spectrum of weather conditions.
8. In drought conditions, we save 90% of the water needed by an overhead system and do not stir up any community controversy over our use of the water. Many locals inquire as to why it appears we are not irrigating, when in fact the

system operates 24 hours a day, 7 days a week.

9. An overhead irrigation system requires a constant observer during all hours of operation to detect major leaks and to monitor the pumping stations, especially when engines are used.
10. The non-polluting appearance of electricity to drive small motors used for pumping puts forth a 'good neighbor' image.
11. Wind has no effect on the delivery of the water through drip irrigation. Overhead irrigation faces significant evaporation, as much as 50% is claimed, and can be blown off target by windy conditions depending on the particular setup.
12. Overhead systems contribute to soil compaction, whereas drip irrigation does not.
13. Retrieving drip tube is a one-man operation through the use of a hydraulic hose reel. There is no need for pipe wagons or piles of pipe that provide housing for critters. The distribution of drip tube is also a relatively low stress activity, requiring about 5 minutes to pull a 500-foot row.
14. Drip tube repairs are extremely easy—only a pruner is needed to cut clean ends. Further drip tube does not decay or incur pinholes as is the case with aluminum pipe.
15. The cost of a drip system is comparable to a solid set overhead system if all of the pipes of the drip system are buried. We have spent about \$2500 per acre including labor of installation, all

components, and 6 low volume wells at an average cost of \$12,000 each. One good well instead of 6 would have reduced our cost per acre by about \$300. Drip tube is a major system cost that is high here due to an intense plant density scheme for shrubs, which are 90% of our production.

16. We spend about 2 man-hours a day to operate the 200 acre system; this is significantly less time than needed by most overhead systems.
17. The single phase electricity pumping cost for our 200 acres is about \$1.10 per hour of operation, pumping about 150 gallons per minute. Our water usage may be relatively low compared to other sites due to the high water holding capacity of the soil.
18. Drip tubes can't freeze—they are full of holes by design.
19. On the downside, one of our dogs likes to bite through an occasional tube. We have not incurred any damage from critters as the dogs eat the critters.

Now that I have more clearly thought through the issue as a result of writing the above, I'm convinced—drip irrigation IS the only way to go!

Reprinted from Free State Nursery and Landscape News, 2002.

Publications

Hardiness of Woody Ornamental Plants. Vol 4. 2002 Canadian Govt. Publishing, Communication Canada, Ottawa, ON KIA 0S5 (tel. 800-635-7943; fax 800-565-7757 (Visa or Mastercard); <http://publications.gc.ca>). \$65.10. 550 p., 12 p. color. ISBN 0660-18674-8. Results and recommendations of 73 species and cultivars of ornamental trees and shrubs.

Utilizing Municipal Trees: Ideas From Across the Country by Stephen M. Bratkovich. This 90-page, color booklet provides inspiring stories from entrepreneurs tree-care firms, city foresters, and sawmill operators that see opportunities for making fine furniture, unique woodcrafts from wasted urban trees. Urban trees removed due to old age, hazardous conditions, and poor health provide an untapped resource for wood products. Order this publication and learn how 16 communities, organizations, and individuals conserve natural resources. To obtain a free copy, call or write: USDA Forest Service, Northeastern Area State and Private Forestry, 1992 Folwell Ave., St. Paul, MN 55108, Ph: 651-649-5262, e-mail: dkking@fs.fed.us

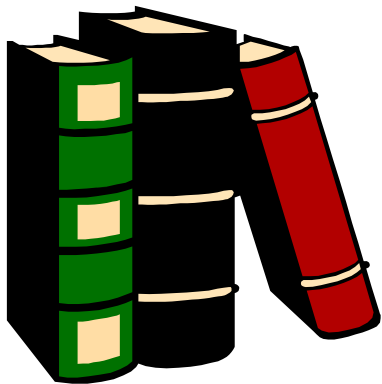
Encyclopedia of Garden Debuts – The Chicago Botanic Gardens debuts it's new, 3-volume, 1545 page reference work, *Encyclopedia of Gardens: History and Design*. Categories include: historical and existing sites, and topics related to garden elements, periods and styles. Illustrated with over 300 photographs and dozens of line drawings of plans and tools. For more information, contact 800-850-8102 or visit www.chicagobotanic.org.

Perennial Ground Covers, authored by David MacKenzie, owner of Hortech, Inc., is now available in paperback. Contains over 300 photographs of thousands of cultivars with

complete plant descriptions. For more information call Joni at 800-875-1392.

Horticopia Software. Horticopia, Inc. released *Garden Studio*, a new software product geared toward the POS merchandising material needs of garden centers. Garden Studio Provides access to 21,000 pictures and 8,700 plants for users to control all print quantities and design their own custom layouts. For more information, call 800-560-6186 or visit www.horticopia.com

The American Woodland Garden. Written by local author, Rick Darke, this book includes hundreds of fabulous photographs of the eastern deciduous woodland. It addresses the principles of design, change and development over time, management practices and includes a chapter covering many excellent woodland plants. Available from Timber Press.



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:
September 24-25, 2002. Kent Co. Ext. Office.
December 17-18, 2002. Kent Co. Ext. Office.

Insecticides:

DISYSTON (disulfoton) – Bayer – The following uses of this product will be phased out by June 2004; barley, wheat, potatoes and ornamentals.

F-1785 (flonicamid) – FMC – EPA received an application to register this new active ingredient as an insecticide for greenhouse use. Comments must be received by 8-9-02. (FR Vol. 67, 7-10-02).

FLONICAMID – ISK Bio Sciences/FMC-EPA has registered this new systemic insecticide to use on ornamentals grown indoors in greenhouses. It controls sucking insects.

PEDESTAL (novaluron) – Compton/Uniroyal – A new insect growth regulator for the control of insects on container grown ornamentals in greenhouses.

TICK-EX (Metarhizium spp.) – Taensa Inc – A new biological product based on a fungi being developed to control deer ticks. It is being tested to maintain a natural tick barrier around buildings and homes.

Fungicides:

BAS-505 (dimoxystrobin) – BASF – A new strobilurin fungicide being developed in Europe for use on vegetables and turf.

GREEN RELEAF (*Bacillus licheniformis* strain SB 3086) – Novozymes Biologicals – EPA received an application to register this new active ingredient as a biological fungicide for use on ornamental turf, lawns, golf courses, turf farms and ornamental plants to control various diseases. Comments must be received by 7-26-02. (FR Vol. 67, 6-26-02).

PLANT SHIELD (*Trichoderma harzianum* rif AL strain KRL-AG2) – Bio Works – Added to their label for this biofungicide the usage on flowers, bedding plants, ornamentals, berries, small fruits, citrus, pome fruit, stone fruit, nuts and hydroponic crops.

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

Herbicides:

BROX2EC (bromoxynil) – Albaugh – A new formulation being introduced for use on corn, sorghum, cereals, alfalfa, flax, garlic, onions, mint, grasses grown for seed, non residential turf grasses and non crop areas.

Miscellaneous

KAPUT (warfarin) – Scimetrics – A new gel formulation used as a rodenticide for mole control. The gel simulates an earthworm making it attractive to the feeding mole.

Research Briefs

Propagation

Butternut propagation. *Juglans cinerea* (butternut) is a hardwood species native to the northeastern US and Canada valued for its wood and edible nuts. Butternut is easily propagated by seed but butternut canker disease is also seed-borne so vegetative propagation will be required to produce disease resistant clones. Successful propagation of *Juglans cinerea* on a commercial scale can be achieved with softwood cuttings taken early in the season; treated with 62 mM K-IBA or 74 mM IBA; and grown in a greenhouse mist bed with supplemental lighting. (P.M. Pijut and M.J. Moore)

Excerpted from HortScience 37(4): 697-700.

Best fertilizer regime for pawpaw seedlings in containers. The slow release fertilizer, Osmocote 14-14-14 can be used effectively as a sole fertilizer source when incorporated into potting substrate at a rate of 2.22 kg/m³ or at a reduced rate of 0.81 kg/m³ when supplemented with weekly applications of liquid feed fertilizer at a rate of 500 mg/L of Peters 20-20-20 to enhance production of container-grown pawpaw (*Asimina triloba*) seedlings. (K.W. Pomper, D.R. Layne and E.B. Reed)

Excerpted from HortTechnology 12(3):397-402.

Stratification improves germination of *Aconitum sinomontanum*. *Aconitum sinomontanum* is a robust perennial monkshood native to China that shows promise as a cultivated ornamental. Seeds were harvested from wild-collected plants of identical provenance growing at the Arnold Arboretum. After harvest and before stratification, seeds were stored dry at 38 F. Stratification appears to

be required for germination of seeds of this species since unstratified seeds failed to germinate during the 73-day duration of this study. Growers wishing to germinate seed of this species should stratify seed for 3 months to achieve the highest level of germination. (M.S. Dosman)

Excerpted from HortTechnology 12(3):423-425.

Propagation of Keolreuteria paniculata.

Efficient propagation of cultivars of goldenrain tree that are both sterile and upright is desirable. This study found that the highest rooting percentage was achieved when cuttings were taken from trees that were 4-6' in height as opposed to smaller trees (1-3' tall). (M. Luker and N. Bassuk)

Excerpted from HortScience 37(3):439.

Container Production

Coir and Comtil as media components for oak production. Difficult-to-transplant tree species with coarse root systems can be successfully produced in copper-treated containers using either 3:1 (by vol) pinebark:Comtil or pink bark:coir substrates under a range of fertility programs. Comtil is a composted municipal sewage sludge; coir is a coconut fruit by-product. When producing plants from seed it is important to remember that seed source often affects growth rate. In this study, one *Q. alba* source grew twice as fast as four other seed sources. Coir and Comtil are renewable resources that can be used as substrate components. A grower wanting to add these species to their product mix should be able to produce 3 to 5 ft tall two-year-old whips. (D.K. Struve)

Excerpted from J. Environ. Hort. 20(3): 133-137.

Tolerance of ornamental grasses to preemergence herbicides.

Tolerance of ornamental grasses to herbicides commonly used in nursery crop production and turfgrass maintenance was evaluated in container studies. Gallery controlled the broadleaf weeds tested but did not control large crabgrass. Surflan at 2 lb ai/A controlled all weeds except rice flatsedge. Pennant at 2 lb ai/A controlled rice flatsedge but not eclipta. Pendulum, Ronstar, Barricade and OH2 also did not control eclipta at the lower use rate. Although growth suppression and stand reduction was observed in certain herbicide/ornamental grass combinations, the species tested generally exhibited good tolerance to the chemicals tested. Ornamental grass tolerance improved by the second herbicide application. After two applications, not rate of Surflan, Pendulum, or Barricade caused a significant reduction in growth of any of the five ornamental grass species tested. (J.F. Derr)

Excerpted from J. Environ. Hort. 20(3): 161-165.

Irrigation timing had a significant affect on plant growth, container temperature, and water utilization efficiency.

Plants that were irrigated 1200, 1500, and 1800 HR (noon, 3 and 6 PM) significantly outperformed plants irrigated during early morning hours. Decreases in plant growth appear to be related to increase in diurnal water stress over the course of the growing season. Growers should avoid letting the container substrate dry out by late afternoon. Our data suggests that growers may want to investigate irrigating at times other than early morning. (S.L. Warren and T.E. Bilderback)

Excerpted from J. Environ. Hort. 20(3): 184-188.

Atrimmec suppressers shoot length and promotes branching of Goldflame

Honeysuckle. Goldflame honeysuckle (*Lonicera x heckrottii* ‘Goldflame’) is often difficult to manage during container production due to its rapid growth and twining nature. Repeated pruning, however is time-consuming and can detract from plant appearance. Extensively pruning overgrown and woody shoots of Goldflame honeysuckle in May before a later (June) Atrimmec application and pruning just prior to a June application of Atrimmec effectively suppressed shoot growth for up to 10 weeks, and may extend the market window of Goldflame honeysuckle through the summer. Atrimmec also increased shoot numbers at 6, 8, and 10 WAT independently of pruning. In addition, Atrimmec applied during the early season (April) to young, rapidly growing plants proved to be effective in suppressing shoot length and increasing the number of shoots without time-consuming pruning. (L.L. Bruner, G.J. Keever, J.R. Kessler, Jr. and C.H. Gilliam)

Excerpted from J. Environ. Hort. 20(32): 73-76.

Date of potting and fertilization of container plants. In this study in Raleigh, NC, ‘Compacta’ holly and ‘Chindo’ viburnum performed well when fertilized with typical rates of fertilizer regardless of time of potting (no winter injury with fall potting). Based on growth data from this study, growers should apply the full rate of fertilizer at potting regardless of time of potting. Plants potted in the late summer/fall outperformed all other potting times. Therefore, growers may want to incorporate more fall potting in lieu of traditional spring potting. (R.L. Ivy, T.E. Bilderback and S.L. Warren)

Excerpted from J. Environ. Hort. 20(2): 104-109.

Greenhouse Production

Rapid determination of nitrogen status in annual vinca. One method for increasing nitrogen use efficiency (NUE) is to apply fertilizers based on plant need. Currently the most reliable method for determining plant N status is by foliar analysis in a lab, but this may take 2-3 weeks so it doesn’t allow for immediate response to plant need. Data indicate that foliar analysis of vinca is highly correlated to sap nitrate levels determined rapidly with the Cardy nitrate meter. Foliar N (FN) determined with a LECO CN 2000 can be predicted by sap nitrate levels (SN) determined with a Cardy nitrate meter. FN sufficiency range for vinca is 3 to 5%. Based on these values, SN sufficiency range for optimal vinca growth would be 2100 to 6700 ppm NO₃⁻. Landscape professionals can use SN readings to rapidly and accurately diagnose the N status of their crop, instead of sending samples to a laboratory for analysis. (J.E. Atland et. al.)

Excerpted from J. Environ. Hort. 20(3): 189-194.

High-pressure sodium lighting for production of specialty annuals. Cutting response to high-pressure sodium (HPS) lighting varied considerably between species and cultivars, and showed the need for growers to trial each cultivar to check whether HPS lighting is effective. The absence of observed differences in initial quality of cuttings, and their subsequent rooting, may have been because the ambient light treatment was not low enough to affect stored carbohydrate level and internode elongation of cuttings. The primary effect of HPS in these trials was measured on cutting production numbers and overall fresh mass production, but cutting quality may be affected for other species, or under darker ambient light conditions. (C.S. Donnelly and P.R. Fisher)

Excerpted from HortScience. 37(4): 623-626.

Controlling hybrid lily height with preplant bulb dips of growth retardants. A-Rest, Bonzi and Sumagic were used on oriental hybrid lilies and on LA-hybrid lilies (hybrids resulting from crosses between easter lily and Asiatic hybrids). A one-minute dip of Bonzi (at 50 to 300 mg/L) or Sumagic (at 2.5 to 10 mg/L) was effective in providing height control. A disadvantage of preplant bulb dips is that they are applied well before the grower knows the need for height control, although tall cultivars will probably always benefit from growth regulations. Another effective strategy might be to use a low, partially effective dip treatment to reduce stem elongation at initial stages, and then apply foliar sprays as the crop develops. (A.P. Ranwala, G.Legnanai, M. Reitmeier, B.B. Stewart and W.B. Miller)

Excerpted from HortTechnology 12(3):426-431.

Reduction of leaf yellowing in seed and zonal geraniums using gibberellins. The development of lower leaf yellowing in seed and zonal geraniums when crops are tightly spaced on greenhouse benches can result in crops that are of undesirable quality and quite often unsalable. When applied to whole plants at 50 uL/L, GA₄₊₇ significantly reduced lower leaf yellowing in five cultivars of seed geraniums and two cultivars of zonal geraniums. However, increases in plant height and floral stalks were observed on the treated seed geraniums but not on the zonal geraniums. (S.S. Han and J.H. Benton)

Excerpted from HortScience 37(3):440.

Recycled newspaper reduces nutrient leaching from container-grown poinsettia. Recycled newspaper products (ground paper, paper crumble and paper pellets) were evaluated as nutrient filters in the bottom of containers.

Paper products in the bottom of containers reduce nutrient concentrations in container leachate. Recycled paper pellets and paper crumble resulted in less nutrient leaching and greater N retention than with ground paper. Paper crumble did not affect poinsettia growth or quality. Since recycled paper is inexpensive and readily available, it may provide a cost effective alternative to other BMPs for reducing nutrient runoff. (J.S. Glenn et. al.)

Excerpted from HortScience 37(3):516-519.

Field Production

Flowering of *Hydrangea macrophylla* cultivars. ‘All Summer Beauty’ and ‘Nikko Blue’ were among the best flowering cultivars overall in field plots in McMinnville, TN and New Franklin, MO. ‘Blauer Prinz’, ‘Blue Wave’, ‘Mariesii’ and ‘Todi’ flowered poorly in all 3 years at both locations. (S.M. Reed)

Excerpted from J. Environ. Hort. 20(3): 155-160.

Tree shelters increase growth and survival of trees under field conditions. Shelters had a significant impact on survival of field-grown trees, but not on containerized, nursery-grown seedlings. Overall survival was approximately 75 and 40% for sheltered and non-sheltered, field grown trees, respectively. Sheltered plants had approximately a 90% survival rate and non-sheltered trees exhibited approximately 80% survival in a nursery situation. Shelters appear to benefit field-planted seedlings by providing physical protection and shade therefore, enabling the tree to better survive stresses from ambient conditions. (D.H. West, A.H. Chappelka, K.M. Tilt, H.G. Ponder and J.D. Williams)

Excerpted from J. Environ. Hort. 20(2): 96-100.

Landscape

Cold hardiness of hydrangea. *Hydrangea macrophylla* ‘Endless Summer’, ‘Mariesii Variegata’, and ‘Veitchii’ acclimated later than all other cultivars. ‘General Vicomtesse de Vibraye’ acclimated first, and was cold hardy to 21 F by September 28, 2000. The greatest cold hardiness in all cultivars occurred on January 5, 2001. Maximum cold tolerance in all cultivars was within an 11 F range with ‘Endless Summer’ being the least cold hardy (0F), while ‘Dooley’, ‘Generale Vicomtesse de Vibraye’, ‘Mme.Emile Mouillere’, and *H. serrata* ‘Bluebird’ possessed the greatest cold hardiness (-11F) on January 5. Deacclimation in all cultivars began after the January 5 collection date. On March 1, 2001, ‘Ayesha’ and ‘Mariesii Variegata’ survived on 39 F while all other cultivars survived at least 21 F. (J.A. Adkins, M.A. Dirr and O.M. Lindstrom)

Excerpted from J. Environ. Hort. 20(3): 171-174.

Red maple cultivars’ performance under drought conditions. This study demonstrated greater drought resistance in *Acer rubrum* collected at a dry site vs. a wet site. The authors believe the range of drought tolerance currently found in commercial cultivars may not represent the full range of drought tolerance within the species. The authors recommend ‘Northwood’ and ‘October Glory’ as the best performing cultivars among those evaluated for dry planting locations. Tested cultivars included: *Acer rubrum* cvs. ‘Northwood’, ‘October Glory’ and ‘Autumn Flame’ and *Acer x Freemanii* cvs. ‘Scarlet Sentinel’, ‘Morgan’ and ‘Armstrong’. (M. Reaves, T. Whilow and J. Comstock)

Excerpted from HortScience 37(3):438.

Turfgrass

Turfgrass quality of species and cultivars maintained in shade. In 1992, a cultivar trial was initiated in Columbus Ohio to evaluate differences in establishment and long-term performance of cultivars of tall fescue, creeping red fescue, chewings fescue, hard fescue, Kentucky bluegrass, rough bluegrass and perennial ryegrass under low maintenance conditions in a shaded environment. Fertilizer and irrigation were applied until 1994 to establish the grasses, after which no supplemental irrigation, or pesticides were applied and fertilizer rates were reduced to 1 lb N/1000 sq. ft./yr. Percentage cover and overall quality data were collected in 2000 and compared with data collected in 1994. Initial establishment success does not appear to be a good predictor of long-term success of a cultivar in a shaded environment. There was some variability in cultivar performance under shade within a given turfgrass species. The tall fescue cultivars, as a group, had the highest overall quality and percentage cover under shade followed by the fine fescues, Kentucky bluegrass, rough bluegrass and perennial ryegrass cultivars. (D.S. Gardner and J.A. Taylor)

Excerpted from HortTechnology 12(3):465-469.

Using a PGR to restrict shoot growth and prolong stand density of ‘Meyer’ zoysiagrass. Trinexapac-ethyl (TE) is an effective anit-gibberellic acid type plant growth retardant (PGR) that reduces shoot growth of turf. Monthly applications of TE at 96g/ha a.i. increased tiller density in full sun and under 77% shade. Shoot growth was reduced and the loss of quality under 77% shade was delayed with TE treatment. These results indicate that

TE application can be an effective management practice to increase ‘Meyer’ zoysiagrass persistence in shaded environments. (E.H. Ervin, C.H. Ok, B.S. Fresenburg and J.H. Dunn)

Excerpted from HortScience 37(3):502-505.

Insects

Resistance among maples to bagworm feeding. Feeding injury by native bagworm caterpillars has been reported on at least 128 host plants and can cause aesthetic or economic injury on many deciduous and evergreen ornamentals. Resistance among plant genera or species to bagworms is not well understood. Laboratory and field assays of economically important or common landscape maples indicate that significant levels of resistance to bagworm feeding exist. Assays showed that paperbark maple (*Acer griseum*) and trident maple (*A. buergerianum*) were resistant to bagworm feeding. ‘Autumn Blaze’ Freeman maple, an *A. rubrum* x *A. saccharinum* hybrid, showed moderate resistance. In landscapes with a history of bagworm infestation, susceptible maples can be scouted for bagworm bags in early summer, after larvae have dispersed. Early diagnosis of larval activity will help landscape managers prevent aesthetic injury to susceptible maples. (W. E. Klingeman)

Excerpted from J. Environ. Hort. 20(3): 138-142.

Elm leaf beetle preference among American, European and Asian elms. Feeding studies revealed that the North American cultivars of *U. americana* ‘Jefferson’ and *U. americana* ‘Valley Forge’, *U. americana* (diploid form) and *U. americana* were the least preferred for feeding and reproduction by the elm leaf beetle. Among simple and complex European hybrids, ‘Homestead’, ‘Patriot’, and ‘Prospector’ were

least preferred. Hybrids of ‘Pioneer’, and ‘Regal’; the simple Asian hybrids of ‘Cathedral’ and ‘New Horizon’; and *U. pumila* were more highly preferred for feeding and suitable for reproduction. (R. Miller and G. Ware)

Excerpted from J. Environ. Hort. 20(3): 148-154.

Acoustic detection of black vine weevil. Tests were conducted in laboratory and field environments with natural and artificial infestations of black vine weevil in containers with different nursery plants to determine whether the larvae were large enough for acoustic detection during late fall when scouting for infestation often occurs at commercial nurseries. The rootballs of tested plants were examined to verify the presence or absence of larvae. All of the containers rated at *high* likelihood of infestation contained black vine weevil larvae (29% of those tested). No larvae were found in any containers rated at *low* likelihood of infestation (20%). Sporadic sounds were detected but failed to exhibit periodicity suggestive of infestation in 51% of containers (rated at *medium* likelihood). Fifty seven percent of these *medium*-rated containers were infested. Experience with the acoustic system in field environments suggested improvements in user-friendliness and robustness that could improve its utility for early detection and targeting applications in commercial nurseries. (R.W. Mankin and J.R. Fisher)

Excerpted from J. Environ. Hort. 20(3): 166-170.

Control of Viburnum leaf beetle (*Pyrrhalta Viburni*). Viburnum leaf beetle is a newly introduced pest of viburnum (from Canada) that can cause considerable damage or death of the plant if left untreated. It is currently found in 52 counties in New York state is will likely become

widely distributed in the United States. Viburnum leaf beetle larvae feed for 5-6 weeks on recently expanded leaves, leaving only major veins when populations are high. Adults also feed on leaves and lay eggs on the undersides of young shoots. The most effective insecticide treatments in this study for controlling larvae of viburnum leaf beetle were soil applications of Merit at 5.6 oz/100 gal or Meridian at 6.3 oz/100 gal. (P.A. Weston, B.Eshenaur, J.M. Beird and J.S. Lamboy)

Excerpted from J. Environ. Hort. 20(2):82-85.

Soybean oil control two-spotted spider mites on burning bush. Summer sprays of soybean oil effectively controlled populations of two-spotted spider mites with minimum phytotoxicity to burning bush plants. A single spray of 0.75 or 1.0% or two sprays of 0.25 or 0.5% soybean oil gave effective mite control. Soybean oil did not greatly reduce predaceous mite populations. (A.L. Lancaster et.al.)

Excerpted from J. Environ. Hort. 20(2): 86-92.

Diseases

Evaluation of bactericides for fire blight control on crabapple. Over the three-year test period, Arimycin 17 21.2 W (streptomycin sulfate) gave consistent disease control in the fire blight susceptible crabapple cultivar 'Snowdrift'. Typically, fire blight damage on the Agrimycin 17-treated trees was minor. In contrast, Aliette, WDG, Phyton 27, and a dormant application of Kocide 101 77W, which are all registered for fireblight control on woody ornamentals, failed to protect crabapple from this disease. Also, the experimental fungicide fluazinam 500F demonstrated no activity against fireblight. (A.K. Hagan and J.R. Akridge)

Excerpted from J. Environ. Hort. 20(2): 93-95.

Biorational products evaluated for powdery mildew control on dogwood. Ajax^R was as effective as the fungicide Banner (propiconazole) and better than Cleary's 3336F (thiophanate methyl). When used with fungicide rotations, Equate^R, Armicarb, M-Pede, and Safer Soap were adequately effective for nursery production. Even though Palmolive was highly effective, additional research is needed to eliminate leaf injury. Since the household soaps are not registered as pesticides by EPA, additional research exploring the possible registration of Ajax^R and Equate^R is also needed. The greatest potential for a biorational production nursery production is as a component of an integrated disease management system that incorporates the judicious use of fungicides with rotation of biorational products. (M.T. Mmbaga and H. Sheng)

Excerpted from J. Environ. Hort. 20(2): 113-117.

Plant introductions

Magnolia zenii 'Pink Parchment'. The habit of *M. zenii* 'Pink Parchment' is conical-pyramidal. The main trunk is smooth and grey. Flowers are 50% larger than the species with purplish pink color in bud, opening white with a narrow pink central stripe that run from below the tip and becomes purplish-pink and triangular shape at the base. Fragrance is extremely sweet. 'Pink Parchment' has reproduced true-to-type from cuttings and is amendable to container production. Hardiness is in dispute with some authors listing hardiness to zone 9 and others listing hardiness to zone 5. The early flowers, though frost sensitive, are harbingers of spring. Scientists and breeders interested in scions for grafting or plants should contact Michael Dirr at the University of Georgia. (M.A. Dirr, J.A. Adkins, R.T. Olsen)

Calendar

September 26 – Educational Programs for The Green Industry. Landscape Design/Build & Grounds Management Tour, New York City. Visit several nationally recognized historical, commercial, and public horticultural sites in the Greater New York City area. Departure points: Paoli Pike Park n Ride (off Rt.202) and Plymouth Meeting Mall. Space is limited. Contact: Dave Suchanic, (610)489-4315. Registration forms and a more detailed program description are mailed about 5 weeks before most programs. <http://www.cas.psu.edu>

September 28 – Tree Spree Fair. Delaware Center for Horticulture. Saturday 10:00 a.m. – 2:00 p.m., Carousel Park, New Castle County. Tree plantings, nature hikes, liver demo's and exhibits. Celebration will be held rain or shine. Free and open to the public. Call (302)658-6262, fax: 302-658-6267. www.dehort.org

September 29–October 2 – Annual meeting. International Plant Propagators' Society, Eastern and Southern regions. Marriott Hunt Valley Inn, Baltimore, MD. Call:(860)429-6818 or (817)577-9272; e-mail ippser@earthlink.net or davidlmorgan@sbcglobal.net; Internet www.ipps.org

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

October 1 – Interior Landscapers Nite-Liter, Montgomery Co. Vo. Tech, Eastern Center for Arts and Technology, Willow Grove PA, 5-8 PM. Contact Warren Golf (610)690-2655.

October 10 – MD Nursery, Greenhouse & Cut Flower Nutrient Management Plan Writing Session. First general session will be held at the Patuxent River 4-H Center, 18405 Queen Anne Road, off US 301 South near Upper Marlboro. The session starts at 9 AM and runs until 3 PM. Contact Dr. John Lea Cox at (301)405-4323.

October 13 – Native Plants for Roadsides, Delaware Center for Horticulture, Sunday, 1:00 p.m. Susan Barton, extension specialist with the University of Delaware will show us her experiments with native plants on Delaware roadsides. We will be traveling by van - Please call for meeting place. Al Matlack (302)239-5383 by the preceding Monday.

October 15 and 17 – Integrated Landscape Management. Taught by Gordon Johnson and Susan Barton from 7-

9pm, Kent County Extension Office, Dover, DE Pre-registration required at (302)730-4000.

October 16 – Proper Tree and Shrub Pruning. Taught by Jay Windsor from 4-6pm, Research and Education Center, Georgetown, DE Pre-registration required at (302)856-7303.

October 16 – Educational Programs for The Green Industry. Pennsylvania Perennial Short Course, Eden Resort Inn and Conference Center, Lancaster. Contact: Alan Michael (717)921-8803 or Warren Goll (610)690-7676. Pesticide update credits will be provided. <http://www.pested.psu.edu/frame.html>

October 18 – Conference on Perennials for the Landscape and Garden Center Industries, Scott Arboretum, Swarthmore College, 500 College Ave., Swarthmore, PA 19081-1397. (Allison Necaie, tel. (610)328-8025; brochure available in June from Longwood Gardens, tel. (610)388-1000, x 507.

October 18 – “Fruitful Grafts: Planning Productive Partnerships”. AABGA Mid-Atlantic and North-East Regional Meeting, Brookside Gardens, Wheaton, MD. Contact Ellen Hartranft at (301)962-1421 or visit us at www.brooksidegardens.org

October 21-25 – Fall 2002 Horticulture Short Course, Montgomery County 4-H Center, Creamery, PA. 9-4 PM each day. Register for any one or all 10 courses. Contact Mary Concklin (610)489-4315.

October 22 and 29 – Disease Identification and Control for Landscape Plants, taught by Bob Mulrooney from 4-6pm, Kent County Extension Office, Dover, DE Pre-registration required call: (302)730-4000 or (302)831-2531.

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

October 27-30 – International Research Symposium: “Invasive Plants: Global Issues, Local Challenges.” Congress Plaza Hotel, Chicago. School of the Chicago Botanic Garden, 1000 Lake Cook Rd., Glencoe, IL 60022 (K. Havens, Director, Institute for Plant Conservation Biology, khavens@chicagobotanic.org; L. Jones, Manager, Continuing Education, ljones@chicagobotanic.org; registrar service, tel. (847)835-8261).

October 28 – Proper Tree and Shrub Pruning. Taught by Susan Barton from 4-6pm, UDBG, Newark, DE. Pre-registration required at (302)831-2531.

November 8 – Dance for Plants Auction, Delaware Center for Horticulture. Time 7:00 p.m. – 11:00 p.m. Annual silent auction, Dance for Plants. Auction features unique plants, garden art and ornaments. For more information call (302)658-6262, fax: 302-658-6267, www.dehort.org. Cost \$25 per person in advance; \$35 at the door.

November 12 – MD Nursery, Greenhouse & Cut Flower Nutrient Management Plan Writing Session. Follow up to first general session to be held at the Carroll County Extension Office in Westminster, MD. Contact Dr. John Lea Cox at (301)405-4323.

November 13 – Hanson Lecture: “The Artist in the Garden: Documenting Plants Through Images in Arts and Crafts”. Delaware Center for Horticulture. Evening filled with garden history, culture and renewed interest in heirloom plants. Reception following the lecture. Advance registration recommended. Please RSVP by November 4. (302)658-6262, fax 302-658-6267, www.dehort.org. Members: \$9/nonmembers \$14.

November 13 – MD Nursery, Greenhouse & Cut Flower Nutrient Management Plan Writing Session. Follow up to first general session to be held at the Patuxent River 4-H Center. Contact Dr. John Lea Cox at (301)405-4323.

November 14 – Ornamentals and Turf Workshop, Hockessin, PA. Contact Valann Budischak 888-448-1203.

November 14 – MD Nursery, Greenhouse & Cut Flower Nutrient Management Plan Writing Session. Follow up to first general session to be held at the Wye Research and Education Center on the Eastern Shore near Queenstown. Contact Dr. John Lea Cox at (301)405-4323.

November 21 – Streams and Structures: Stream Restoration and the Built Environment, Villanova University, Villanova PA. For information call (215)247-5777 ext 156 or 125 or email ilm@pobox.upenn.edu

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.

