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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.

As I sit at my computer trying to decide how I want to begin my quarterly letter to our many devoted members, I can only help but to shake my head in wonder. Here we are on the threshold of another spring – the most pivotal season to most of our members. Yet we also sit on the threshold of a possible drought. Many of our neighboring states are in various stages of a drought (i.e. watch, warning, emergency). The DNLA, in conjunction with PGMS and the DSGA Green Section, have been working diligently throughout the past year to review and refine the Green Industry Document. We've also been actively attending Water Supply Coordinating Council meetings, and meeting one-on-one with Stuart Lovell of DNREC; Gerry Kauffman, Water Coordinator; and Andrea Kreiner, Policy Advisor to Gov. Minner to ensure that our industry's needs are heard and addressed. We'll keep you posted. In the meantime, pray for a wet spring.

The Delaware Horticulture Industry Expo was held January 16th & 17th at the Modern Maturity Center in Dover. The first day gave us the opportunity to hear such speakers as Cole Burrell and Stephanie Cohen. Their slides and discussion got everyone motivated and excited for the upcoming planting season. The second day of the DHIE was merged with the Annual Delaware Pesticide Conference. Everything went smoothly despite it being our first year together. More than 400 participated the second day. It was exciting to see so many people in our industry in one location!

Our 2001 Landscape Award winners were honored at the DHIE. They are as follows:

Tony and Terry Lemper of Lemper's Landscaping, Inc., Newark, DE - <\$10,000 category

Chris Valenti of J.B. Landscaping (USA), L.L.C. - >\$10,000 category

Congratulations to our winners! **We encourage any member to submit an entry for our 2002 Landscape Awards.** Please keep this in mind throughout the upcoming season. In response to our members' requests, the board of directors made a change in the requirements for the award. Landscapes no longer have to be in the state of Delaware. However, they must be designed and installed by a current DNLA member in the past 24 months. More information will follow later in the summer.

We are currently in the process of reviewing grant proposals and awarding funds from our Research & Education account. I'd like to offer a special thanks to The Sterling Nursery for their very generous gift, as well as the many other members that consistently support this worthwhile fund. The purpose of the fund is to subsidize research and educational projects that are of interest and benefit to the horticulture industry in the state of Delaware.

Mark your calendars! August 21st is the date that has been set for the Summer Expo and Annual Golf Tournament. Garrisons Lake Golf Club will once again host the festivities. More information will follow.

Welcome New Members:

Delaware Veterans Memorial Cemetery

2465 Chesapeake City Road
Bear, DE 19701-2344
(302) 834-8046

Green Lawns

437 Blue Heron Road
Dover, DE 19904
(302) 674-8850

Sleepy Hollow Lawn Care & Landscaping, Inc.

Sleepy Hollow Farm
1057 Bayview Road
Middletown, DE 19709
(302) 378-2582

Graphics Unlimited

113 North James Street
Newport, DE 19804
(302) 994-4433

Garden Escapes LLC

24 Meteor Court
Newark, DE 19711
(302) 239-7353

Anne Berry

2 Grand Teton Drive
Bear, DE 19701
(302) 593-4049

Arbor Glen Nurseries, Inc.

P.O. Box 135
Cochranville, PA 19330
(610) 857-9810

FROM THE PRESIDENT

Bruce Paulish

Delaware Nursery and Landscape Association

Welcome to the DNLA. I would like to introduce myself as the new President of the DNLA for 2002/2003. I am married with three kids and one on the way, due in early Sept. I am the owner of Paulish's Landscaping Co. We are based out of the Smyrna/Dover area and service the whole state. We are a full service company, in operation since 1994, and strive towards commitment in the industry. Thank you to all the people who work so hard getting the information out that helps keep my company moving forward, like the DNLA, U of D, Extension Service and others.

The Board, which meets once a month to discuss many issue that affect everyone in the nursery and landscape business, is currently working on events and projects that I believe will educate us even more. We can never have enough learning power to run a business. I thought the DHIE show this year was great. It was nice to see most of the Ag industry in attendance. And great to see a lot of faces and have so much information under one roof. Thank you for your support. Also the Plant of the Year is soon to be out, so stay tuned . . .

And on a final note, I have been on the board for many years now and I want to thank all those I have met and those I will meet in the future; a special thanks to Valann Budischak who has greatly improved the DNLA. As always if anyone has any questions or comments on functions provided by the DNLA, please call Valann or myself. With your comments, the DNLA can grow to better serve our members.

U of D NEWS
Susan Barton
Extension Specialist

Once again, I was able to attend a truly fabulous ANLA Management Clinic. I came home brimming with good ideas. Look for two American Nurseryman articles this spring, plus I've covered a bunch of good ideas below:

Brian Minter, Minter Country Garden - Selling "the experience." Brian Minter wanted to have a water garden at Minter Country Garden so he arranged to have one installed. He called it a workshop, charged \$100 each, hired a water garden expert as the instructor and had 15 people spend all day learning to and actually installing a water garden. These 15 workshop participants can now install their own water gardens but more importantly they feel a sense of ownership to the pond at Minter Country Garden. And guess where they come to purchase supplies?

Here's an idea—How about "Birchwood trees." There are gemstones for every month. What if you established a tree for every month, such as January-oak, February-maple, March-dogwood, etc. Develop a nice point-of-purchase poster and encourage customers to celebrate births and birthdays by planting the appropriate tree.

Many garden centers have Halloween mazes. But at Minter Country Garden they surrounded their maze with black plastic. It was just a little spookier!

George Tomlinson, Tell Us About Us, Inc. – Customer Feedback. Dave Thomas, Wendy's famous CEO said, "Exceed expectations to get loyalty." But how do you know what your customers' expectations are unless you ask them. Soliciting customer feedback is an important part of any business. You must

discover how your customers see you.

Let's start with an appropriate greeting. Use a greeting that requires more than a yes/no answer; a greeting that starts a conversation. Tomlinson conducted a study at a craft shop in Winnepeg. When the sales person used no greeting, sales remained static. When the salesperson asked "Can I help you?" sales decreased. And when the salesperson used an appropriate, conversation prompting greeting, sales increased by 10%. Salespeople should follow the three-second rule—make eye contact and smile within three seconds of a customer entering the store. Eye contact shows that you know the customer is there and you are available to help when they need you. When customers ask about a product, never point to its location—take them to it!

Customer feedback requires answers to three main questions—Who are your customers? Did they find what they wanted? And are they coming back?

You can get feedback in a variety of ways. Talking to customers is the simplest method, but it requires the development of key questions so all employees know what to ask. Good salespeople can work those questions into a natural conversation. Comment cards can be placed in every customer's bag. Use a pre-stamped response card to increase the likelihood of responses. Telephone surveys should be short and you may want to offer a gift (to be picked up at the store) for completed surveys. Websites with feedback buttons will help you collect information from one segment of your market. Exit interviews are a great way to collect feedback from customers. They are time consuming, especially since they should be conducted during your busy season. A local college or university might have students who could conduct surveys as a class project. Mystery or secret shoppers can be hired to

evaluate your store. Technology is available to collect and maintain detailed information on customer purchases with a loyalty card.

Let's get back to our three main questions:

Who are your customers? You should know the age, income, education level, sex, retirement status, home ownership (how recent), and location (zip code) of your customers. Age and income may be difficult to ask, especially in a face-to-face survey, but can often be ascertained indirectly by home location.

Did they find what they wanted? Ask about the selection/varieties. Did they have trouble finding merchandise? Was the store laid out conveniently? Was it tidy and clean?

Are they coming back? Value can be described as a triangle with service, quality and price as the three corners. You can ask customers to rate the service they received, the quality of the product and their perceived value. It is best to use a scale of 1 to 5, with 5 as outstanding, 1 as poor and 2-4 as in between (with no words assigned). Be sure to leave a space or ask for comments. It does no good to know that service was rated poor, if they don't explain why they gave a low rating. Service, quality and value will provide a clue about whether or not a customer plans to come back, but you can also simply ask--Will you come back? or Will you recommend us to a friend?

Once you have customer feedback, what do you do with it? It is important to track all customer feedback. If the feedback requires action, such as complaints on a comment card, do it immediately (within 72 hours for comment cards). Remember, a complaint is opportunity to turn around a bad situation. Develop a complaint policy so every staff person knows how to handle complaints efficiently and effectively. Finally, keep asking. Customer

feedback is more valuable when measured over time so you see how the changes you implement affect your customers.

Dave Thomas says, "Never forget your customers and never let your customers forget you." Collecting customer feedback keeps you in tune with your customers.

Ken Charbonneau, Color Marketing Consultant – Creating Color Magic. What is the number 1, most important factor affecting customer selection of any product? You guessed it—color! And it is not just color, but color combination. There are really no new colors, but there are new technologies that allow us to combine old colors and use them in new ways. Popular colors and color combinations are influenced by people, foreign affairs and designers explorations. Yes, September 11 was a huge influence on the world of color resulting in the need for healing colors. People respond to colors that show spirituality. Eastern influences are strong in color this year. Colors can't appear artificial or chemically made; people want real, natural colors.

There are three types of customers—the person-of-the-moment, the wait & see person and the traditionalist. The person-of-the-moment wants the newest, the latest, and the trendiest colors. They want to be the first to try new products and new color combinations. Wait & see customers will try new colors once they have been accepted and traditionalists will never change. Red geraniums and white petunias will satisfy their needs every year!

Next, Ken Charbonneau shared his color boards for 2002. Each board represents a color type and/or combination that will be popular during the next year (or more).

- Metallics – gold, silver, copper; these sleek, light-reflecting surfaces are

luminous; water features and reflecting balls can bring metallics into the garden

- Blue –Chinese export blue is the color for 2002
- Purple-violet – these play a supporting role; they make the rest of the palette look good. Small quantities provide a spiritual component. They are a split compliment with yellow greens like celadon and sage, which give a sense of history and time. (But don't ever use the word purple!)
- Pink and magenta – also work well with yellow green
- Red – traditional reds like burgundy (call it cranberry for pizzazz) or even red-red if you want an attention getter—not for the faint of heart
- Peach and orange – orange tulips and roses are very popular; when you let down orange, it becomes peach (or coral)
- Earth-related colors – deeper, darker colors are returning. The three neutrals in the landscape industry are white, green and brown.
- Whites – convey purity, healing and spirituality; but there are many shades of white
- Yellow – this is a love/hate color. Yellow and white make a good combination and yellow ages to gold, while white ages to off-white.
- Black and white – classic
- Dark greens – this green is more on the moss green side. (Traditional forest or hunter green is too blue to go with the popular yellow greens.)
- Blue green – turquoise evokes a native American sentiment
- Pales – light colors

Here are some more color tips:

1. Improve lighting conditions within the store to improve the effect of color.
2. Show customers how to combine colors in preplanted containers.
3. When two colors clash, they can often be used together for a vivid effect if separated by a neutral barrier like white, black, brown, green or sage.
4. Use black or dark green pots to place the emphasis on the plants.
5. When you move interior colors outdoors, add grey to tone them down.

Have fun with color and help your customers enjoy color too!

A central theme present at the 2002 Management Clinic was--retailing with entertainment. Brian Minter talked about 'retail-tainment.' He suggested re-inventing your store to make it a neat place to visit. Be hilarious, wild—anything goes. The outside of the store should look like an interesting place to visit and once customers walk in—don't disappoint, hit their senses with color, sound, fragrance, even touchables and edibles.

Chris Ohlinger spoke about emotional retailing. In 2001, 38% of shoppers made a decision about where to shop based on emotion, rather than rational factors. In any industry, the high performing stores don't look like the regular stores. They offer great interactive experiences. No one bought Cracker Jack for its delicious taste—we bought it for the surprise inside (the mystery). How about a plastic card for kids allowing them to collect a surprise at each department? Involving employees is critical for emotional retailing. Over 60% of customers most enjoyable shopping experiences are related to employees. And over 70% of their least enjoyable shopping experiences are related to employees. Make it fun for employees to give great service.

MERCHANDISING TECHNIQUES TO INCREASE YOUR PROFITS

John Stanley

The following article is summarized from a talk given by John Stanley at the 2002 ANLA Management Clinic.

Stanley started by making the point that we are all in the “business of change.” He referred to a book by Larry Downes and Chunk Mui entitled “Unleashing the Killer App.” A killer app is an invention that changes the way we live our life. Thousands of years ago, the wheel was a killer app. In the 20th century, the phone, TV, car and airplane were all killer apps. Now, change is coming so rapidly there were 25 killer apps developed last year alone. On the other hand, nothing is changing—retailers have always been in the entertainment business.

Stanley showed how all businesses develop along a sigmoid curve. Everyone loses money at first and then begins to grow. If you don’t change, eventually the business will peak and begin to decline. The trick is to reinvent yourself before you peak to keep climbing consistently.

Sigmoid Curve of Business Development

Inevitable
downturn

Reinvent
yourself here

Loose \$
at first

Seventy percent of a customer’s buying decision is based on what they see, another 20 percent on what they hear. The final 10 percent comes from what they feel and smell. Effective merchandising helps ensure your customers see and experience more of your store.

Customers are greatly impacted by their first impression of your garden center. It only takes about 10 seconds to make that impression based on a series of “moments of truth.” Those “moments” include the view into the garden center, entering the garden center store, the first product a customer sees and their first interaction with an employee. Those “moments” should reflect your carefully crafted garden center image. Customers also remember their last impression, so the area around the checkout counter is also critical.

Your layout should be designed so that 100 percent of your customers see 100 percent of your products. In the US people turn right upon entering a store and usually proceed counter clockwise. And people need space to shop. Typically 40 percent of the floor space can be allotted to product on display and 60 percent must be reserved for aisles and space to shop.

Merchandising is about the products themselves. Stanley divides products in to Known Value Products (KV) and Non-Known Value Products (nonKV). There are only a maximum of 12 KV products in any industry. These are the products whose prices are known and can be easily compared between outlets. Bedding plants and potting media are common KV products in garden centers. You do not have to beat your competitors’ prices on KV products, but you must be in the ballpark. You can charge up to 10% more for KV products if you provide extra service.

KV products are also often “purpose” products. These are products a customer is seeking, they

are the reason for the visit in the first place. Eggs and bread are purpose products in a grocery store and merchandisers use those products to promote “bounce merchandising”—hitting all four corners of the store. Purpose products can be displayed with less surrounding space since they don’t require much consideration. Think about placing bedding plants near the back of the store and trees up front. Would more people consider a tree purchase and would all those people who come in for petunias see more of your store?

Browse products require more space. Customers spend time considering their purchase of browse products. Impulse products must be displayed in high traffic locations because they are only purchased when they are stumbled upon. We should do more product linking through display. Put categories together as the customer sees them. How about a “breakfast aisle” in the grocery store that sells both cereal and grapefruit?

On the product shelf, premier space lies between the chin and belly button. Product facing is the width of the product on the shelf. It should be approximately equal to the height of the product (with a minimum of 3 and a maximum of 11). Indenting is removing an item every 4-5 feet so customers are comfortable when they remove an item. Product range refers to the quantity and selection you offer. Garden centers should be deep and wide on plants, but shallow and narrow on hardgoods. There may be fourteen different slug control products, but you are the expert. Help your customer by offering three options—the cheapest product, the organic product and the best product.

Make shopping easy for your customers by keeping the language simple. Scotts found that sales increased when they changed their product heading from “insecticides” to “bug control.”

Stanley recommends two types of product signs. KV products only need the name and the price—that’s all the customer needs to know. Non KV product signs should include the name, three benefits (no more), the price and a “throw away line” at the bottom to get attention. Ten percent of your products should be promoted in signs. Use shelf talkers with “our best seller.” Customers want to know what you and your team are recommending. It gives the customer a starting point if they are unfamiliar with the product.

The following is a recommended strategy for managing slow moving merchandise. First, buyers must understand both the products and the market to buy effectively. But, everyone makes mistakes every once in a while. Here’s the plan:

Set a goal for each week during the selling season (10 weeks) and track numbers actually sold. If you don’t meet the sales goal on a product for the week make the following changes:

- Wk 1 change one merchandising strategy
- Wk 2 change one merchandising strategy
- Wk 3 change one merchandising strategy
- Wk 4 change one merchandising strategy
- Wk 5 change one merchandising strategy
- Wk 6 change financial strategy
- Wk 7 three for the price of 2
- Wk 8 reduce gross profit
- Wk 9 sell at cost
- Wk 10 remove from shelf

Power displays are located in the best selling locations in the store --4 steps inside door; 4 steps into outdoor sales area (OSA); or 4 steps back inside from OSA. They are used for one-product promotions. Change power displays as frequently as the shopping regularity of your best customers. Customers want the store to appear to be changing, but they still want to be

able to find products they are looking for. The best way to give the appearance of change is by changing power displays. Keep power displays full, giving the impression of having a lot of available product.

A “dump bin” is a display unit located in the main traffic flow that is used to promote one product by displaying it in a “dump” arrangement to give the impression that it is a price motivated promotion. Use price signs to highlight a price special. Keep dump bins looking full all the time and never use a dump bin for more than one month.

A cross merchandise display combines at least two allied products to encourage the purchase of both. Use signs that clearly link the products and use encouraging phrases like “Remember you’ll need . . .” or “Secrets of Success.” Make cross merchandise displays topical and seasonal with at least one cross merchandise promotion in each department.

Displays at the check out counter are the “mars bars” of your business. These are impulse items that customers do not plan to purchase. One-third of the average sale is the price ceiling for a counter display item. Sell no more than three products on a single counter display.

Build special displays overnight. Customers want to see the magic, not the mechanics. If your display is too complicated for overnight construction, use a black cloth barrier with a sign that says “All will be revealed in _____.” Great displays are created when the boss sets the budget and allows the team to do the rest.

John Stanley closed with the quote “A sign of insanity is to do exactly the same thing but expect a different result.” Dare to be different. Reinvent your business before you need to and provide the theatre that keeps customers coming!

INVASIVE PLANTS / EVASIVE ANSWERS

Steve Castorani, Gateway Garden Center and North Creek Nurseries

Recently my County government adopted an ordinance banning the use of invasive plants. Many are commonly grown and sold by the nursery industry. They are not banning the sale of these invasive plants, just their use in new landscape projects. Not all of these are your Kudzu variety invasive plants. Some are sold at garden centers and used by designers, landscape companies and homeowners. Some are even planted around County buildings. This ordinance came as a big surprise to the State Nursery and Landscape Association. As the nursery representative assigned to the State Invasive Species Council, I was invited to participate in the creation of a policy for the identification and control of invasive plants in the State. Many plants deserve to be on that County list, but why were plants like, *Berberis thunbergii*, *Ilex crenata*, *Pachysandra terminalis*, *Styrax japonica* and other commercially available plants on it? These plants were never mentioned at meetings. We were not informed a County list had been adopted. Was this really happening? Had we been deceived?

Not exactly.

As it turns out, different levels of government can act independently. The County, pro-actively imposed it’s own list of invasive plants without consulting State or Federal Agencies, or our Association. It seems invasive species lists are being created and adopted at will. During a meeting with County officials we were able to explain our views. They agreed that they might have acted prematurely in placing so many common ornamentals on the list. It just goes to show that you can never be too prepared.

I'm all for prohibiting the sale and use of known invasive plants. I feel it is the responsibility of the nursery industry, in cooperation with state and federal officials to identify known invasive plants and discontinue growing and promoting them. This process is taking place across the country.

In the meantime, don't take the attitude this won't happen in your backyard. I urge all nursery trades' people to get involved. Not only on the federal and state levels but also in your cities, counties, townships and communities. Promote good plants and advise people of alternatives to the plants that may be targeted as invasive. Foremost, be aware of legislation on all levels that could affect your industry and livelihood.

LIVERWORT AND PEARLWORT MANAGEMENT

Dick Bir, North Carolina Extension

Many of you are trying to control the primitive plant called Liverwort . . . what you have is probably *Marchantia polymorpha*. In regularly moist areas, particularly in propagation, this weed can become a real problem.

There is a website for Liverwort and Pearlwort management that has been very active recently. A lot of experience sharing has taken place. If you would like to be part of this listserve, contact Sven Svenson at Oregon State. Sven.E.Svenson@orst.edu

Sven's most recent (1/10/02) posting said, "The thallus of the *Marchantia* has started growing again here at the NWREC. This growth response may be in response to the daylengths starting to get longer. This is the time of year to completely clean-up all deciduous materials. For any evergreen plants, just-potted cuttings or seedlings, or plants potted into community pots from tissue culture, be very careful with your rates. Test first; never assume the rates used by someone else are safe on your plants.

As a rule, use only products with proper labels for your crops, and follow and comply with all label instructions.

For deciduous perennials and container-grown shade trees, this is a good time of year to use products like CinnaMite, CinnaCure, Safers Insecticidal Soap, TerraCyte, Timsen, Physan, Phyton-27, nearly any sanitizing product, and the various home-brews that folks use like acetic acid (vinegar - there are products with correct labels). With no green leaves on the plants, there is very little to no risk of phytotoxicity from the use of these products at label rates. At this time of year, the higher rates can be very effective on *Marchantia* populations. We have

had good success with bacterial hand soaps containing the active ingredient Triclosan. There can be a certain satisfaction in seeing the green thallus turn black!

It is VERY IMPORTANT to get rid of all the Marchantia before April. In May and June, the Marchantia will start to produce its fruiting bodies (call them flowers if you like...but they are more like mushrooms than flowers). Once the Marchantia is in the fruiting stage, it seems to be more resistant to chemical controls. Thus, it is important to get eradication completed before 'flowering.' Also, the 'sporocarps' or flowers release more spores that will simply re-infect your crops, so it is important to eradicate the weed before it can propagate itself by airborne spores. Finally, there are fewer gemmae cups on the plant at this time of year...so it is less likely to be spreading by splashed gemmae. If your plants are under solid cover for the winter, there should be little or no raindrops or irrigation water drops available to splash gemmae around. Thus, this is the time of year when the Marchantia life cycle is most susceptible to control.

Don't forget to cruise your driveways, walkways, landscaped areas and property perimeters. Eradicate the Marchantia when and where you see it.

Consider the growing media and fertilization practices you will be using as you pot-up plants this spring. Can you make any adjustments to help discourage Marchantia growth? What preemergent herbicides can you use on your plants? Do any of these have any activity on Marchantia? How soon after potting can you apply the herbicide?

Sven is in Oregon. Conditions differ there. Labelling of chemicals may differ here. Please be sure to read the label before making any applications.

BLACK VINE WEEVIL
Ed Lewis, Virginia Tech
Department of Entomology

The black vine weevil is a serious insect pest in landscapes, nurseries and greenhouses throughout much of the northern United States and Canada. This insect attacks over one hundred different plant species, and is commonly found damaging rhododendrons, astilbes, hostas, hollies, etc. Virginia is near the southern edge of this insect's range in the US. As anyone knows who has tried to manage a nursery with a black vine weevil infestation, these insects are extremely persistent once they are established. The best defense against them is to avoid buying contaminated plants. The weevils don't fly, so the only way they move from nursery to landscape, is via transport of infested material. They have been extremely successful in moving this way. Consider that they are of Northern European origin and were first found in the US in the mid-1800's. Since then, they have been spreading throughout the northern US and Canada.

Black vine weevil infestations are sometimes overlooked because the larvae are in the soil and the adults are strictly nocturnal. The most common indication of a black vine weevil infestation is the typical adult feeding pattern of notching the margins of leaves. The larvae, which are white and legless, are found in the soil of pots or landscapes and will not be seen unless you dig them up. The larvae feed on roots and can kill plants whereas the adults' damage is aesthetic in most cases.

We have established that feeding and egg-laying are cyclical in nature for black vine weevils, and we have monitored the duration and the periodicity of these cycles. When the weevils first emerge, they feed but do not lay eggs. After about 3 weeks, their feeding rate drops significantly and they begin to lay eggs. These

behaviors continue through several 2- to 3-weeklong cycles. Each weevil (they're all females) can produce several hundred eggs throughout her lifetime. Typically, adult weevils are thought to emerge in mid-May, so egg laying would begin in early June for most weevils. However, some adults live through the winter, which means that some proportion of the adults (which is yet unknown) that are seen in the spring are actually more than a year old. Hence, their cycles might be differently timed. There is another complication; we doubt that all adults really appear in May or June. It is likely that adults emerge throughout the summer.

The management implications of this information are significant. Current recommendations state that for best results, foliar insecticides that target adults must be applied within 3 weeks of first noticing black vine weevil adult feeding damage. This timing is intended to prevent the weevils from living long enough to produce eggs. Now we know that in addition to killing the weevils before egg production, pesticide application must be timely because the weevils' feeding rate decreases after the first three-week period. Most of the insecticides that target adults are stomach poisons, and so must be eaten to be effective. To avoid wasting insecticide, it must not be applied during the egg-laying period when the adults are not feeding. It appears that these cycles of feeding and egg laying become less predictable as the season progresses, either because as the weevils age they become less synchronous, or because new weevils emerging throughout the summer are on cycles that do not coincide with the cycles of the weevils that emerged in the Spring. It is likely that both of these factors complicate black vine weevil timing.

The black vine weevil is actually one of a group of root weevil species. This is not news to folks in the Pacific Northwest, where root weevil

problems abound in nurseries, but here we tend to think that any root weevil that we find is the black vine weevil. Perhaps the most disturbing fact here is that we don't really know how many of these species are currently residing in Virginia. I have not found any of the other species of root weevils, but that does not mean that they are not here.

Why do we care which and how many root weevil species we have in Virginia? The weevil species' life cycles are differently timed. Some species lay eggs all summer, some species lay eggs only one in the spring. Therefore, spray timing would differ among the species. Perhaps some current management techniques provide variable results because the infestation is not really the black vine weevil. When root weevil infestations are found, the pest management specialist should make sure of the weevil's identity. Those who have dealt with them before easily identify adult black vine weevils, but the other root weevil species will be unfamiliar.

The take-home message here is that the knowledge we have of black vine weevil biology is not adequate to develop effective IPM programs. We are trying to remedy that situation by our studies. We have found the specific holes in our knowledge that have led to what many would agree is ineffective control. Now we know what questions to ask, and we are continuing to address them. As always, the first step to effective IPM is information. The information that you can collect now is based on scouting often and keeping records of what you see. As our work progresses, I hope that we can provide an effective targeted IPM system for black vine weevils, and root weevils in general.

*Reprinted from VNLA Newsletter,
November/December 2001.*

USE OF NONSELECTIVE POST-EMERGENCE HERBICIDES IN NURSERIES AND LANDSCAPES

Jeffrey F. Derr
Weed Scientist, Va Tech

There are a number of situations where nursery workers and landscapers desire complete control of all existing weeds. These situations include turf renovation, site preparation prior to planting ornamentals, directed spray applications around established trees and shrubs, and general weed control around buildings and fences. There are several products available for this use and I have been evaluating them in my trials over the last few years. These chemicals are nonselective, meaning they will damage desired species such as turfgrass and ornamentals. These chemicals must be used with caution when applications are made near desired plants. The potential for damage to nontarget plants varies among this group of chemicals.

These herbicides are postemergence, meaning they are applied after weed emergence. They are absorbed by weed leaves, and to a certain extent, through stems and bark. These chemicals do not exhibit soil activity, desirable when one wants to plant the treated area soon after application.

An important distinction among these nonselective herbicides is whether they translocate (systemic action), or do not translocate (contact action only) in plants. When trying to control small plants of annual weed species, all of these chemicals will work since one does not need the chemical to translocate to the roots to control these plants. Thorough coverage of all weed foliage is necessary when using contact herbicides. However, obtaining complete coverage of all leaves and stems may be difficult when treating

large plants of an annual species. Annual grasses can sometimes be difficult to control with a contact herbicide since the growing point is generally protected. The growing point is generally much more exposed in broadleaf plants.

When controlling perennial weeds, one must kill the underground portion of the plant, as well as the above ground portion. If the roots, rhizomes or tubers are not completely controlled, perennial weeds will regrow from these underground structures. A systemic herbicide is therefore the chemical of choice when trying to eradicate perennial weeds.

Contact herbicides

There are several chemicals that fit this category. They include paraquat (Gramoxone Extra), diquat (Reward), and pelargonic acid/related fatty acids (Scythe). A newer chemical that I have been evaluating in this group is Burn-Out.

An advantage of these chemicals is a rapid effect on weeds. On certain species, such as woodsorrel (*Oxalis*), I have seen onset of injury symptoms within 15 minutes of application for Scythe and BurnOut. Damage from diquat and paraquat can be seen within a few hours of application on a sunny day. The trade-off that occurs with this rapid response from contact herbicides is not direct effect on the root tissue of perennial weeds.

These chemicals can be used for control of perennial weeds if multiple applications are made. When the top growth of a perennial weed is burned off with one of these contact herbicides, the weed relies on energy stored in root or rhizome tissue to regrow a shoot system. Repeatedly forcing a weed to regrow from its root system will eventually control these plants when the root reserves are depleted.

An advantage of this group is that drift of these chemicals onto the foliage of desired plants will cause spotting of leaves but no long term injury to the plant. New leaves that develop after exposure will be unaffected. Application to suckers of trees or shrubs will not lead to systemic damage within the plant.

Contact/systemic herbicides

A chemical that fits roughly half way between the contact and systemic group is glufosinate (Finale). This chemical does translocate to some degree in plants but the translocation is limited and may be species dependent. Glufosinate works more slowly than the contact group listed above. Injury symptoms develop within 1 to 4 days of a glufosinate application. Since glufosinate has some systemic action, it is more effective on perennial weeds than the contact herbicides. It is generally less effective on perennial weeds than glyphosate, a systemic compound.

Drift of glufosinate poses greater risk to non-target plants than contact herbicides. Since it only has limited translocation in plants, it poses less risk of systemic injury to desired plants than a systemic compound. For this reason, glufosinate has been used for sucker control in certain species.

Systemic herbicides

The chemical that fits this category is glyphosate, (Roundup Pro, Touchdown Pro, others). Glyphosate will translocate throughout plants, including the underground portion, making it the chemical of choice for perennial weed control. It is the slowest acting chemical in the nonselective postemergence group of herbicides, generally requiring 3 to 7 days for onset of injury symptoms.

People sometimes ask me why they see regrowth of certain perennial weeds, such as bermudagrass, about a month after a glyphosate

application. The answer is that even though glyphosate is systemic and will translocate into the rhizomes of weeds like bermudagrass, it is difficult to kill all of the underground buds on these rhizomes for a well-established stand of a creeping perennial. We will kill some but not all of the underground buds with one application. That is why we generally need two or three applications of glyphosate when trying to achieve complete eradication of a creeping perennial weed. Keep this in mind when trying to eliminate creeping perennial weeds in a site prep operation. Allowing for multiple applications of glyphosate will result in much better long-term control of aggressive perennial weeds.

Since glyphosate is systemic, however, it poses a hazard to non-target plants. Drift of glyphosate onto foliage of desired trees, shrubs or turf areas could result in severe injury. One can reduce this potential for injury by using shielded sprays or wiper applications.

Combinations

When evaluating perennial weed control with these chemicals, effectiveness differs over time. When evaluated one day after application, the contact herbicide will be most effective. When evaluated one week after application, glufosinate will generally be the best performing treatment. When evaluated one month after application, glyphosate will generally be providing the best control. To address this issue, people have tried various combinations of these herbicides.

One wants to avoid combining a contact herbicide with a systemic one in most situations. The rapid action from the contact herbicide will limit translocation of the systemic compound, reducing its effectiveness. Although adding the contact herbicide will speed up injury symptom development compared to the systemic herbicide applied alone, regrowth of perennial

weeds will occur much quicker than if the systemic herbicide was applied alone. Some people have investigated adding a small amount of a contact herbicide to a systemic one. I evaluated one such treatment this year. The objective is to have the client see some quick results, without adversely affecting long term control. Additional research would be needed to determine if this is feasible.

Another combination that some people have told me they use is a mixture of glufosinate and glyphosate. The concept here, as well, is to combine the faster action of glufosinate with the greater perennial weed control from glyphosate. In my limited research in this area, I have not seen a benefit to combining these two chemicals. However, there may be situations where this combination could be useful. There are some weeds, like cutleaf evening primrose and dayflower, where glufosinate is more effective than glyphosate. If these weeds occur in a mixture with perennial weeds, a combination of these herbicides may be more effective than either applied alone.

Choice of chemical

An understanding of weed life cycle will assist one in choosing the appropriate nonselective herbicide for a given site. Double check the proximity of desired plants to the area being treated. This may determine chemical choice and/or application method. Keep these chemicals off the foliage and bark of desired trees and shrubs. Check for regrowth a few weeks after application as retreatment may be required for certain weed species.

The use of trade names in this article does not imply endorsement of the product or imply criticism of similar ones not mentioned. For recommendations, please consult the Pest Management Guides.

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COMPARISON OF B & B STOCK HOLDING METHODS

**Bonnie Appleton and Roger Berrier
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If you grow, sell or plant trees you're aware of problems associated with holding field grown B&B stock for more than a few weeks, or with holding spring-dug stock for summer sales. Roots may dry out, leaves may scorch or drop, root balls may harden or flatten, and weeds may grow on the root balls. These holding challenges often increase tree stress thereby decreasing tree quality and landscape establishment.

While mulch has been widely used in the past, additional methods currently being used to hold B&B stock include surrounding the root ball with stretch wrap, and using untreated or copper-impregnated geotextile bags. Research conducted using copper-treated burlap showed that the treated burlap prevented rooting-out of B&B stock during storage thereby reducing the incidence of re-balling and/or root removal prior to planting. Other research has shown that treated or synthetic burlap should be removed from the root ball at planting time since both decay slowly and inhibit root growth.

Research has recently been conducted at HRAREC to compare B&B stock holding methods for spring-dug/summer-planted trees, and to determine the economic advantages and disadvantages of these holding methods. The following nine rootball holding treatments were applied to newly harvested 28" root balls of 2"

caliper *Acer platanoides* ‘Summershade’
(Summershade Norway maple):

- UTB–untreated burlap/no drip irrigation
(control)
- TB–treated burlap/drip irrigation
- M–untreated burlap mulched with shredded
hardwood/no drip irrigation
- BSW–untreated burlap covered by black stretch
wrap/drip irrigation
- CSW–untreated burlap covered by clear stretch
wrap/drip
- TB–untreated burlap covered with a
polypropylene/drip irrigation
- CU–untreated burlap covered with copper -
impregnated polypropylene/drip irrigation –
this treatment was placed into a 28” hole in
the ground
- CONT–untreated burlap potted into 65 gal.
Black plastic container/drip irrigation

During the March to July holding period, root ball temperatures were taken from 9 am to 8 pm on two dates to determine how hot the root balls were getting. When the trees were transplanted to the landscape in mid-July the amount of leaf scorch and rooting out through the holding materials was rated before the trees were planted. The trees were re-dug 1-½ years later with a 60” tree spade. The roots were allowed to air dry and then an Air Spade was used to remove the top 6” of root ball soil to permit a rating of new root growth out from the original root ball.

Several important observations were made relative to ways in which you might recommend that tree root balls be treated for extended holding. The control treatment’s limited caliper and root growth supports applying some form of holding treatment to root balls if they must be held above ground for more than a few days after spring digging and prior to summer planting. (Table 1).

High root ball temperatures did not appear to be a major limiting factor in plant growth despite a significant spread in root ball temperatures. Growth of trees with lower root ball temperatures using the mulch (M) treatment was not as good as for the black stretch wrap (BSW) treatment that incurred higher root ball temperatures. Though both the clear (CSW) and the black (BSW) stretch wrap treatments resulted in high root ball temperatures, competition for moisture from weeds that grew under the clear stretch wrap (CSW) probably accounted for the poorer growth of trees with that treatment.

Whether or not it is desirable to have root growth occur outside of the root ball during holding is debatable, and probably depends on the ability of whoever is moving the trees to deal with extra roots. The mulch (M) and containerized (CONT) treatments had large volumes of roots growing out of the root balls, but rated poorly in caliper growth once planted in the field (Table 1). Many roots probably dried out in transit to the transplant site, killing the roots and wasting the tree’s stored reserves that were used to produce those additional roots.

Trees from the untreated above ground bag (TB) which did not contain copper had little rooting out during holding due to air-root pruning, but field growth was limited (Table 1). By contrast both the copper-treated bag (CU) and the burlap treated with cupric ammonium carbonate (TB) had similar limited rooting out during holding but performed well in the field possibly due to copper’s effect as a growth regulator, stimulating a denser root system.

The importance of drip irrigation combined with a root ball covering was confirmed in a follow-up study that focused on just four root ball coverings – mulch, containerization in a black container, white stretch wrap, and white shrink wrap – with or without drip irrigation. Though

the stretch wrap and shrink wrap (a very inexpensive and quick method to wrap balls) holding methods allowed no rooting out, they proved bad holding methods if the trees broke dormancy and no supplemental irrigation was provided. Root balls quickly dried out and leaves scorched. If root balls will be covered with these materials into the time when the trees will leaf out, wrap only the sides of the root balls and provide either overhead or drip irrigation to keep adequate moisture in the root balls until transplanting.

Overall treatment costs, representing material costs plus the cost of labor for applying the materials, varied greatly (Table 2). Treatment costs range from a low of \$2.25 for the drip irrigation only (DI) treatment to a high of \$14.70 for the containerized (CONT) treatment. If a nursery or landscape company is only holding a few trees the cost of the holding treatment may be insignificant, but cost could be very important if a large quantity of trees is being held.

The overall performance of two treatments, the treated burlap (TB) and the black stretch wrap (BSW), both of which were relatively inexpensive holding methods, should be considered by the industry. Holding cost should not, however, be the sole determining factor in selecting a holding methods. Cost should be considered along with the ability to supply supplemental irrigation during holding, plant response to the holding method, and the ability to move additional roots if a treatment that promotes considerable rooting out is selected.

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BIGLEAF HYDRANGEAS: WHICH CULTIVARS ARE BEST?

Dick Bir

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Introduction: About a decade ago bigleaf hydrangeas (see note) exploded back onto the landscape scene. They were sold as Florist or French hydrangeas and under lots of other names as well. These hydrangeas with their large blue and pink flowers began showing up container-grown in garden centers under hundreds of different cultivar names and with all sorts of promises like “hardy, free flowering, grows well in sun or shade, etc.”. Some of them were absolutely spectacular but too often they did not survive or did not flower consistently. Their performance in landscapes around the country was often variable. Not all of the failures could be blamed on improper siting and care in the landscape. Since many of these cultivars had been developed to be grown in the greenhouse or for radically different climates

than the extremes plants are exposed to in many U.S. gardens, I wondered if part of the problem was that non-hardy plants were being sold for landscapes needing hardier cultivars.

The Test: I decided the best way to determine which cultivars performed best in our area was to plant replicated trials. I obtained as many commercially available cultivars as I could, and then planted them. Fifty-four cultivars were planted in a replicated trial at North Carolina State University’s Mountain Horticultural Crops Research Station, Fletcher, N.C. (zone 7-a). Since establishing the trials reported here, at least as many “new” cultivars have been added to our collection. In an independent study, Dr. Sandra Reed, of the U.S. National Arboretum, planted 21 *H. macrophylla* cultivars in a replicated trial at the Tennessee State University Nursery Crop Research Station in McMinnville, Tennessee (zone 6b) and at the University of Missouri Horticulture and Agroforestry Research Center, New Franklin, Missouri (zone 5b).

Dr. Reed and I did not plant all of the same cultivars and our growing conditions, both winter cold and summer heat, were quite different. However, certain cultivars emerged as flowering dependably following winters in three dramatically different climates from Missouri to North Carolina. Our tests were in the field in the sun in something similar to typical landscape conditions.

When looking for your favorite cultivar in our lists, please remember that our conditions may have differed from yours. The cultivar 'Pia,' for example, has flowered well in containers under 60% shade in McMinnville, Tennessee and in shady gardens in the mountains of NC. However, 'Pia' did not perform well in our field trials. We feel that our best performers are truly tough plants but winter cold may not be the limiting factor in their performance--it may be summer sun. In the upper and mid-South, late spring freezes after the plants have started to leaf out probably do as much damage to flowering as do winter temperatures.

Combining data on multiple characteristics from different research tests is always chancy. However, I thought you would like to know which cultivars flowered consistently under three sets of conditions. The best flowering cultivars in Missouri, North Carolina and Tennessee tests were 'All Summer Beauty', 'Coerulea', and 'Nikko Blue.' These three cultivars even flowered well following -13 F. temperatures during winter 1998-1999 in Missouri. Cultivars that performed well in two thirds of the tests but not in all sites were 'Alpengluhen' (Glowing Embers, Alpine Glow), 'Blue Bird', 'General Vicomtesse de Vibraye', 'Grayswood', and 'Tokyo Delight.' Some cultivars that were not included in the tests in Missouri or Tennessee performed well in North Carolina and might be worthy of consideration for tests in other areas. These include:

'Altona', 'Amethyst', 'Ami Pasquir', 'Ansley', 'Ayesha', 'Beni Gaku', 'Blau Doneau', 'Blaumeise', 'Blue Danube', 'Bottstein', 'Decatur Blue', 'Domotoi', 'Europa', 'Geisha Girl', 'Goliath', 'Hadsbury', 'Hamburg', 'Holstein', 'Kastlen', 'Kluis Superba', 'LaFrance', 'Lanarth White', 'LaMarne', 'Mathilda Gutges', 'Merritt Supreme', 'Niedersachen', 'Otaksa Monstrosa', 'Paris', 'Pink Beauty', 'Pink Libelle', 'Red Star', 'Revelation', 'Rosarita', 'Seafoam', 'Sister Theresa', 'Souvenir President Doumer', 'Teller Red', 'Veitchii' and 'White Wave.'

Those interested in more details can find this information on the internet at: <http://www.sna.org/research/researchproceedings.shtml>. Once at the website, use SNA's search engine with the word to find related research articles.

Note: For purposes of this article, the morass that is hydrangea classification will be avoided by just listing cultivar names. Many are hybrids and the nomenclature is not clear even when the correct species name seems to be. Therefore, it seemed much more appropriate for this article to list 'Preziosa', a terrific plant in North Carolina, but not in Missouri and Tennessee, without the tentatively correct name of *Hydrangea macrophylla* var. *macrophylla* x *H. macrophylla* subsp. *serrata* hybrid 'Preziosa.'

Sources of hydrangea cultivars tested: Berylwood Nursery, Hawksridge Farms, Heronswood Nursery, Greenbrier Nursery, Greer Gardens, JC Raulston Arboretum, Lorax Farms, Spring Meadow Nursery, Peninsula Nursery and Wilkerson Mill Nursery

Article distributed through email by Dick Bir.

DAYLILY RUST ALERT
Walt Blosser
PA Dept. of Agriculture

In August 2000, daylily rust (*Puccinia hemerocallidis*), a disease of daylily new to the United States was discovered in a Georgia nursery. *Puccinia hemerocallidis* is a heteroecious rust native to temperate and tropical Asia. The disease may have entered the U.S. on plant shipments from Costa Rica. Since its initial discovery and confirmation the disease has also been reported from Alabama, Arkansas, California, Connecticut, Florida, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Minnesota, Mississippi, Missouri, New Jersey, North Carolina, Pennsylvania, South Carolina, Tennessee, Texas, Wisconsin and is likely to be even more widely dispersed.

All heteroecious rusts require an alternate host to reproduce sexually. However, rusts may have life cycles with as many as five different spore stages. Daylily rust encountered so far has been in the uredinial stage, which produces urediospores allowing asexual reproduction and reinfection of daylilies in the absence of alternate hosts. The alternate host for daylily rust is *Patrinia* spp. (Golden Valerian). *Hosta* spp. has also been reported as a possible alternate host, but this report is as yet unconfirmed. Spores are primarily windborne and could conceivably be blown over long distances. The rust can be easily spread through movement of infected plants and on contaminated tools and clothing as well. Under optimum conditions of temperature and moisture, new infections may occur within 2 or 3 days with spores reappearing in 7 to 14 days. Symptoms of the disease vary with a cultivar's susceptibility. They may appear as bright yellow spots or streaks or small water-soaked tan spots with dark borders (Fig. 1). The bright orange urediospores arise primarily from lower leaf surfaces.

Rust infections of varying severity, reported from Pennsylvania and elsewhere, have been found on cultivars that include: "Alda," "Art Imperial," "Attribution," "Broadway Pink Slippers," "Channeled Agression," "Colonel Scarborough," "Crystal Tide," "David Kirchner," "Designer Gold," "Double Buttercup," "Edge of Eden," "Erin Lea," "Fancyful Candy," "Gertrude Condon," "Happy Camper," "Imperial Guard," "In the Stillness," "Jersey Girl," "Joan Senior," "Lilac Surprise," "Luxury Madness," "Mal," "Ming Ballet," "Molino First Lady," "Moonlit Caress," "Moonlit Rhapsody," "Nell Keone," "Pardon Me," "Psychic Oasis," "Quick Gold," "Reginald," "Roses and Peaches," "Starstruck," "Stella D'Oro," "Tippy Tippy Tin," "Violet Explosion," "Wait Until Dark" and "Woodside Jewel." This is not an exhaustive list; it is likely that many other varieties are also susceptible.

Control measures should be initiated promptly if daylily rust is found. Effectiveness of currently available fungicides is uncertain. Products that control rust diseases include Daconil, Mancozeb, Oxycarboxin (Plantvax), Propiconazole (Banner Maxx), Azoxystrobin (Heritage), Flutolanil (Contrast), and Myclobutanil (Systhane). Daconil and Mancozeb provide contact protection, whereas the other products listed offer systemic action. It is suggested that two or more products be applied alternately until evidence of rust is no longer apparent. Check product labels for host clearance and follow labeled rates and spray intervals carefully. In addition to chemical treatments, infected plants or plant parts should be carefully cut back or removed. Removed plants and foliage should be burned or buried immediately to limit spore dispersal. Composting is not recommended and any plant parts that cannot be burned or buried should be tightly bagged.

The Pennsylvania Department of Agriculture (PDA) is treating daylily rust as a quarantine significant disease due to its rapid dispersal and aggressive nature. Infected plants encountered during routine inspections by PDA Plant Inspectors will be placed under a stop-sale order. This order will remain in effect until control measures are proven to be effective in eliminating the disease.

Several websites with excellent pictures and additional information include:

AHS Daylily Dictionary -

http://www.daylilies.org/ahs_dictionary/daylily_rust.html

Florida -

<http://doacs.state.fl.us/~pi/enpp/pathology/daylily-rust.html>

Georgia -

<http://www.ces.uga.edu/Agriculture/plantpath/daylilyrust.html>

National Plant Board -

<http://www.aphis.usda.gov/npb/daylily.html>

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STRATEGIES FOR MANAGING FUNGUS GNATS IN GREENHOUSE AND NURSERY PRODUCTION

Cathy Thomas, Integrated Pest Management Specialist, PA IPM Program

Fungus gnats, or sciarid flies (order Diptera), can be a nuisance and damaging pest in greenhouse floriculture, vegetable crops, and especially in propagation areas (cutting and plug production). Overlapping and continuous generations in a greenhouse environment, coupled with the development of insecticide resistance, make control strategies difficult. Effective management of this insect requires an integrated approach, including special monitoring methods, sanitation, and application of insecticides and biological controls.

Life Cycle and Damage

The dark-winged fungus gnat has a complete, four-stage metamorphosis (egg, larva, pupa, and adult). The development from egg to adult is approximately 3-4 weeks at 70°F. The life cycle may be shortened at higher temperature and humidity. Adult fungus gnats are small (3-5mm), dark flies with long, slender antennae and long legs. Over a 7-day period that follows mating, the female lays 50-200 eggs in strings deposited in the top inch of soil or planting medium. In 4-6 days, eggs hatch into larvae that increase in size through four instars over 10-14 days. By that time they are about 5mm long, colored translucent white with a distinctive black head capsule (Fig. 1).

Fungus gnat larvae generally eat rotting plant material, algae, and fungi; however, they will also feed on fine root hairs, stem, and leaf tissue. Young seedlings and plugs are especially prone to attack. Larvae may bore into cuttings and migrate up the stem. The most common symptoms are wilting and slowing of growth of infected plants (Fig. 2). Mature, well-rooted plants can tolerate heavy infestations of fungus

gnats but may be damaged indirectly by the larvae. Indirect damage occurs when root-feeding larvae create entrance sites for soil-borne pathogens such as fusarium, pythium, phytophthora, and thielaviopsis. Adult fungus gnats are also capable of spreading disease spores.

The larva pupates in the compost, and the adult emerges in 4-6 days. Pupae can resist drought and high temperature, so crop-free periods or heating greenhouses may not eliminate this pest. After emergence, the adults mate and begin depositing eggs within 2 days.

Management

Monitoring: In addition to inhabiting potting media, fungus gnats are also found in areas containing decaying organic matter (under benches, in debris piles, etc.). Gravel beneath benches is prime breeding territory for fungus gnats. These areas should be included in treatment plans.

Adult fungus gnats - As with any insect or disease, early detection is the key in managing this pest. Weekly scouting will determine the effectiveness of treatments. Use yellow sticky cards to monitor for the presence of adult fungus gnats, verifying identification with a 10 to 15x hand lens. A good characteristic used to identify fungus gnats is the “Y” vein pattern on the wing tip (Fig. 3). Placing cards horizontally

above growing media (or at ground level to monitor under benches) is usually more effective than vertical placement.

Larval Stages - Fungus gnat larvae usually are found in the top inch of growing media, but they can also be found at the bottom of the pot near the drainage holes. Monitor for larval activity with potato disks (one inch in diameter and ½ inch thick) placed face down on the growing media. Check the discs regularly for fungus gnat larvae and change weekly.

Cultural Control: High moisture levels promote the development of fungi and algae, and therefore enhance fungus gnat populations. Since all life stages of fungus gnats can be found on or near algae, proper sanitation and environmental control are necessary. Eliminate area of freestanding water on floors, under benches, and on other greenhouse surfaces. Disinfectants and algaecides can be used for cleanup before and during the crop cycle. For gravel and soil floors, use a treatment of hydrated or flowable lime every 4-6 months to deter algal development. Powerwash concrete floors to remove algae. To control algal growth in pots, select potting soil that drains well, and then avoid overwatering. Do not use incomplete composted organic matter in potting mix unless it is sterilized, because it may be infected with fungus gnats. Other sanitation procedures include removing weeds, debris and dump piles.

Table 1 contains a list of registered products for algae control in greenhouses.

Table 1. Products registered for algae control in greenhouses, 2001.

Clean Green™ - Granulated peroxygen, biodegradable product - apply to walkways, soil and other surfaces for long-term algae control.

Greenshield™ - Quaternary ammonium salts - disinfectant and algacide on hard, non-porous surfaces.

Oxidate™ - peroxygen formulation - for control of algae, viruses, bacteria, fungi, and their spores. Labeled for greenhouse vegetables and OMRI approved.

Triathalon™ -Algaecide, fungicide, bacteriacide, for ornamental plants and trees. Can also be used as a disinfectant.

ZeroTol™ - peroxygen formulation - broad-spectrum control of algae, fungus, bacteria and viruses on surfaces and plants. ZeroTol will kill spores on contact.

Biological Controls for Fungus Gnat Larvae:

Biological control is a good option for managing fungus gnat populations. Two commercially available natural enemies, the entomopathogenic nematode, *Steinernema feltiae* and the predatory soil mite, *Hypoaspis miles*, are being used in Pennsylvania greenhouses for control of larval stages. Biological agents should be used as a preventive when cultural cleanup procedures are in place and pest populations are low. Always consult your biocontrol supplier for rate information and to determine if any previous pesticide applications will affect the biocontrols. Many insecticides and insect growth regulators are compatible with nematodes and can be used in rotation. Consult your supplier for information on compatible compounds.

Steinernema feltiae is a microscopic non-segmented worm (nematode). It is sold under

such trade names as Nemasys, Scanmkask, X-Gnat, Entonem, and Exhibit. These products can be purchased through greenhouse supply companies and through biological control distributors. Nematodes can persist for long periods, have no reentry interval, and can be applied using conventional spray equipment.

Steinernema feltiae is shipped to the grower in the infective juvenile stage. When applied to the growing media as a drench, the juvenile seeds out the fungus gnat larva and enters its body through natural openings or areas of thin cuticle. Once inside the body, the nematodes release bacteria from their intestines, resulting in infection of the fungus gnat larva and its subsequent death within 24-48 hours. The juvenile nematodes feed on broken down tissue in the insect cadaver, and then develop into adults. A new generation of nematodes is produced within two weeks, and thousands of new infective juveniles emerge from the insect cadaver in search of fresh hosts. Infected fungus gnat larvae are brownish-yellow rather than the normal, healthy white. Nematodes may provide season-long control after several initial applications.

- Apply routine preventive treatments to growing media and to soil under benches.
- Treat as soon as possible after sowing seed or inserting cuttings.
- For slow-growing crops, reapply nematodes at two- to four-week intervals.
- If fungus gnat populations are already established it may take 2-3 weeks and several applications before there is a reduction in numbers of adult fungus gnats.

For optimum nematode performance, consider these factors:

- Irrigate compost before and after application (nematodes require moisture for movement).

- Keep compost moist for the first two weeks after application.
- Avoid exposure to sunlight; nematodes are sensitive to drying and ultraviolet light.
- Do not apply within 7 days of a nematicide application.
- Use nozzle screens of 50 mesh or coarser during application and do not exceed a pump pressure of 300 psi.
- Soil temperature must be 55-90°F.
- Monitor effectiveness of nematode applications with the potato disk method.

Hypoaspis miles has already shown good potential as a control for fungus gnat larvae, however it is also known to feed on other soil insects such as springtails, thrips pupae, and shore fly larvae. *Hypoaspis miles* can be introduced in combination with insect parasitic nematodes.

This predatory mite inhabits the top layer (1- 1.5 inches) of the soil. *Hypoaspis miles* is a brown mite that grows to a length of 1mm. Females lay their eggs in the soil. At 75°F *Hypoaspis miles* development takes 10-13 days from egg to adult, passing through 3 immature stages. It prefers moist (but not wet) potting compost and can live for up to 7 weeks in the absence of food. This mite will not go into hibernation in cold temperatures, and the minimum temperature for good activity is 60°F. *H. miles* can be observed in and on the soil, and at the base of plant stems.

Hypoaspis miles is delivered to the grower in sprinkler tubes with all stages in a vermiculite/ peat carrier. Always follow instructions that are supplied with the product. If instructions are not packed with the product, contact your supplier and request this information.

- Apply routine preventive treatments to prevent crop damage.

- Treat as soon as possible after sowing seed or inserting cuttings.
- Press the openings of the sprinkler tube and sprinkle the material onto rockwool cube or growing media, or mix into media before planting. *Hypoaspis* can also be applied to floors.

For optimum performance consider these factors:

- Several pesticides have a negative effect on *Hypoaspis miles*. When controlling diseases and other pests, consult your supplier for a list of side effects of pesticides on beneficial organisms.
- the predatory mites should be introduced as soon as possible after delivery.

The biocontrols discussed are commercially available from biocontrol distributors. For a complete list of suppliers, visit this website: www.cdpr.ca.gov/docs/dprdocs/goodbug/benefic.htm <<http://www.cdpr.ca.gov/docs/dprdocs/goodbug/benefic.htm>>

Or request a written copy:
California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring and Pest
Management Branch
1020 N. Street, Room 161
Sacramento, California 95814-5604

For questions on biological control methods, a helpful source is the Association of Biocontrol Producers at this website: <http://www.anbp.org/>

Bacillus thuringiensis subspecies *israelensis* (Bti) (Gnatrol™): Gnatrol™ is produced from a naturally occurring, sporeforming bacterium produced by fermentation. This product

consists of endospores and crystals that must be ingested by the fungus gnat larvae. After the larva feeds, its gut is paralyzed, it stops feeding, and dies. This Bt is a different subspecies from that applied to foliage to control caterpillars. Bt labeled for caterpillars is not effective against fungus gnat larvae.

Gnatrol™ is applied as a soil drench in containers and under benches when fungus gnat populations are at low levels. The bacterial toxin that kills the larvae is only effective for 48 hours, so repeat treatments may be necessary. Gnatrol™ should not be mixed with fertilizers or fungicides containing copper or chlorine.

Chemical Control: A summary of chemical controls for fungus gnats is published by the Bureau of Plant Industry - 2001 General Controls for Greenhouse Insect Pests of Ornamental Plants. Many of the insecticides labeled for fungus gnat control are insect growth regulators (IGR) (i.e., Citation™, Enstar II™) and will only affect the larvae, not adults. When using an IGR, direct the spray or drench to media surfaces in pots and below benches. When treating pots, apply spray solution to penetrate the upper ¼ to ½ inch of the media surface. There are a few compounds that can be used to control adults (i.e. Talstar F™, 1300 Orthene™ TR), but this may be a losing battle if strict sanitation measures are not in place. Total release aerosol applications in combination with a soil drench will control both larvae and adults. As with any chemical pest management program, rotation of insecticide chemical classes is a must to delay the development of insecticide resistance.

In summary, economical management of fungus gnat life stages requires an integrated approach consisting of good sanitation and weekly scouting. Develop a resistance management program through integration of chemical and biological controls. Many of the new, narrow

spectrum pest control products are compatible with natural enemies, making the application of biological control in high value ornamental crops a reality. Always consult biocontrol suppliers for compatibility information.

Websites:

www.biobest.be <<http://www.biobest.be>>

www.koppert.nl <<http://www.koppert.nl>>

www.koppert.nl/e0110.shtml

<<http://www.koppert.nl/e0110.shtml>> - a

database on side effects of pesticides on biocontrols

www.nysaes.cornell.edu/ent/biocontrol/websites.html

<<http://www.nysaes.cornell.edu/ent/biocontrol/websites.html>>

www2.oardc.ohio-state.edu/nematodes/

www.anbp.org/

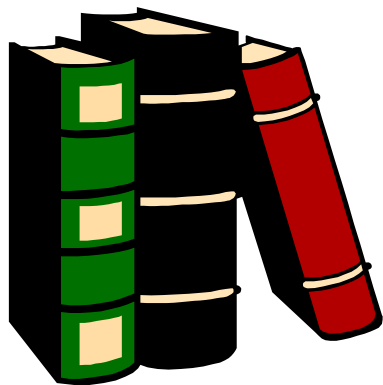
Reprinted from Regulatory Horticulture, 2001, PA Dept. of Agriculture, Vol. 27.

Publications

Agricultural Chemical Book II: Herbicides Rev. 2002. Thomson Publications, P.O. Box 9335, Fresno, CA 93791 (559)266-2964; fax (559)266-0189; www.agbook.com. About 30 new herbicide products have been added since the last revision. Available from Thomson Publications at \$26.95.

Heirloom flower Gardens: Rediscovering and Designing with Classic Ornamentals. Written by Jo Ann Gardner. Explores the uses of more than 300 classic ornamental plants, introduced to North American between 1600 and the 1950s, and their uses in the landscape and the home. Available from Chelsea Green Publishing, 205 Gates-Briggs Bldg., P.O. Box 428, White River Junction, VT 05001 (802)295-6300; fax (802)295-6444; www.chelseagreen.com. This 335-page softcover is available for \$29.95.

Total Crop Management of Herbaceous Perennial Plants. Edited by Stanton Gill, University of Maryland. This guide includes IPM principles, insect and disease problems, weed management, nutrient management, plant height management, and water and irrigation management. It is available from MD Cooperative Extension for \$12. To order, call (301) 403-4263.



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. We've added material!

March 22 (Friday) and 25 (Monday), 2002. New Castle Co. Extension Office.

March 27-28, 2002. Sussex Co. Extension Office.

June 12-13, 2002. Kent Co. Extension Office.

Insecticides:

AZATIN (neem oil) – Certes – As a result of the IR-4 Project the producers can now add the usage on roses to their label.

BOTANIGARD (*Beauverina bassiana*) – Emerald Bio Agriculture – The re-entry period for this bio-insecticide is now 4 hours.

CITATION (cypromazine) – Syngenta – As a result of the IR-4 Project they can now add to their label the usage on carnations and geraniums.

ESTEEM – (pyriproxyfen) – Valent – As a result of the IR-4 Project they can now add the usage on chrysanthemum, coleus, ficus, pothos and yew to their label.

FORCE (tefluthrin) – Syngenta – As a result of the IR-4 Project they can now add to their label the usage on 20 new ornamental plants.

MERIT (imidacloprid) – Bayer – Additional labeling includes the usage on sod farms.

ORTHENE (acephate) – Valent – As a result of the IR-4 Project they can now add the usage on

English daisy to their label.

OVIATION (clofentezine) – Scotts – As a result of the IR-4 Project they can now add to their label the usage on ageratum, juniper, marigold, calendula, cyclamen, roses and snapdragons.

PERMETHRIN – As a result of the IR-4 Project the producers can now add to their label the usage on African violets, azaleas and buttercups.

PYLON (chorfenapyr) – Olympic – As a result of the IR-4 Project they can now add to their label the usage on chrysanthemums, roses and impatiens.

SANMITE (pyridaben) – BASEF – As a result of the IR-4 Project they can now add the usages on iris, cardinal flower, Indian pink, potentilla, spruce and euonymos to their label.

SUCCESS (spinosad) – Dow AgroSciences – Added to their label the post harvest use on asparagus fern and the use on tree nuts, pistachios, artichokes, strawberries and cranberries.

TALSTAR EZ (bifenthrin) – FMC – This is a new granular formulation for long lasting control of lawn and general household pests.

TALSTAR F (bifenthrin) – FMC – This is the new name for Talstar Lawn & Tree Flowable Insecticide/Miticide. It is now available in pints, quarts and gallons.

TETRASAN (etoxazole) – Valent – A new miticide that should be registered for use on ornamentals in 2002. It acts as an insect growth regulator.

ULTRAFLOA (melbemectin) – Gowan – Registration is expected in 2002 for use on greenhouse ornamentals.

Herbicides:

METGARD (metsulfuron-methyl) – Makhteshim – A new formulation recently introduced for total vegetation control for use on turf, forests, rangelands, grasslands and pastures. It is a 60DF formulation.

SPEED ZONE/POWER ZONE (carfentazone-ethyl/dicamba/phenoxy) – PBI Gordon – These are new 3-way turf herbicides used to give broad spectrum broadleaf weed control and to increase activity during cooler weather.

BARRICADE (proflumicafene) – Syngenta – As a result of the IR-4 Project they can now add to their label the usage on 7 new ornamental species.

DIMENSION (dithiopyr) – Dow AgroSciences – As a result of the IR-4 Project they can now add to their label an additional 12 ornamental plants.

ENVOY (clethodim) – Valent – As a result of the IR-4 Project they can now add to their label the usage on boxwood, spirea, candy tuft, lily turf, pinks and potentilla.

GOAL (oxyfluorfen) – Dow AgroSciences – As a result of the IR-4 Project they can now add to their label the usage on 11 new ornamental species.

ORACLE (dicamba) – Gharda – A new formulation for use on corn, sorghum, small grains, pasture, hay rangeland, fallow, sugarcane, asparagus, turf, grass seed crops and general non crop weed control.

ORNAMENTAL HERBICIDE II (oxyfluorfen/pendimethalin) – Scotts – As a result of the IR-4 Project they can now add to their label the usage on 8 new ornamental species.

PENDULUM (pendimethalin) – BASF – As a result of the IR-4 Project, they can now add to their label the usage on 37 new ornamental species.

RONSTAR (oxadiazon) – Aventis – As a result of the IR-4 Project they can now add to their label the usage on gazania.

ROUT (oxyflourfen/oryzalin) – Scotts – As a result of the IR-4 Project they can now add to their label the usage on rhododendrons.

SURFLAN (oryzalin) – Dow AgroSciences – As a result of the IR-4 Project they can now add to their label an additional 21 ornamental plants.

Fungicides:

ASPIRE (Candida oleophia) – Ecogen – As a result of the IR-4 Project they can now add to their label the usage on 18 new ornamental species.

BAYLETON (triadimefon) – Bayer – As a result of the IR-4 Project they can now add the usage on begonias to their label.

BORDEAUX MIXTURE – As a result of the IR-4 Project the producers can now add to their label the usage on 11 new ornamental plants.

BOTRAN (DCNA) – Gowan – As a result of the IR-4 Project they can now add to their label the usage on Douglas fir and redwoods.

CUPROFIX DISPENSE (basic cooper sulfate) – Cerexagri – A new DF formulation fungicide bactericide for use on turf and ornamentals.

EAGLE (myclobutanil) – Dow AgroSciences – As a result of the IR-4 Project they can now add to their label the usage on the ornamental bee balm.

FORCE (mancozeb) – Dow AgroSciences – As a result of the IR-4 Project they can now add to their label the usage on flowering quince.

GRAVEL (zoxamide/mancozeb) – Dow AgroSciences -- As a result of the IR-4 Project they can now add to their label the usage on 11 new ornamental plants.

HERITAGE (azoxystrobin) – Syngenta – As a result of the IR-4 Project they can now add to their label the usage on fir and Douglas fir trees.

KALIGREEN/ARMICARB (potassium bicarbonate) – Church & Dwight/Toagosei -- As a result of the IR-4 Project they can now add to their label the usage on 9 new ornamental plant species.

KOCIDE (copper hydroxide) – Griffin – As a result of the IR-4 Project they can now add to their label the usage on maples, pines and zinnias.

MANEB – Due to the high cost of re-registration the manufacturers of this product have voluntarily withdrawn the support of golf course use.

MEDALLION (fludioxonil) – Syngenta – Received a new label to control various diseases on over 40 container-grown and landscape plants. It can be used in interiorscapes, field nurseries, forest nurseries, residential and commercial landscapes, greenhouses and other enclosed structures.

PHYTON 27 (copper sulfate pento hydrate) – Source Technology – As a result of the IR-4 Project they can now add to their label the usage on 8 new ornamental plants.

PROSTOP MIX (Gliocladium catenulatum) – Kemira - This is a new bio-fungicide used to

control soil borne diseases, such as Pythium and Rhizoctonia, in vegetables and ornamentals. It is currently being sold in Europe.

Miscellaneous:

TELONE (1,3,-DCP) – Dow AgroSciences – EPA issued an extension to an experimental use permit to use on 5,000 acres of golf course turf to control nematodes. It now expires on 8-28-02. (FR Vol. 66, 10-31-01)

Research Briefs

Greenhouse Production:

Using plant growth retardants in canna production. Rapid increases in height during container production of cannas often result in top-heavy plants prone to blow over and increased shipping costs. Due to varied emergence from winter dormancy or new spring divisions for cannas, PGR application must frequently be made to plants dissimilar in height, a condition that often results in non-uniform height control in many crops and ultimately a non-uniform finished crop. Results of this study show that a 25 ppm filiar spray of Cutless applied to Florence Vaughan canna lilies, regardless of initial plant height, effectively suppressed height though 90 days after treatment (DAT) without adversely affecting plant appearance, include floral display. Short plants at the time of treatment grew more rapidly than taller plants, regardless of PGR treatment, resulting in a more uniform crop by 60 DAT. (L.L. Bruner, G.J. Keever, J.R. Kessle, Jr. and C.H. Gilliam)

Preceding brief excerpted from J. Environ. Hort. 19(4): 180-183. December 2001.

The effect of ethylene on easter lily development varies depending on stage of development. The sensitivity of easter lilies to either ethylene or methane (products of incomplete burning in gas-fired unit heaters) was tested during rooting, vernalization and subsequent greenhouse forcing. Short- or long-term exposure to ethylene during rooting and vernalization had no effect on the number of buds, leaves, or plant height but increased the number of days to flower. Short-term exposure within 6 weeks after vernalization reduced the number of buds by 1 bud/ plant. However, extensive bud abortion occurred when plants

were exposed to ethylene during the flower development phase. Long-term exposure to methane from planting until the end of vernalization increased both the number of buds, leaves, and height without affecting forcing time, leaf yellowing or bud abortion.

Commercial forcers may be able to use smaller bulb size exposed to methane to produce a plant with similar number of leaves and flower buds as a larger sized bulb. (T.J. Blom, W. Brown, G.C.L. Chu, W.T. Liu, L. Skog)

Preceding brief excerpted from HortTechnology. 12(1): 91-94. January-March 2002.

Floriculture:

Commercial production recommendations for cut stems of *Campanula* and *Lupinus*.

Campanula should be grown initially under the noninductive 8-h photoperiod to enhance vegetative growth. Plants should then be transferred at 5-6 true leaves into an inductive 16-h photoperiod for flowering. Commercial use of HID supplemental lighting would be recommended to decrease production time and increase profits when used in conjunction with the 16-h initial photoperiod. However, the 16-h initial photoperiod resulted in reduced stem length and diameter compared with the 8-h initial photoperiod. Therefore, if long, thick stems are desired more than short production time, the 8-h photoperiod should be used.

Lupinus should be grown in a continuous 16-h photoperiod to minimize production time. Delayed transplanting increased profits due to decreased production area per plant. High intensity discharge supplemental lighting increased *Lupinus* stem length and diameter and decreased days to anthesis. While the benefits of increased light intensity may warrant the use of HID supplemental lighting to improve crop quality, and profitability, the initial investment

in the HID supplemental lighting system and the additional electricity expenses must be considered. However, supplemental lighting may not be beneficial if natural light levels exceed those in this study. (T.J. Cavins and J.M. Dole)

Preceding brief excerpted from HortScience. 36(7): 1192-1196. December 2001.

1-MCP protects geranium from ethylene postharvest damage. Ethylene reduces post harvest quality of geranium, but when used as a treatment of stock plants to eliminate flowers and produce more compact plants, it does not predispose plants to higher rates of petal abscission when exposed to ethylene during post harvest. The ethylene inhibitor, 1-MCP, proved effective at decreasing rates of petal abscission after exposure to ethylene. 1-MCP will protect most cultivars of geranium during a 24-h period of exposure to ethylene. (M.L. Jones, E.S. Kim and S.E. Newman)

Preceding brief excerpted from HortScience 36(7):1305-1309, December 2001.

Container Production:

Supplemental light to promoted growth of slow-growing trees. *Carpinus caroliniana*, *Fagus grandifolia* and *Gymnocladus dioicus* are all desirable landscape trees but are often not grown due to their slow growth rate. When seedlings of these species were subjected to supplemental incandescent light (INC) and high-pressure sodium light (HPS), *F. grandifolia* and *G. dioicus* has greater stem height compared to natural light and daylength (NAT). All greenhouse grown seedlings were successfully overwintered in containers in an unheated polyhouse and broke dormancy normally the following spring. The supplemental lighting used in this study can be used to produce a second flush of growth in species that typically

produce only a single growth flush. This second flush results in increased height, caliper, and root and shoot dry weight for the first season. (L.E. Richardson-Calfee, J.W. Day, W.T. Witte and D.C. Fare)

Preceding brief excerpted from J. Environ. Hort. 19(4): 171-174. December 2001.

Shoot suppression of *Lonicera x heckrottii* ‘Goldflame’. Vines, such as honeysuckle, present unique maintenance problems during nursery production due to vigorous shoot growth and twining nature. These results indicate B-Nine/Cycocel combinations are effective when applied to pruned or non-pruned Goldflame honeysuckle of different physiological stages (non-flowering vs. partially flowering) at treatment. Cutless treatments did not suppress shoot length. The pruned Goldflame honeysuckle appeared more sensitive to B-Nine/Cycocel treatments and shoot length suppression was more pronounced. This treatment would allow growers to extend the production window to meet consumer demand or hold plants at a flowering, marketable stage. (L.L. Bruner, G.J. Keever, J.R. Kessler, Jr. and C.H. Gilliam)

Preceding brief excerpted from J. Environ. Hort. 19(4): 203-206. December 2001.

Controlled release vs. liquid feed on potted “color” production. Research conducted in 1999 and 2000 compared CRFs from 4 different companies applied once at the beginning of the experiment with completely soluble fertilizers applied weekly. Fertilizers were applied at three rates such that all plants were fertilized by a rate calculated to provide the same amount of nitrogen per pot per month from different sources for each tests species.

CRFs consistently produced the best growth, regardless of the company providing the

fertilizer. A one time application of controlled release fertilizer top dressed at the medium suggested application rate provided superior growth on color crops over weekly applications of a complete, soluble fertilizer. Similar results were obtained when the controlled release fertilizers tested were Osmocote, Multicote or Wilbro and the completely soluble fertilizers were Excel or Plantex.

These results suggest that if a liquid fertilizer program is adopted at nurseries growing color crops, either more fertilizer in weekly applications or fertilizing more frequently with the soluble fertilizer will be required to achieve growth equal to that seen when CRFs were used. However, neither higher application rates nor more frequent fertilization was tested so this is just speculation.

Plants evaluated over the 3 years of the test include: *Buddleia* ‘Dartmoor’, ‘Pink Delight’ and ‘Nanho Purple’; *Coleus* ‘India Frills’; *Echinacea purpurea* ‘Bright Star’; *Eupatorium fistulosum* ‘Carin’; *Helianthus angustifolius* ‘Gold Lace’; *Panicum virgatum* ‘Cloud Nine’ and ‘Prairie Skies’ plus *Pennisetum orientale*.

Preceding brief excerpted from email by Dick Bir, February 2002.

Wulpak as a source of N in potted “color” production. In 2000 tests, when the processed wool fiber product Wulpak was applied at rates calculated to provide the same amount of nitrogen as the standard fertilizer products, the CRF fertilized plants produced from 200 to 400% more growth during the experiment as those receiving only Wulpak. Data indicated that available nitrogen from Wulpak was released during the first two weeks of the experiment. Observations were that, for some species, a superior root system seemed to develop where Wulpak was top-dressed, presumably because of temperature and water

stress modification by Wulpak as a mulch.

When Wulpak is used alone, equivalent growth to about that achieved when 0.25 times the standard controlled release fertilizer treatment was achieved.

If a grower is using Wulpak for mulching value anyway, no more than the 0.5 rate of controlled release fertilizer needs to be used for *Buddleia* 'Nanho Purple' and no more than 0.5 rate should be used for *Eupatorium fistulosum* 'Carin.' However, when growing the ornamental grass *Panicum virgatum* 'Prairie Skies,' the full rate of CRF application with Wulpak resulted in increased growth over the full CRF rate alone. Therefore, a higher application rate of the CRF may be worth exploring.

Preceding brief excerpted from email by Dick Bir, February 2002.

Growth of Rhododendron in plastic and fiber pots treated with copper hydroxide. Shoot and root growth responses of 'Cunningham's White' Rhododendron was studied when grown in black plastic or molded fiber pots treated with copper hydroxide, or not treated. Containers of two sizes were studied, and the influence of pot type on substrate temperature was recorded. Rhododendron shoots were larger when grown in 2-gal pots compared to 1-gal pots, or when grown in 2-gal fiber pots compared to 2-gal plastic pots. Copper treatment did not influence shoot size. Copper treatment reduced the amount of circling or matted roots at the container-substrate interface. Based on data from this study and others, copper-treated fiber pots appear to be a useful alternative to plastic pots for rhododendron production of 1-year duration. Longer production cycles in fiber pots would require additional study, but up to 2 years longevity may be possible. Fiber pots provided a reduction in maximum substrate temperature

when containers were directly exposed to solar radiation. (S.E. Svenson)

Preceding brief excerpted from HortTechnology. 12(1): 134-137. January-March 2002.

Field Production:

Sulfentrazone for summer weed control.

Sulfentrazone has value as an herbicide for summer weed control because it controls weeds such as morningglory and yellow nutsedge that are difficult to control with available products. Based on the findings in this study, one might recommend application of sulfentrazone as a soil-applied preemergent, but in a shielded manner rather than over the top of the ornamentals to protect developing tissue from herbicide contact. Since phytotoxicity appears mainly due to contact and not translocation, one would expect good weed control at higher rates of sulfentrazone with a shielded application with limited phytotoxicity. (K.B. Collins, R.E. McNiel and L.A. Weston)

Preceding brief excerpted from J. Environ. Hort. 19(4): 189-194. December 2001.

Growth regulators and irrigation mitigate competition between intercropped grass and Fraxinus nigra 'Fallgold.' Intercropped grass in field production of trees results in less erosion, a more desirable soil structure, inhibition of weed species, and increased harvest accessibility. But it also results in slower tree growth due to competition and possibly allelopathy. Results from this experiment indicate that growth regulators applied to grass intercrops, especially in conjunction with irrigation, may have the ability to mitigate competition between trees and intercrops. (J. H. Gillman and C.P. Giblin)

Preceding brief excerpted from J. Environ. Hort.

19(4): 195-198. December 2001.

Plant green manure as a replacement for methyl bromide. The suppressive activity toward *Pythium* and, at the same time, the increase in total fungal population after rapistrum, iberis and cleome green manure suggest additional benefits to the well-known effects of incorporating organic matter into the soil. These preliminary results, together with the interest in new, ecologically sustainable methods for the control of soilborne fungi, both in organic agriculture as well as an alternative to MB in conventional agriculture, open interesting, practical prospects for the use of biocidal green manure even under field conditions. (L. Lazzarie and L.M. Manici)

Preceding brief excerpted from HortScience 36(7):1283-1289, December 2001.

Landscape:

Breeding and selection for high pH tolerance. Many popular birch species and cultivars grow poorly and develop extensive foliar chlorosis when planted in alkaline soils. This study demonstrates significant genetic variation and the effectiveness of an inexpensive detection test for screening birches to facilitate breeding and selection of high pH tolerant plants. (S. McNamara and H. Pellett)

Preceding brief excerpted from J. Environ. Hort. 19(4): 175-179. December 2001.

Tree growth in sidewalk profiles. Three tree species (*Tilia cordata* ‘Olympic’, *Acer campestre* and *Malus* sp. ‘Adirondack’) were grown in a standard sidewalk pavement, an experimental sidewalk profile (SSM), and in the field. SSM has focused on a series of gap-graded skeletal soil materials for use in pavement design. In SSMs, stones establish a load-bearing lattice or skeleton. In the desired

mixture, the soil is ‘suspended’ between the stones during mixing, placement, and compaction. Loads from pedestrians and vehicles on the material are borne by the stone matrix, without compacting the soil between the stones to a detrimental level. A cross-linked potassium propenoate-proenamide hydrogel is used to help create a uniform mixture. Results indicate several advantages in root and canopy growth for street trees grown in the experimental profile compared to the standard sidewalk pavement profile. (J. Grabosky, N. Bassuk, L. Irwin and H. Van Es)

Preceding brief excerpted from J. Environ. Hort. 19(4): 222-225. December 2001.

Yard waste compost as a soil amendment for azaleas. These results indicate that azaleas transplanted into sandy soils amended with at least 3 inches of yard waste compost and irrigated every third day had great shoot and root growth than azaleas in unamended soil that were irrigated more frequently. Thus, soil amendment appears to be more critical to azalea establishment in landscapes than irrigation frequency. In this study, yard waste was incorporated into landscape beds 5’ wide and 270’ long. (R.C. Beeson, Jr. and K.G. Keller)

Preceding brief excerpted from J. Environ. Hort. 19(4): 171-174. December 2001.

Insects:

Bifenthrin use on container grown crops for black vine weevil larvae control. Bifenthrin (Talstar 0.2G) provides somewhat sporadic control of black vine weevil in some container media. The label instructs growers to mix insecticide into the medium to achieve a concentration of 10-25 ppm. In a mix with peat or other low-density components, this can result in very sparsely distributed insecticide granules and therefore poor black vine weevil control. In

this study, prevention of black vine weevil development required incorporation of 32 ppm of Talstar 0.2 G (greater than label recommendations so the label should be modified). This study also tested dipping bare roots, corms, or tubers into an 800-ppm suspension of Talstar F before planting bare-root stock into bifenthrin-treated media. This technique protects plants with fleshy root systems from internal feeding by black vine weevil larvae and has pending registration. (R.S. Cowles)

Preceding brief excerpted from J. Environ. Hort. 19(4): 184-189. December 2001.

New Plants:

Garden Chrysanthemums ‘Peach Center piece’ and ‘Sesquicentennial Sun.’ ‘Peach Centerpiece’ and Sesquicentennial Sun’ are garden chrysanthemums released in 2000 and 2001, respectively, by the Univ. of Minnesota herbaceous perennial breeding program. Breeding and selection for complete frost tolerance of petals, extended flowering duration, moderate winter hardiness, improved stem strength, cushion plant habit, and gold flower color led to the selection of ‘Sesquicentennial Sun.’ ‘Sesquicentennial Sun’ is being offered as a new and improved replacement of ‘Centennial Sun’, a 1985 release that is not frost tolerant; ‘Sesquicentennial Sun’ is moderately frost tolerant. The two cultivars have similar flower color, flower form, and floral display. ‘Sesquicentennial Sun’ has a more compact flowering habit than ‘Centennial Sun’. In side-by-side trials, ‘Sesquicentennial Sun’ proved to be season extender that out-performed ‘Centennial Sun’ later in the fall after a frost.

‘Peach Centerpiece’ is a spontaneous mutation of ‘Centerpiece’. Its superior qualities include moderately high winter hardiness, early flowering, superior stem strength, upright plant

habit, above-average frost tolerance of petals and an attractive peach flower color. Stock plants of both cultivars have been distributed to commercial herbaceous perennials and nursery growers for propagation. Information on sources of propagules may be obtained from Jim Stolzenburg, Secretary-Treasurer, Minnesota Nurserymen’s Research Corporation, 1325 Bailey Road, St. Paul, MN 55119. (N. Anderson et. al.)

Preceding brief excerpted from HortScience. 36(7): 1349-1351. December 2001.

Human Issues:

The Green Brigade: Effects on horticulture knowledge and environmental attitude. The Green Brigade horticultural program is a community-based treatment and diversion program for juvenile offenders. The program is used for vocational training and rehabilitation. Participants in the Green Brigade program significantly improved their horticultural knowledge exam scores as a result of participating in the program. Participants also had significant improvements in their environmental attitude scores after completing the program. Program participation was found to be a significant factor in posttest environmental attitude scores. Participants with attendance rates less than 60% were found to have significantly poorer environmental attitudes than those participating more frequently. This program successfully provides development of job skills, worth ethic and community pride. (C. Cammack, T.M. Waliczek and J.M. Zajicek)

Preceding brief excerpted from HortTechnology. 12(1): 77-81. January-March 2002.

Calendar

March 4, 11, 18, 25 – Landscape Plant for Delmarva will be offered from 7-9 PM at the Research & Education Center in Georgetown, DE. The course will be taught by Jay Windsor and Gordon Johnson. Preregistration is required by calling 302-730-4000 or 302-856-7303.

March 7-10– Philadelphia Flower Show, Call: (800)714-3287.

March 13– Industrial and Right-of-Way Weed Control. Location: Williamson Restaurant, Contact Scott Guiser (215)3345-3283. Pesticide update credits will be provided.

March 14 – Goodstay Lecture: The Designed Landscape. Lecture by Cornelia Hanna McMURtrie, well-known Massachusetts Landscape Designer specializing in residential design and park restoration. 7:30 PM at the Delaware Center for Horticulture, Wilmington, DE. Contact Amy Foster 658-6262.

March 16 – Pruning in Springtime—What to Do, What Not to Do. Lecture by expert gardener, J-P Malocsay who will lead you through the techniques needed for proper pruning of trees and shrubs. Delaware Center for Horticulture, 10 AM to 12 PM. Contact Amy Foster, 658-6262.

March 18-22 – Horticulture Short Course. Location: Penn State Great Valley, Malvern Campus, PA. Contact: Dave Suchanic (610)489-4315.

March 20 – Soil and Soil Management for Turf and Landscape will be offered from 7-9 PM at Paradee Center in Dover, DE (Kent County Extension Office). The course will be taught by Jay Windsor and Gordon Johnson. Preregistration is required by calling 302-730-4000.

March 22 and 25. Pesticide training and exam sessions. New Castle Co. Extension Office. Details are posted at: <http://www.udel.edu/pesticide/Cal.htm>

March 25 – 4th Annual Copeland Lecture: Reading the Forested Landscape. Lecture by Tom Wessels, author and New England forest ecologist, who will explain the process of interpreting a forest's history while wandering through it. 7:30 PM at the Delaware Center for Horticulture, Wilmington, DE. Contact Amy Foster 658-6262.

March 26 – CNP exam, Dept. of Agriculture, Dover, DE Contact Valann Budischak (888)448-1203 or 610-274-2166.

March 27 – Invasive Species Council – Third Annual Meeting, St. Jones Reserve, 8 AM – 3:30 PM. Registration is \$15 and includes lunch. For questions contact Cathy Martin 653-2887, x106.

March 27-28. Pesticide training and exam sessions. Sussex Co. Extension Office. Details are posted at: <http://www.udel.edu/pesticide/Cal.htm>

March 28 – Nutrient Management for Golf Courses will be offered from 1-4 PM at the Delaware Ag Museum on Rt. 13 in Dover. Preregistration is required by calling 831-2531.

April 3 – Phosphorus Site Index Training. The course will introduce participants to the Phosphorous Site Index for Maryland and teach them how to calculate the parameters used in determining the P-site index. In addition, there will be field training arranged in various locations around the state. For more information, call (410)841-5959 or visit the MDA Web site at www.mda.state.md.us

April 10 – Emerging Diseases and Insect Pest will be offered from 7-9 PM the Fischer Greenhouse in Newark, DE. The course will be taught by Bob Mulrooney and Dewey Caron. Preregistration is required by calling 302-831-2531.

April 26 – Rare Plant Auction, Longwood Gardens, Kennett Square, PA. Sponsored by the Delaware Center for Horticulture. Contact 658-6262.

April 27 – UDBG Plant Sale. University of Delaware, Newark, DE. Contact Dot Milsom 831-2531 to request a catalog.

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. June 19- Industry Tour, June 20-22 –Educational Sessions, June 21-22 – Trade Show. For more information call: 1-877-927-2775 to receive a \$15 discount coupon.
www.sgcts.ore

June 26 – SE PA IPM Pest Walk. Location: Temple, Ambler, PA. Contact: Dave Suchanic (610)489-4315.

July 9-14– AN & LA Convention, San Diego, CA. Contact: (202)789-2900.

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 at 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 at www.mda.state.md.us

July 23-25, 2002 – PANTS, Ft. Washington, PA. Contact: (610)544-5775

July 24 – SE PA IPM Pest Walk. Location: Scott Arboretum, Swarthmore, PA. Contact: Dave Suchanic (610)489-4315.

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 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 x29.

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

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

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

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

