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

Hope you're hanging in there. This summer is shaping up to be the triple crown of green industry challenges. We've got skyrocketing gas prices, a struggling economy, and it's DRY. Ugh!!! But we will prevail!

Treat yourself to a much deserved day of education and R&R. DNLA's Summer Turf & Nursery Expo will be held on Thursday, August 14th at the University of Delaware Botanic Gardens. As always, we will have the opportunity to visit with exhibitors and friends, hear from some outstanding speakers, and obtain some pesticide and nutrient management credits. Featured talks include:

- A firsthand view of the UDBG Trial Garden. If you heard Dr. Bob Lyons at the DE Horticulture Industry Expo in January, you won't want to miss this!
- A tour of the UDBG led by Dr. John Frett. The tour will focus on trees you need to know.
- UD's Sam Jones will lead a tour of the athletic fields and discuss *The ABC's of Sports Field Management*.
- Dianne Petranuk of Penn State will show us what's involved with maintaining synthetic fields and the pros and cons of turf & synthetic playing surfaces.
- Last but far from least, the ever-popular dynamic duo of Bob Mulrooney & Brian Kunkel will challenge us with a plant pest and disease walk through the gardens.

Registration forms are forthcoming. Please join us for this fun-filled day. It's guaranteed to be a good time!

Retirement congratulations to:

- Dick Kauffman owner of London Grove Nursery in Avondale, PA has recently retired.
- Lynn Harrison, of the Plant Industries section of the DE Department of Agriculture will also be joining the ranks of "retired" in August. Lynn has been a longtime member of the board of DNLA.

Kudos to Dick and Lynn! They have been staunch supporters of the DNLA and its efforts.

On a more somber note, the DNLA would like to express their deepest sympathy to the family of Debbie Morris who died on June 8th. Debbie, of Wilmington, was the president of the DNLA in 1985 and owner of W. D. Martine and Son. She also spent 37 years as a host of "The Garden Club", a radio program on WILM 1450.

Remember to keep the Landscape Awards in mind throughout the summer. Applications will be mailed in the beginning of September. The deadline for entries is September 28th. We encourage any/every member to submit an entry!

U of D NEWS

Susan Barton, Extension Specialist

The summer I am working with Jules Bruck (assistant professor in PLSC who teaches landscape design) to supervise two student interns, Sarah Chatterson and Sarah Minnich. Both have received summer research grants from the UD undergraduate research office. Sarah Chatterson (Natural Resources major), also received a grant from the Mushroom Compost Council to work on a landscape establishment project with mushroom compost. She has planted boxwood and viburnum (donated by Joseph Wick Nurseries) and black-eyed Susan and sea oats (donated by North Creek Nurseries) in 15 plots on the Newark Farm. Her treatments include: mushroom compost tilled into the soil, mushroom compost as a topdressing on tilled soil, mushroom compost as a topdressing on untilled soil, tilled soil with no mushroom compost and untilled soil with no mushroom compost (control). On the plots with no mushroom soil, she has applied slow release fertilizer and on the plots with no mushroom compost topdressing she applied a thin layer of hardwood bark mulch. Sarah took her first round of data in mid June on plant height and overall good health (1-5 scale). She plans take data monthly. Her plots will be part of the Summer Landscape Expo (August 14) tours and the Ornamentals Research Expo (September) tours.

Sarah Minnich (Landscape Horticulture major) is doing a project at St. Andrews School in Middletown, with funding from a USDA Conservation Innovation Grant. She is continuing the work that Leslie Carter started at St. Andrews. Sarah is working on removing invasive plants (primarily multiflora rose, honeysuckle and vinca) from a woodland trail that runs along Noxontown Pond. She will be designing a replanting plan with planned installation this fall. She is also coordinating

three volunteer work days at St. Andrews to accomplish more invasive plant removal. Sarah has evaluated each section along the trail for its level of invasiveness (1-5 scale) and is keeping track of the square footage of removal per person hour in each section. By the end of the summer, she hopes to have an estimate of the average square footage of invasive plant removal that can be accomplished per hour. This data should be extremely useful to land managers who coordinate invasive plant removal.

Valann and I have started two new DelDOT research projects this year. We are testing various methods of controlling vegetation around guardrails. EPA would like DelDOT to reduce its use of herbicides, so we are looking at low fescue seed mix, two types of plastic groundcover systems, and several formulations of herbicides to see how well each treatment controls vegetation. We will be tracking costs (materials and labor) associated with each management method. We hope to provide DelDOT with some important information about how to manage guardrail vegetation using less chemicals at a reasonable cost.

We are continuing to look at methods of establishing warm season grass meadow on highway medians. We have used various carriers (moist sawdust, municipal compost and kiln-dried sawdust) and various pieces of equipment (wheelbarrow and hard rake, mulch blower and manure spreader) to broadcast seed along the median. Our kiln-dried sawdust/manure spreader plot from last summer is full of blooming Black-eyed Susan this year. In late June, we established a replicated trial comparing seed broadcast in sawdust and mushroom compost applied with a manure spreader to seeding with a truaax drill. We hope to have some good answers about the most effective method of establishing warm season grass meadows by this time next year!

SEVEN STEPS TO BUILD CUSTOMER LOYALTY

Greg Smith

Most businesses spend more time and energy trying to find new customers instead of retaining those they have. The logic behind customer retention is simple – It costs far less money to keep customers happy than to spend much more money recruiting new ones. Loyal customers tell their friends about your business and will spend more money than new customers.

I dread eating at airports. If you travel as much as I do, you are probably familiar with the “3 b’s” as it applies to airport fare – bad food, bad attitudes, bad timing.

I had an early flight to catch at the Ontario, California airport recently. I found myself standing outside the closed and gated doorway to an Applebee’s restaurant ten minutes before they opened up. I just knew they would be late and expected to receive the usual grumpy service common at most airports the world over. I was wrong!

Bam! The clock struck five, the lights popped on and this charming lady opened the doors. She greeted me with a smile, a warm “hello” and told me to sit anywhere I wanted. I never had seen such a positive attitude at 5:00 in the morning.

For the next hour, I watched Felicia cheerfully greet customers, many of whom she called by name. They were the “regulars” she said. Felicia was the remarkable person who made that small restaurant pleasant and memorable. Next time I return to the Ontario Airport, I guarantee you this is the restaurant I am going to first.

Here are seven steps to build customer loyalty.

Select the right people. In the book, *From Good to Great*, Jim Collins said, “People are not your most important asset, the RIGHT people are.” Most businesses do a poor job of hiring people. They hire just anyone and place them on the front-line with customers. Spend more time recruiting and hiring the right people with good personalities. Focus on those who are friendly and demonstrate an interest and enthusiasm for the job. Consider using personality profiles as part of the hiring process. These profiles help identify true personality characteristics of your applicants.

Sensationalize the experience for your customers. Good service is not good enough. A Gallup survey showed a customer who is emotionally connected to your place of business is likely to spend 46% more money than a customer who is merely “satisfied” but not emotionally bonded.

Set performance standards. Outline the behaviors of how employees should act, speak, and respond to customer needs and requests. One of our clients developed a list of twenty customer service commandments that outline actions he wanted his service people to demonstrate.

Sustain on-going training and reinforcement. Good customer service skills are not natural for most people. Effective customer service training must be reinforced and taught on a recurring basis. For example, the Ritz-Carlton hotels provide a thorough customer service training program for all of its employees during their orientation. Then each supervisor conducts a daily “line-up” to review one of the commandments with his employees ten minutes before each shift.

Specify incentives for good behavior. Yes, employees want to be paid well, but they also

want to be treated with respect and shown appreciation. The front-line supervisor has the greatest impact on motivating and retaining employees. Reward those who exceed the standards and provide development for those who do not.

Survey your customers and reduce your defection rate. On average, businesses lose 15-20 percent of their customers each year to their competition. All businesses encounter this defection rate, but few do much about it. To improve retention, one client sends out a customer service report card to its top customers every month. This requires an evaluation based on four specific criteria. They tally the results and make sure employees see the scores. This motivates the employees to do a better job.

Seek customer complaints with enthusiasm. For every complaint there are at least 10 other customers that visited your business who have the same criticism. A portion of those 10 people just took their business to your competitor. Look at customer complaints as an opportunity for improvement.

For a free fact sheet, "How to Hire Exceptional People Each and Every Time," please call (770)860-9464 or (800) 821-2487 or visit our website at:

*www.chartcourse.com/greatservice.html
Greg Smith helps create high performance organizations that attract, keep, and motivate their workforce and exceed customer expectations. He speaks at conferences and conducts training programs and is also the author of eight books.*

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HOW TO HIRE EXCEPTIONAL PEOPLE - EACH AND EVERY TIME **Greg Smith**

The interview process should determine if there is a match between the individual and the job. Furthermore, a good process allows you to understand the applicant's behavior, values, motivations, and qualifications. Time and time again we have seen people hired for sales jobs that don't like calling people, customer service people who can't look into your eyes and say "Hello." Then there are good employees promoted into management positions lacking the competencies to lead and manage others. Here are several reasons why interviewing techniques fail:

Lack of preparation - The first impression lasts a long time. Prior to the interview make sure you understand the key elements of the job. Develop a simple outline that covers general job duties. Possibly work with the incumbent to get a better idea of what the job is about. Screen the resumes and application to gain information for the interview. Standardize and prepare the questions you will ask each applicant.

Lack of purpose – Not only are you trying to determine the best applicant, but you also have to convince the applicant that this is the best place for them to work. Today's workers have many more choices and job opportunities to choose from.

Lack of clearly defined job competencies – Each job can have anywhere from 6-14 job competencies. Identify the behaviors, knowledge, motivations, and qualities incumbents need to have to be successful in the job. If the job requires special education or a license, be sure to include it on your list also. There are several assessments and profiles available to help insure you have a good match between the applicant and the job.

Lack of structure – The best interview follows a structure process. This doesn't mean that the entire process is inflexible without spontaneity. Then each applicant is asked the same questions and is scored with a consistent rating process. A structured approach helps avoid bias and gives all applicants a fair chance. The best ways to accomplish this is by using behavioral based questions, role-plays, and situational questions. Here are some examples:

Behavior Based Questions

Behavioral based questions are used to evaluate the applicant's past behavior, experience and initiative such as:

- Give me an example when you.
- Describe an incident where you went over and beyond the call of duty.
- Tell me about the time you reached out for additional responsibility.
- Tell me about the largest project you worked on.
- Tell me about the last time you broke the rules.

Situational Based Questions

Situational based questions evaluate the applicant's judgment ability and knowledge. The interviewer first gives the applicant a hypothetical situation such as:

"You are a manager and one of your employees has just told you that he thinks another worker is stealing merchandise from the store."

- What should you do?
- What additional information should you obtain?
- How many options do you have?
- When or if should you call the police?

Role Plays

Sample role-plays are effective ways to learn and practice new skills. They can also be used during the interview process to determine the skills and personal charisma of people during stress. For example, if you are interviewing a customer service representative you can use a role-play to see how this person can manage an irate customer. When using role-plays consider the following guidelines.

1. It is a good idea to write the situation down on paper. Give the person time or a short break to "get into character" prior to beginning the role-play.
2. Give the candidate clear guidelines and background information so they thoroughly understand the situation.
3. Allow them to ask questions before you begin.
4. Debrief the applicant at the conclusion of the role-play. Ask them to tell you how they thought they did and how they could have done it differently. Conclude the role-play in a positive way.

Resumes and interviews are not as reliable as they used to be. Yes, a structured approach will improve your chances, but it is important to go one step further. Pre-employment profiles are a valid, legal, reliable, and important part of the hiring process for a growing number of employers.

Approximately 65% of all employers use some form of assessment during the hiring process. But using these tools, organizations have reduced turnover and improved the quality of the workforce. Assessments provide an accurate analysis of employee's behaviors, skills, and attitudes otherwise left to subjective judgment.

There are a variety of assessments to choose from. Some assessments can measure the

honesty and integrity of the applicant. Other assessments can determine the sales ability of the individual.

Another way to hire great people is to understand your *current* top performers. Certain assessments allow you to graphically profile the behaviors, attitudes, and attributes of your people giving you the ability to compare the characteristics of top and low performing employees. This benchmark process puts you in a powerful position to predict success.

More information about assessments and free samples can be found at <http://www.BehaviorProfile.com>

Greg Smith is a nationally recognized speaker, author, and business performance consultant. He has written numerous books including his latest, Here Today, Here Tomorrow: Transforming Your Workforce from High Turnover to High Retention.. He is the President of a management-consulting firm, Chart Your Course International, located in Atlanta, GA 770-860-964

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THE SKILLS OF TOP MANAGERS – BEING A LEADER

Bill Cook, Human Resource Associates

Being a leader is not the same as being a manager and vice versa. It has been said that managers are orchestra conductors and leaders are artists. But what does that mean?

Managers manage things. They create order out of complexity, they keep the trains running on time and to where their supposed to go. Leaders determine what to manage; they deal with ambiguity, change, and opportunity.

Leaders decide where the company or the group is going, what its vision and goals are, how to communicate that vision and to inspire everyone to make that journey.

Not all good managers make good leaders. But equally not all leaders are very good managers. These are two different professions.

What Are the Characteristics of Effective Leaders?

Caring - They empathize with others needs, concerns, and goals of others. Comfortable with ambiguity - They can operate in environments of uncertainty, where guideposts are few.

Persistent - They maintain a positive, focused attitude in pursuing a goal, despite obstacles and failures.

Excellent in communications – They know how to listen closely, make presentations, and speak in public.

Effective negotiators – They are always negotiating, both with outsiders and their own people.

Politically astute – They have a solid sense or

their organization's power structure. They listen carefully to the concerns of its most powerful groups and know where to turn for the support and resources they need.

Humorous – When the situation calls for it they know how to relieve tension with little humor.

Level-headed – In the mist of turmoil and confusion they maintain their inner calmness.

Engaging – They are effective in getting others to commit to organizational goals.

Challenging – They convince others that they should set high standards and to accept goals that make them stretch.

Self-aware – They know how their own behavior affects others.

Future focused – They organize short-term tasks according to long-term priorities.

Not everyone has these traits. Some can be developed, but most of them will be necessary to become an effective leader. But beyond the useful exercise of observing the characteristics of effective leaders, we need to know what effective leaders do.

What they do includes making decisions even though all the facts are not available, making difficult trade-offs, creating plans that others eagerly follow, taking actions consistent with their values, inspiring ordinary people to do extraordinary things, and balancing the tensions inherent in business life. Close-range observation of their behavior can help us to model our own behavior as leaders.

Two Conflicting Energies That Leaders Face on the Job

There are, in almost all organizations, energies that are in conflict. These energies are inherent

in talented, successful individuals and must be identified and managed into balance. Two key energies in conflict are:

1. **The Urge to Compete:** Competitive people are necessary for most growing organizations. Most of these people are competitive by nature. And that competitiveness is not always directed at the company's competitors. It is often aimed at those within the company. Individual employees, team members and entire departments inevitably compare themselves to each other. But some try to shine at the expense of others. Their competitive instincts urge them to seek the recognition and rewards that come with winning. This competitive urge must be channeled into activities that benefit the entire organization. Internal competitiveness can be useful, exciting and even fun. The goal of the effective leader is not to curtail that competitive urge but to keep it in balance and focused on the company's interests.

2. **Decisiveness vs. Group Decisions:** We want and expect our leaders to be decisive. But isn't it a given that leaders share decision making? Decision making is also an energy with built-in conflicts. Leaving all decisions to a democratic polling can be as wrong as making all your decisions on your own with no other input or influence.

Too much democracy can lead to "everyone's second choice." That kind of compromise may be okay with politicians but it can't be the vision you have for yourself or your company. On the other hand, too much autocracy can result in narrow-minded results, missing out on the best ideas and a useless team whose members are all anxious to jump ship.

Astute leaders recognize the benefit of taking counsel, having their own assumptions challenged and hearing alternatives. They know how to make the most out of group decision

making. The effective leader demands that the team address the critical unresolved issues. For example, rather than saying to the team “Here are the budget cuts that need to be made,” the leader says, “Our task this morning is to determine the best way to cut the budget given that the R&D line is untouchable. Tell me your thoughts, the facts that support them and their most likely consequences.

However, when emergencies demand immediate action a singular decision by the leader may be necessary. Team members will understand as long as their input on other issues is welcomed and considered. A leader who is dismissive of their input quickly loses support.

Creating a Vision That Others Will Follow

Visions and goals are not the same thing. Vision is about where you are going. Goals are about how you will get there. A vision is a picture of a hoped-for end result; what it will look like, how it will function, and what it will produce. A powerful vision is one that resonates with the deep yearnings of one’s followers. When President John F. Kennedy stated in 1961 “I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to earth,” he created a classic vision statement. And in July 1969 that’s what we did.

An effective vision touches people’s inner aspirations. Its language can be translated into a realistic strategy. Its fulfillment is usually challenging but achievable; it serves the interests of the company’s key stakeholders, and it clearly defines the benefits to them.

The vision must be easy to explain and understand; focused and straightforward. Even if implementing it is a complicated process, explaining it should not be.

Being an Agent of Change

What is a change agent, and how do they deal with changes?

Creating a vision will show a picture of something different than what now exists. To achieve that vision will require some changes. The leader who intends to produce that vision is by definition a change agent.

Change agents must detect signs in the outer world that changes are happening in their environment. They must be aware of the threats and the opportunities and prod others to respond in ways that will lead to success and survival. They are mindful of those things that do or can affect the world that they and their companies live in.

Author Everett Rogers writing on change agents described them as “figures with one foot in the old world and one in the new,” and said they create a bridge across which others can travel. Change agents fill critical roles:

- Articulate the need for change
- Are accepted by others as trustworthy and competent. (People must accept the messenger before they accept the message)
- See and diagnose problems from the perspective of their audience
- Motivate people to change
- Work through others in translating intentions into action
- Get people to become used to innovation as a norm
- Teach people to recognize complacency and question it when they do

If you possess these characteristics, you are a change agent and a leader. If you don’t, begin now to develop them. Start looking at your

company, or your part of the company, with an “outside-in” perspective. Try to stand outside your situation and look at it with the objective eye of a stranger. Is what you observe going on in your organization in sync with the world around it, or is it out of touch with the larger realities? If it is out of touch, develop some though leadership on the problem. Discuss the problems you see with others, both inside and outside of your group. They find opportunities to alert your peers and your boss to the problem and its consequences if they do not change. Be change agent talents of the team on the vision and the changes it takes to reach it.

But if your organization is uncomfortable with the status quo, feels a need to change, and has respected and effective leaders who know how to work in a collaborative environment, they your organization is prepared for change.

Fight Complacency

Complacency is your enemy. If everyone is just too comfortable to chase visions then they will never see the changes that need to be made, and you could forever be locked in the status quo. Complacency is the most common enemy of change. Your job as leader is to shake them out of their complacency.

If you detect a threat from a new technology or a competitor, it’s your job as a leader to bring this to light with discussion and to challenge the complacency that kills so many other organizations.

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Planet Magazine

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THE ADJUVANT PUZZLE – ADJUVANTS AND SYSTEMIC PESTICIDES

Gordon Johnson, Ag Agent

University of Delaware

An adjuvant is a chemical that is added to a pesticide, either in the pesticide formulation, or as an additive in the spray tank, that enhances the action of the pesticide by modifying its characteristics in relation to the target. The world of adjuvants is very confusing with much information being proprietary. Often it is recommended by manufacturers or by researchers that specific adjuvants be used with systemic pesticides including herbicides, insecticides, and fungicides, to improve their activity or efficacy. Terms such as surfactant, penetrant, and activator are used to describe what the adjuvant does, and to some degree, the general nature of the additive.

There are two basic actions that must be successful for a systemic pesticide to be effective. First, the chemical must enter into the plant. Second, it must be distributed in the plant to the site of action. Adjuvants are used to enhance entry into the plant.

The chemical nature of the pesticide drives what adjuvant is needed to enhance the uptake of that pesticide. Chemical properties such whether the chemical is hydrophobic-lipophilic or hydrophilic-polar are determinate factors in adjuvant choice.

There are several important uptake pathways for pesticide entry through the leaf of the plant. The first is the cuticle. The cuticle is a complex matrix of polyesters and waxes. The waxes are crystalline in nature and may form filaments, plates, ribbons, rods, or other structures. There are also carbohydrate fibers extending from the underlying leaf cell into the cuticle. The chemical and physical nature of the cuticle on a given plant will affect the entry of specific

pesticides. Leaves with thinner cuticles will allow pesticides to enter more readily. That is one of the reasons why pesticide activity is greater in younger plants. For hydrophobic (lipophilic) pesticides, the wax layer is the most likely entry pathway through the cuticle. For hydrophilic (polar) pesticides, the polyester and carbohydrate fiber portion of the cuticle are a likely pathway. Stomata are another entry pathway for some pesticides but entry is restricted by surface tension.

Leaf cellular structure also affects uptake. Basal trichome cells, cells overlying veins, and the area between cell walls in leaves (think of them as joints) are major areas of entry for pesticides.

Adjuvants are added to help the chemical pesticide cover over the leaf surface, move through the cuticle, and in some cases, move into the stomata. Surfactants are a major category of adjuvants. They reduce the surface energy of chemicals applied and water, allowing the chemical to spread over the leaf surface more readily. They have both hydrophilic and hydrophobic components thus working with a wide range of pesticides (whether hydrophilic or hydrophobic). Depending on their formulation, they may work to emulsify, disperse, spread/wet, or solubilize the added pesticide as they interact with the leaf surface.

Surfactants act in a number of ways depending on formulation. They may increase the area of contact of spray droplets with the leaf, increase spray retention, act as a humectant to keep spray droplets moist for a longer time, modify the cuticle by allowing dual solubility in hydrophilic and hydrophobic components as the pesticide moves through the cuticle, produce hydrophilic channels for those pesticides with that characteristic, increase the permeability of the cuticle and cell membrane of the underlying leaf cells, complex with pesticides and lower their surface tension, lower tensions allowing

movement between cell walls of the leaf, and enhance entry into stomata.

Organosilicone adjuvants have been shown to enhance the movement of chemicals into the stomates as a major mode of entry for pesticides. Oil based adjuvants are diverse with two broad categories: petroleum based and vegetable based. Oils work to reduce vapor loss of a pesticide and for some pesticides, improve entry into the leaf by a number of mechanisms.

TIP FOR TICK REMOVAL

I had a pediatrician tell me what she believes is the best way to remove a tick. This is great, because it works in those places where it's sometimes difficult to get to with tweezers: between toes, in the middle of a head full of dark hair, etc. Apply a glob of liquid soap to a cotton ball. Cover the tick with the soap-soaked cotton ball and let it stay on the insect for a few seconds (15-20), after which the tick will come out on its own and be stuck to the cotton ball when you lift it away. This technique has worked every time I've used it (and that was frequently), and it's much less traumatic for the patient and easier for me. Unless someone is allergic to soap, I can't see that this would be damaging in any way. It is that time of the year again.

**CAUTIONS WITH ALTERNATIVE
LIMING MATERIALS**
Gordon Johnson, Ag Agent, UD

Each year we receive questions on different liming materials. This has included waste lime, byproducts from industrial processes and manufacturing, lime-stabilized biosolids, wet limes, and waste materials from construction. Indeed, many of these materials may be effective in moderating soil pH, but it is critical to understand what is in these products or wastes, the chemistry of how they will react in the soil, and how they compare with standard agricultural/horticultural liming materials.

Materials based on limestone such as waste limes and wet limes must be directly compared to standard pulverized agricultural/horticultural lime. To make valid comparisons obtain laboratory analyses of the materials, commonly done in state regulatory laboratories. A typical analysis will report the following: moisture percentage, calcium and magnesium percentages; total neutralizing value (also known as calcium carbonate equivalent), fineness reported as percentages passing different sieves (20, 60, 100 mesh), and effective neutralizing value (based on a combination of fineness and total neutralizing value). The finer the lime, the greater the effective neutralizing value. Wet limes have more moisture and spread in a different manner. Compare how much of the alternative material will need to be spread to equal the neutralizing ability of dry pulverized lime (or pelletized pulverized lime) and adjust so true costs can also be compared. In addition, consider whether or not the material is based on high magnesium (dolomitic) or high calcium (calcitic) limestone.

Lime stabilized biosolids and other lime stabilized wastes also must be compared to standard pulverized lime. Ask what type of lime and how much was used in the stabilization and

get the analysis of the final product (stabilized biosolid). Most commonly, quicklime (calcium oxide) or hydrated lime is used in the stabilization (other alkaline materials have also been used and are replacing lime in some treatment plants). Quicklime and hydrated lime have higher neutralizing values than pulverized lime. However, some of the lime is reacted in the stabilization process. The actual liming value will then need to be adjusted. A calcium carbonate equivalent should be provided by the source treatment plant. In addition, when applying biosolids, a nutrient management plan will need to be in effect to account for the other nutrients provided by the biosolids.

There are many industrial and manufacturing by-products that can be used as liming materials. These commonly have a base element (calcium, magnesium, sodium) in oxide, hydroxide, or carbonate form. Make comparisons based on the basic element provided and the neutralizing ability of the material. One recent analysis we received was waste from an antacid manufacturer. It was high in moisture (40%), had 3 and 6 % calcium and magnesium respectively, had significant amounts of aluminum and iron, had a calcium carbonate equivalent of 42% and had an effective neutralizing value of 29%. While this material could be used as lime in nursery, turf, or landscape areas, you would need to use over 2.5 times more than standard lime. In addition, it is much higher in magnesium than “high mag” lime and only should be used on situations where magnesium fertilization is needed.

Other products or wastes are sometimes touted as liming materials but really are not, for ex. Gypsum and crushed wallboard. These are calcium sulfate. While the calcium may fill exchange sites on soil colloids, the sulfate ion will not effectively neutralize the hydrogen that is released. Therefore, gypsum generally does not change soil pH to any degree.

SUSTAINABILITY AND THE GREEN INDUSTRY

Elise Hansen Tripp, Senior Environmental Scientist, Fishbeck, Thompson, Carr & Huber, Grand Rapids, MI
Robert E. Schutzki, Dept. of Horticulture, Michigan State University

Open any newspaper or news magazine, and it is likely you will encounter the word “green”. None of the described entitles are, in fact, the color green. Green describes a societal movement that prescribes alternatives to conventional 20th century approaches to our way of living.

It prescribes alternatives to the way we eat, live work, and play. Synonymous and often used interchangeably with “green” is sustainability. Like green, sustainability refers to alternative living approaches that maintain the quality of human life and the health and integrity of our natural environment. Sustainability principles are rooted in economic, scientific and sociological disciplines and strive for resource efficiency and economically sound and environmentally friendly approaches.

Assessing sustainability is a comprehensive exercise. It involves:

- Examining our use of resources.
- Identifying intersecting cycles of energy flow and materials.
- Nurturing relationships between animals, plants, and microorganisms.
- Evaluating the economic impact of sustainability practices upon goods and services by completing a cost/benefit analysis.
- Assessing the perpetual give and take between the living and the inanimate in both our natural and built environments.

In order for the Green Industry to determine

where we stand in terms of being “green” or “sustainable”, we must first understand the definition of sustainability; the factors used to evaluate sustainability; and how these factors can be successfully applied to Green Industry operations. The primary focus of our industry is already to contribute to human lifestyle and environmental quality. To complete the journey towards sustainability, it is just a matter of understanding the nature of sustainability, assessing our present practices, making the necessary modifications to our operations, and documenting their impact.

A useful starting point is to review the popular definitions of sustainability utilized by industry, government, and nonprofit agencies. These provide an ideological framework for determining sustainability. They also offer a springboard for developing a model of sustainability for the Green Industry. This model will address every operation within our industry, including nursery production, landscape design/build, landscape management, garden center/retail management, irrigation design/installation, arboriculture and any other related segments.

In 1987, the United Nations World Commission on Environment and Development (UNWCED) formulated what is perhaps the most widely accepted definition of sustainability. UNWCED defined sustainability as “meeting the needs of the present generation without sacrificing the needs of future generations”. The needs may be political, economic, ecological, or social. An inherent weakness within this definition is the subjective nature of needs and wants. Who determines what is a need or a want? Many Americans view their dishwasher and air conditioner as needs, while other social groups might view them as extravagant wants.

Another common approach to sustainability is known as the “triple bottom line” (also known

as TBL, and “People, Planet and Profits”). John Elkington first coined TBL in his book *Cannibals with Forks: the Triple Bottom Line of 21st Century Business* (1994). The triple bottom line is an accounting standard that measures organizational and societal success not only in terms of financial gain or stability, but also in terms of environmental and social performance. TBL requires fair and beneficial practices toward labor, the community, and the region in which a company conducts its business. TBL also requires a company to utilize sustainable environmental practices, to do no harm and curtail negative environmental impact. Areas of concern are energy consumption, waste generation, and use of resources. TBL argues that environmentally sustainable practices are ultimately more profitable for a business.

The Nature Conservancy in conjunction with Chicago Wilderness proposes that sustainable land development consists of three components:

- Environmental integrity: protection and improvement of the air, water and land:
- Economic prosperity: cost effective development that reduces flooding and water quality degradation;
- Community livability: access to recreational opportunities, natural areas, open space and trails. It also provides easy access to employment, education and shopping.

BuildingGreen, Inc. (2001) proposed that sustainability covers a wide range of actions needed to reduce the impact of the built environment on the natural environment. Its goal is to allow future generations to have a high quality of life (in accordance with the UNWCED definition of sustainability). This is accomplished by: using all resources (energy, water, material, and land) efficiently; protecting the natural environment; and creating a healthy built environment.

The emerging ideology of industrial ecology provides helpful insights as we define sustainable operations in the Green Industry. Industrial ecology has three primary goals. The first goal is to promote sustainable development at the global, regional, and local levels through a three-pronged approach:

- Management of resources. Industrial ecology strives for the maximum use of renewable resources and minimum use of non-renewable resources;
- Maintenance of ecosystem structure and function. Industrial ecology asserts that this maintenance is necessary to sustain ecological and human health;
- Achievement of inter-societal and intergenerational environmental equity.

A second goal of industrial ecology is to identify and trace flows of energy and materials. It examines industry’s inputs of materials and energy, tracks their flow and transformation through the manufacturing process and identifies waste outputs.

Industrial ecology’s third goal is to modify the linear flow of materials and energy typically present in industrial systems to a cyclical flow. In linear flow raw materials are used and products, by-products and waste are produced. In a cyclical system, waste is reused as energy or raw materials for another product or process. This approach mimics the cycles present in the natural world, such as nutrient and hydraulic cycling.

The principles of industrial ecology relate to manufacturing, i.e. it consumes raw materials and energy, creates a product, and generates waste. However, several of the strategies that industrial ecology utilizes can be adapted to green industry operations. A first strategy to

consider is that operations can be modeled after a natural ecosystem, which is characterized by a high degree of integration and interconnectedness. The various components of the operation form a web of ecological and physical relationships. This web will create closed cycles of energy and materials (such as eater and nutrient) transformations, thus minimizing overall consumption of materials, energy, land, and water.

A second strategy that the Green Industry may adapt from industrial ecology is the concept of pollution prevention. The U.S. Environmental Protection Agency defines pollution prevention as “the use of materials, process, or practices that reduce or eliminate the creation of pollutants at the source”. A broad definition of pollutant is any material that is present in a large enough concentration to cause harm to human health, other living organisms, or other aspects of the environment. They consist of both natural and manmade substances. Pollutants may be natural elements such as water and soils or energy-related (heat, light, or noise). Pollutants may be chemicals such as fertilizers and pesticides, when applied inappropriately. Soil is a dominant pollutant generated during landscape construction due to the high degree of surface disturbance that occurs during this phase. Storm water removes it from the disturbed landscape, conveys it through drainage courses as suspended solids, and deposits it at downstream locations. An additional consequence of landscape development is often increased storm water discharge. Impervious surfaces and compacted soil prevent infiltration of onsite rainwater. Storm water drains off-site, carrying various pollutants such as road salt and motor oil.

A final strategy that the Green Industry may adapt from industrial ecology is waste minimization. Waste is defined as a by-product of an operation that requires handling and

disposal. Waste generated during construction includes excess soil (from cut and fill operations) and brush from clearing operations. Site maintenance generates grass clippings and pruned plant material. Waste plant material is commonly recycled through composting, but requires handling and is often transported off-site, thus requiring an expenditure of energy.

So, considering the background on sustainability, let's identify criteria that will guide our application of sustainability principles within the Green Industry; criteria that have relevance to our operations; criteria that can be quantified, qualified and analyzed; and criteria that will aid in documenting change and our contributions to environmental, economic, and social quality. We can utilize principles and strategies derived from the triple bottom line and industrial ecology. We can acknowledge priorities established by the U.S. Environmental Protection Agency, U.S. Green Building Council, the Nature Conservancy, BuildingGreen, Inc. and virtually any other group that may have direct or indirect connection with our products and services. While evaluating these priorities, it is important to remember that the perspectives of these organizations arise from political, economic, ecological, and social agendas.

Each agency and organization sets its own priorities and as a result, views sustainability through its own lens. The outcomes may be similar in terms of efficient use of resources, protection of the natural environment, and maintaining a healthy built environment and economic stability, but the path to this outcome may vary between interest groups. The heart of sustainability for the Green Industry is to efficiently manage our resource, protect the natural environment, create and maintain a healthy built environment, and ensure economic stability and prosperity.

There are already numerous programs focused on various segments of our industry. For example, EcoHort™ is an environmental management system for Australian nursery production developed in partnership between Nursery and Garden Industry Australia and Horticulture Australia Limited. It is used to both assess responsible and sustainable nursery production methods and to promote the industry's environmental and natural resource stewardship. In the Winter 2007 issue of Perennial Press titled *Growing Green*, Walters Garden Inc. gave an excellent overview of sustainable practices in their operations. It cites environmentally friendly solutions in the greenhouses, fields and the office. Sustainable water management is addressed by the American Nursery and Landscape Association in their "Be Water Wise" program (www.anla.org/waterwise). Another water management program was developed by the U.S. Environmental Protection Agency in cooperation with the Irrigation Association, the U.S. EPA WaterSense certification program (www.epa.gov/watersense). The Sustainable Sites Initiative coordinated by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center and the U.S. Botanic Garden is developing a certification program for "natural" and "built" site development patterned after LEED programs. Being "Green" is a part of our industry, take a look at these examples of sustainability in practice and then take a look at what you are doing. Can you promote being "Green" and its contribution to our quality of life?

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SUSTAINABLE PLANT SELECTION

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The heart of sustainability in the Green Industry is to efficiently manage our resources, protect the natural environment, create and maintain a healthy build environment, and ensure economic stability and prosperity.

Without a doubt, plants are the foundation of our outdoor environment. The diversity of plant species and the multitude of cultivars, hybrids and varieties make for creative and appealing landscape compositions. There are a number of reasons for choosing plants for the landscape. We may be attracted to their ornamental appeal or call upon them to serve a specific function or purpose in the landscape, such as providing a screen, blocking unwanted views or stabilizing a soil bank. Others may be selected because of their ability to adapt to poor soils or simply for the ease of subsequent care.

Generally, when professionals are asked about plants, responding is not as simple as blurting out a few names. Plant selection is an organized process that examines several factors: function, aesthetics, site adaptability and management. The priority placed on each category varies with the individual. The freedom to choose from a wide variety of plants depends on the flexibility or restrictions imposed by the individual, the site or, in some cases, availability. Viewing plant selection as a process may at first seem cumbersome, but in time the process can make it easier to make decisions and unveil more choices than first thought.

Function or purpose defines the reason for the plant use. Looking good certainly justifies a

selection, but the value of a plant may go far beyond aesthetic appeal. Function guides the selection of a plant type, such as tree, shrub or perennial and how it will serve the property owners. Plants are packaged in many ways – their aesthetic qualities are as diverse as the species we have to choose from. Plant aesthetic qualities include the overall habit or shape of the plant and its foliage, flowers, fruit, and bark. The combinations of plant form, foliage, flowers, fruit and bark can result in creative, artistic displays.

Once we have identified the potential aesthetic qualities, the next question is to determine whether or not the plant will truly perform in the soil and environmental conditions on the site. A helpful adage is “Don’t fight the site.” If you test or challenge Mother Nature and pick a plant that does not match your site conditions, there is a good chance that it will fail. Factors related to site adaptability – such as the plant’s cold hardiness and tolerance for site conditions such as soil type, exposure and light levels – will define whether your aesthetic selections will perform to your expectations and thus be sustainable.

The final consideration in plant selection is management. Landscape management or maintenance guides the development of plants and is important for the long term success of a landscape. After initial establishment, accent plants start to show off their qualities, plant masses begin to integrate, and border plantings achieve their intended shape. It is the feasibility and quality of maintenance that ensures the long-term aesthetic appeal of any plant and certainly highlights its contribution to the overall appeal of the landscape. Horticultural practices such as pruning, fertilization, irrigation and pest management need to be considered in making our final plant choices.

Function, aesthetics, site adaptability and

management form the foundation of Right Plant/Right Place and have been used for years to identify appropriate plants for a given landscape. Sustainability can be easily interwoven into the four criteria of plant selection. In fact, several sustainable qualities have always been a consideration in plant selection, use, and management. Let’s take a close look at these criteria from a sustainable perspective.

“Function” refers to the purpose that plants serve in the landscape. The shade of a tree canopy, the filtered screen from a hedge or the erosion control a ground cover address the specific objectives of the planting. Plants serve three major functions in our landscapes: architectural, engineering and environmental. Individually or in concert, plants are the foundation of the landscape and reinforce the intended use of our outdoor space, whether that use is active or passive. We can liken the development of our landscape to the development of rooms in our homes – each room is shaped for its intended use and accessorized or embellished accordingly.

Plants serve an architectural function by defining the floors, walls and ceilings of our outdoor rooms. Floors direct our movement into and around the rooms. They are defined by colors and textures of turf, ground covers, creeping perennials and other interesting materials. Several ground cover plants have been promoted for their ability to withstand foot traffic. These in combination with more traditional turf have certainly changed our definition of living carpets. Walls establish boundaries and set the mood in our outdoor space. They can allow or limit visual and physical access. The dimensions of a wall are defined by height, depth and density. In combination, these dimensions can provide an open, filtered or enclosed feeling. Screens of evergreen trees, clusters of multi-stemmed trees,

masses of intermediate shrubs and low masses of herbaceous perennials all contribute to the characteristics of a wall and its influence on the mood or feeling the room projects. Ceilings are usually formed by our canopy trees. Ceilings are characterized by their height and density. The branching height of a tree can contribute to the openness or intimacy of a room. Density influences light, whether it is blocked, filtered, dappled or bright. The location of the canopy can also contribute to changes in a room throughout the day or season. Deciduous trees offer a wide array of seasonal characteristics that contribute to the artistic appeal of our ceilings. Plants serve a very important role in shaping the rooms in our landscape. Their form provides the structural framework, and their foliage, flowers and branches provide the wallpaper and decorative appeal.

Plants serve an engineering function by influencing how we walk through the landscape, blocking objectionable views on or off of the property, establishing buffers between divergent activities and minimizing drainage or erosion issues. Bordering a sidewalk with small shrubs may help direct people along the walk. Screens between patios and utility areas separate leisure from work space. Ground cover shrubs can hold soil on a slope or prevent excessive erosion during seasonal rains. The engineering role of plants tends to be more utilitarian in addressing site issues or irregularities, but nonetheless contributes significantly to the overall success of the plantings.

When we speak of an environmental role for plants, our attention focuses on their influence on microclimates within the landscape. "Microclimate" refers to temperature, wind and light in a relatively small area. Plants can modify microclimates in our landscapes and thus contribute to human comfort. The positive contribution of plants to energy conservation has been well documented. Plants can reduce heat

loss in the winter and minimize heat gain in the summer. Windbreaks are designed to intercept and deflect prevailing winds and reduce wind speed in the protected area. Plants along a foundation can form an insulating layer between the building and the outside wind. Plants provide benefits in the summer by intercepting direct and reflected rays of the sun or channeling summer breezes. Canopy trees intercept the direct rays and provide a shade pattern; while shrubs can intercept reflected rays from pavement and the sides of buildings.

Sustainability adds natural function and the accompanying ecological services to our list of functions that plants serve in the landscape. Plant functions are the product of interactions between plants and elements of the environment: the individual plant's relationship with the soil within its root zone, the air circulating around its stem and leaves, the water that falls on its leaves and stems and is absorbed by its roots, the insects and animals that eat it and disperse its seeds, and, finally, the other plants that exist in association with it. Every plant provides multiple functions; these may be general in nature (such as removing carbon dioxide from the atmosphere) or specific (such as providing food for a particular type of larvae).

Plant functions are biological, physical, and aesthetic in nature (Dunnett & Clayden, 2000; Thompson & Sorvig, 2000; Lyle, 1999; and Robinette, 1972). Plants play an important role in maintaining water quality through intercepting rain and stabilizing soil. By absorbing the energy of raindrops, precipitation reaches the ground more slowly, allowing for greater infiltration and less overland flow. Plants' spreading, clinging roots hold soil in place and modify its structure, further improving infiltration and preventing erosion.

Plants impact air quality in several ways. Leaf stomata (small openings) allow the interchange

of gases in and out of the plant. Oxygen is released and mixes with the ambient atmosphere, diluting the concentration of pollutants. It is believed that most of the oxygen needed for human respiration comes from terrestrial green plants (Woodwell, et al., 1978). Leaves also release water vapor through transpiration, humidifying and cooling the air. One estimate contends that a single tree, through evaporation alone, produces a cooling effect equivalent to approximately ten room-size air conditioners working 20 hours per day (Reilly, 1976).

Leaves absorb carbon dioxide, which is converted into plant matter through photosynthesis. This reduces the concentration of carbon dioxide in the atmosphere, counteracting the greenhouse effect caused by carbon emissions. Leaves also absorb and assimilate gaseous pollutants. In a modeling study using meteorological and pollution concentration data from across the continental United States, U.S. Forest Service scientists determined that urban trees remove approximately 711,000 metric tons of pollutants each year (Nowak, et al., 2006). This reduction in the concentrations of ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, and particulate matter less than 10 microns in diameter significantly improves urban air quality.

Plants provide various functions that directly benefit people. They provide food and raw materials, such as wood and fiber. They offer aesthetic benefit, and have been attributed to promoting physical and mental health. The Sustainable Sites Initiative contends that views of nature and plants impact physiological functions, such as stress responses and healing time (SSI, 2007). Views of nature and plants have also been linked to higher mental function, greater worker productivity (Kaplan, 1993), and better school performance (Wells, 2000). Plants modify people's sensory experience of the

outdoor environment. If placed strategically, they absorb noise. They also create pleasing or calming sounds directly (rustling) or indirectly (through the presence of birds, insects, and frogs). Finally, they benefit wildlife by providing food and shelter.

In general, the above functions impact both the natural and built environments. Aside from some wildlife habitat requirements, these functions are performed by both native and nonnative plant species. The degree that they perform a function is determined by the species' physical attributes, such as biomass, rooting depth and plant morphology.

Aesthetics or curb appeal tends to be the most notable quality of a landscape. The success or failure of a landscape is often judged on the visual quality of the plants.

Aesthetics starts with the plant type and the size of the designated planting area. All plants will take up space, some more so than others. To ensure the integrity of the planting we must plan accordingly and identify the amount of space we want or will allow the plants to cover. The size of the available space influences the type of plant that we select. Each plant type sparks an image, some large, some small. "Shade tree" implies large canopy; "evergreen tree" usually suggests dense foliage and a conical shape; an ornamental/flowering tree could be a small, delicate threadleaf Japanese maple or a wide-spreading crabapple. Shrubs offer a diverse array of sizes from dwarf barberries to massive viburnums. Ornamental grasses and perennials offer a variety of sizes to choose from. "Ground cover" implies a carpet-like growth habit. Plant type, size and overall habit are important considerations of sustainability. Unwanted growth or plants that overextend their bounds may result in adding maintenance and waste disposal.

Looking first at plant type allows us to match the plant with the space and leads us to consider shape. Shape adds another dimension to the ornamental quality of a plant composition. It also aids in characterizing the relationship between or among plants in the composition. Selecting for shape will give us plants for overhead, underneath as well as side by side. Many of our landscape compositions have several layers of plants, each contributing to the aesthetic appeal of its own layer and that above or below.

Flowers, foliage, fruit and stems/branches/bark add to the aesthetic appeal of our landscape by providing color and texture. The impact, duration and seasonality of these characteristics vary. Choice of colors, the textural qualities of the foliage, fall color and winter displays of fruit, branch color and bark contribute to the four-season appeal of the landscape.

Sustainable plant selection adds one more factor for consideration when identifying aesthetic plant qualities, and that is biological character. Biological character is broadly defined by vegetative habit, reproductive characteristics and dispersal ability. Vegetative habit refers to growth form and rate. Vegetative habit is often a consideration on shrubs, vines and ground covers. Reproductive characteristics and dispersal ability strongly relate to the potential of a plant to become invasive. Reproductive ability identifies a plant's tendency to reproduce by seed and/or through vegetative means. Questions are asked to determine if a plant can regenerate from seed, the extent of seed production, and the viability of the seed bank and natural dispersal mechanisms. Vegetative reproduction focuses on fragmentation, spreading rhizomes, and natural dispersal mechanisms. Dispersal ability identifies the vectors or agents of dispersal and the likelihood of long distance dispersal. Dispersal agents are environmental influences such as wind and

water; wildlife, both mammals and birds; domestic animals, both mammals and birds; and human activity. Dispersal ability refers to the potential for long distance dispersal. Understanding the biological character of plant species and their subgroups (Variety, Subspecies, Cultivars, Forma, Intergeneric Hybrids, Interspecific Hybrids, Line, Strain, Race, and genetic variants) leads to sustainable and environmentally responsible plant selection.

Site adaptability is the relationship between the environmental and soil conditions on the property and/or the designated planting area and the needs of the plant. It ultimately determines whether a plant will perform to expectations. If the plant is unable to establish and resume vigorous growth after planting, it is not likely to exhibit the aesthetic qualities that led to its selection. "Don't fight the site" – either let the site conditions guide selection or be prepared to modify the site (soils, drainage, microclimate) to accommodate the plant introductions.

Hardiness refers to the plant's ability to withstand cold temperatures. USDA hardiness zones are based on the average minimum cold temperature. It is critical to base your plant selection on its ability to withstand the lowest expected temperature.

Soil type influences aeration, water retention, drainage and nutrient-holding capacity. Sandy soils are noted for their drainage and low nutrient-holding capacity. Loams are often considered the best soils for plant growth and development because of their adequate aeration, drainage and nutrient levels. Clays are suspect for poor aeration and drainage problems. Knowing your soil type and its benefits and liabilities will aid in identifying the right plant for your site.

Soil pH is another soil parameter influencing plant growth. Soil pH regulates the availability

of micronutrients in the soil. For example, iron is relatively unavailable in soils with high pH (above 7.0). Acid-loving plants find it difficult to extract iron in adequate amounts from high pH soils. The result is a deficiency called iron chlorosis. Chelated iron applications are necessary to correct the problem. Knowing your soil pH will help you avoid pH sensitive plants.

“Light exposure” refers to the amount of light available in the designated planting area. Knowing daily light patterns and their changes with the season again help tailor selections. Available light can also change with the maturity of the planting. As plants grow, what once was considered full sun can now be classified as partial shade. It may be necessary to change plants in a composition as time influences light levels.

Compass orientation refers to exposure to the north, east, south and west. Orientation may subject plants to prevailing winds or seasonal sun patterns that may have a negative influence on their development. Prevailing winds in the winter come from the north-northwest. The wind direction shifts in the summer to south-southwest. As a rule, broadleaf evergreens should not be placed in north-northwest exposure unless they are protected from the direct influence of the wind. Winter sun patterns can also be a problem for broadleaf evergreens and thin-barked trees. The sun is in the southern portion of the sky in winter. Late afternoon sun warms plants in southwest exposures. Late afternoon warming followed by the abrupt temperature change when the sun sets causes frost cracks (splitting bark on trunks). Exposure to drying sun and wind can cause sunscald and desiccation of broadleaf evergreens. Other environmental considerations that influence plant performance include sensitivity to air pollution, exposure to and tolerance of deicing salt, and tolerance to light reflected off of pavements and buildings.

As mentioned, site adaptability ultimately determines whether a plant will perform to expectations. If a plant is unable to establish and resume vigorous growth after planting, it is not likely to serve the expectation of the property owner, contribute natural functions and ecological services, and exhibit aesthetic appeal.

Landscape management addresses the heart of sustainability. Designing and constructing a landscape is a short-lived process based upon limited human understanding of the complexities of nature. Site management addresses the long-term life of the site: its foundational character at this point in time, and what it is becoming. As Peter Del Tredici states, “Sustainability is not a design. It is what happens later.” (Hines, 2006)

Sustainable plant selection anticipates both the initial and future landscape, and the natural and human functions that these provide. If completed with sensitivity and forethought, cognizant of the site’s character and limitations, plant selection will minimize the management inputs and waste outputs needed to maintain acceptable landscape function and form. Ideally, these inputs and practices will carry the lowest possible environmental cost and protect natural resources. It could be argued that the least environmental impact would occur if no site maintenance occurred. However, for most landscapes, this is not an acceptable approach, because it does not allow for maintaining human function (including the desired aesthetic appearance).

Plant management within the landscape contributes to its overall appeal. The visual quality of the landscape can fall short if horticultural practice does not fall in line with plant needs. We must be realistic in determining the level of maintenance that we are willing to administer and adjust our plant selection accordingly. There is no such thing as

a maintenance-free landscape, but low-maintenance sustainable landscapes are possible.

Pruning can be minimal if plants are picked to fit their allotted space. Pruning may be necessary to minimize encroachment of one plant into another's space. If a formal hedge is an integral part of the design, pruning becomes more intense and more of a priority. Sanitation is a necessary part of plant management. Leaves, fruit and stems are normal plant litter. Some plants litter more frequently than others; some produce larger amounts of litter than others. Sanitation can be limited to the fall or may be a constant chore throughout the growing season. Supplemental irrigation can be a weekly requirement in some landscapes. Some plants require more water than others, and some require water at regular intervals. Understanding the water requirements of certain plants or the situation they are in will ensure long-term sustainability and aesthetic quality.

Once established, most landscape plants do not need regular fertilization. Micronutrient deficiencies may require special treatments, but in most cases this is not a major consideration in selection. Pest management, however, is another case. In plant selection we need to consider the susceptibility and/or tolerance to major insects and diseases. Major problems are those that reduce plant quality and must be controlled on a regular basis. Plant selection can focus on resistant species or cultivars to avoid the need for preventative or curative control applications. One pest that has to be considered in plant selection is deer. We must either focus on deer-resistant plants or provide the necessary protection from feeding.

Landscape management utilizes energy expanded by both humans and machines. Management tasks include cutting plant material (mowing turf, pruning shrubs and trees),

removing plant waste (leaves, grass and trimmings), introducing materials that aid in plant growth (water, fertilizer, lime, and pesticides), and physically modifying soil (through aeration and mulching). Energy in the form of gasoline or electricity powers the equipment employed in site management and can be evaluated and potentially reduced by sustainable plant selection.

Sustainable plant selection follows an organized process. The criteria used in the process integrate function, aesthetic preferences, adaptability of a species to the site, and the management required to ensure establishment and subsequent performance. Sustainable plant selection is at the heart of sustainability in the Green Industry. It contributes to efficient resources management, protects the natural environment, creates and maintains a healthy built environment, and ensures economic stability and prosperity. Think about it, sustainability gives us a few more factors to consider and reason for identifying the plants that we use.

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PEST INDEX: A NEW APPROACH TO ESTABLISHING THRESHOLDS FOR PEST MANAGEMENT IN WOODY LANDSCAPE PLANTS

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A new approach is proposed for prioritizing management of pests of woody plants in landscapes. A *pest index*, which is calculated by considering the detectability, damage potential, and the ease with which pests can be controlled, is proposed as a measure of the threat posed by a number of groups of insect and mite pests to trees and shrubs. The pest index can be used to assist in making decisions about pests that are encountered, whether to ignore them, have zero tolerance for them, or tolerate them up to critical threshold values. Using this approach should enable managers of woody plants in landscapes to effectively limit damage from arthropod pests while minimizing the unnecessary usage of pesticides, thereby fostering the adoption of integrated pest management.

Management of arthropod pests of woody plants in the landscape is challenging because of the huge diversity of pests and potential host plants in these settings. As pest management in landscapes has moved to incorporate elements of integrated pest management (IPM), the result of greater concern about pesticides and stricter environmental regulations, an increasing number of landscape management firms are shifting away from the use of cover sprays and a zero-tolerance mentality toward arthropod pests. This approach, by definition, requires that one is willing to accept the presence of pests at some level. A fundamental question to address is: How many pests are too many? How many pests can be tolerated before intervention is required to keep the pest population from causing excessive damage? Further, what level

of damage is excessive? The answers to these questions depend on many factors. Because landscape plants are grown primarily for aesthetic purposes, it is more difficult to quantify damage than for, say, a crop plant, where damage thresholds can be readily quantified. In addition, tolerance for plant damage varies greatly with the property owner and the setting; some people prefer to see pest-free trees and shrubs, and less damage is tolerated in high-visibility locations than in back yards. If property owners truly wish to use less pesticide in managing the arthropod pests of their trees and shrubs, however, they will clearly need to become tolerant of some level of pest damage (changing attitudes such as this may require substantial educational effort, which is not the focus of this paper). For the purposes of discussion, I am assuming that the property owner has been convinced of the need to accept some level of aesthetic damage; for the rest of this paper, I focus on developing pest management thresholds that are designed to prevent damage to the health of woody plants, not aesthetic damage.

Ball and Marsan nicely developed the concept of treatment thresholds for a landscape IPM program. They point out that landscape firms using a See-And-Spray approach to pest management (i.e. a zero-tolerance approach) use a *visual threshold* to make decisions about pesticide application; if a pest is seen on a landscape plant, regardless of the number of pests or the damage, a pesticide application is made. One step above this is the *damage boundary* approach, which results in pesticide application whenever damage from a pest is apparent. Both of these approaches suffer from the fact that woody plants are able to tolerate significant amounts of feeding damage, anywhere from 25 to 50% in the case of defoliators (3, 5, 10); thus, unneeded pesticide is applied using these approaches.

A more sophisticated type of treatment threshold, as Ball and Marsan point out, is the *economic threshold*. This level is the level at which intervention prevents a pest population from exceeding the economic injury level (the level of damage at which damage from the pest equals the cost of controlling the pest). Because this type of threshold requires exact quantification of the value of the plant, it is more suitable for use in agronomic settings (such as nurseries), where plants are grown for sale. Quantifying the aesthetic damage is much trickier, but has been elegantly approached by Raupp et al. As pointed out earlier, though, this paper will not focus on aesthetic damage but rather on damage threatening to the health of the plant.

A more neutral type of threshold is the *action threshold*, defined as the pest population level at which action must be taken to prevent unacceptable damage. The level of damage is generally agreed upon at the start of a growing season, and if the level of damage approaches the threshold, intervention is generally required (although declining pest population levels would dictate that pesticide application be deferred).

A number of researchers have attempted to establish action thresholds for landscape pests, but unfortunately, the number of pests for which treatment thresholds exist is disappointingly small considering the large number of plant/pest combinations.

Other investigators have attempted to broaden the range of treatment thresholds for woody plant pests by suggesting values based on reasoning as opposed to experimentation, and I am convinced that such an approach needs to be expanded because of the overwhelming number of pest/host/setting combinations and the logistical and financial limitations facing researchers who might attempt to determine such thresholds experimentally. Consider the

number of plant/pest combinations: there are over 300 species of woody plants found in landscapes in North America, and over 300 species of pests. Not all pests occur on all species of plants, of course, but the number of plant and pest combinations is staggering nonetheless. Other factors influence the tolerance for pests as well: time of year, soil conditions, weather, the starting health of the plant (or previous infestation history), location (e.g. back yard vs. high profile landscape), and the tolerance level of the property owner/manager. These factors all need to be considered when deciding what level of pest damage is acceptable.

To establish treatment thresholds rigorously for even the most significant pests out of the multitude that infest trees and shrubs would be a tremendous amount of work. It would take many researchers many years to measure the impact of each pest at a variety of densities on each of their host plants. Then, the impact of the moderating variables mentioned (soil and weather conditions, time of year, location, etc.) would need to be assessed with additional years of effort. The likelihood of this type of research being conducted is increasingly unlikely because funding for ornamentals research is far below what it should be for a sector of the agricultural economy that is as vibrant and growing as the Green Industry. Further the number of researchers available to conduct the needed work is becoming limiting as well.

Given the impracticality of trying to experimentally establish treatment thresholds for the myriad of arthropod pests of woody plants, I took a more theoretical approach to the problem. The objective was to derive a measure of the threat posed by pests to the woody plants they attack based on several factors that determine pest potential, a measure I have termed the *pest index*.

To narrow down the plethora of pest/plant combinations to a more manageable set of pests for which thresholds can be established, I lumped pests into groups based on similarity in their feeding habits. Using these criteria, I have broken pests of woody plants into 17 categories (Table 1).

The next step was to classify each of these groups according to three dimensions that go into determining the overall pest potential of each group. The first dimension is *detectability*. This is merely the ease of difficulty of detecting these arthropods when they are present on a plant. Thus, leaf-feeding larvae as a rule are quite easily seen, so they would be classified as high on the detectability scale. In contrast, borers are generally not seen until feeding damage is rather extensive, so they rate low on the detectability dimension.

The second dimension is *damage potential*. This is a rough assessment of the damage the arthropod is capable of inflicting on the host plant if nothing is done to protect the plant. Thus, leaf feeding larvae rate from moderate to high, whereas borers rate high on damage potential. I have rated bark beetles low in terms

of damage potential because they primarily infest trees that are dead or dying, although species of bark beetles that may attack and kill trees under stress that otherwise would have survived should be classified differently, perhaps lumping them with borers.

The final dimension is *ease of control*. This is a rough assessment of how easy or difficult the pest is to control, especially with reduced risk pesticides (e.g. *Bt*). Ease of control is determined by several factors, the main ones being how exposed the pest is (e.g. internal vs. external feeders) and how readily it is killed by pesticides. Pests that feed externally and can be easily managed with pesticides would thus rate high on the ease-of-control scale, whereas internal feeders (e.g. borers) or those that are not easily impacted by pesticides would rate low. Other groups of pests fall somewhere between these two extremes.

The *pest index* is a combined function of the three dimensions just described: detectability, damage potential, and ease of control. The pest index represents a relative measure of the threat posed by a pest to a woody plant. It differs from damage potential, which is a measure of how

much damage a pest is capable of inflicting on the plant if left uncontrolled, because it takes into consideration other factors that impact our ability to control the pest. Thus, a pest that is easily controlled but is difficult to detect will naturally have a greater likelihood of causing damage than an insect that is easily detected, and thus will have a greater value for its pest index. In addition, the pest index does not reflect differences in likelihood of encountering pests in a given landscape. Just because a pest has a high pest index (that is, poses a serious threat to a plant if encountered) does not mean that it is likely to cause damage to the woody plants in that landscape; the threat exists only if the pest is encountered. Given the unpredictability of occurrence of many of our landscape pests, it seems prudent to consider the potential threat posed by arthropods known to infest woody plants in a region, and be prepared to deal with them should they surface in a given year.

Calculating the pest index for the groups of pests in Table 1 results in most of the pests falling into the low and moderate categories, with the only member of the high category being borers. It is not surprising that borers would surface as the pests with the greatest pest potential; borers are one of the more serious groups of pests because of their damage potential, their inaccessibility to pesticides, and their difficult detection. As a result, the tolerance for this group should be near zero; they should be vigorously battled in the landscape, and prevented from becoming established, whenever possible. Using detection traps would be appropriate for these pests, and fortunately, there are traps available for a number of borers (mainly clearwing borers). Unfortunately, there are many borers for which traps are not available (e.g. most coleopteran borers, including roundheaded and flatheaded borers as well as ambrosia beetles); prophylactic application of pesticides, normally considered

counter to the principles of IPM, are justified for settings where these insects can be expected to occur based on prior history or their presence in nearby locations.

The pest groups with low to moderate pest index values and low damage potential can probably be safely ignored – using the values listed, that covers lace bugs/plant bugs, aphids, and bark beetles. (Again, those species of pests within these groups that pose more serious threats to plant health should be treated separately, and have a pest index computed that reflects their greater damage potential. For example, lace bugs are often unimportant pests in more northern reaches of the United States but can be serious pests in many southern locations; for these pests, a pest index should be adjusted to reflect this difference in damage potential.) Those pests with moderate to high damage potential should be treated as they are encountered at any level in the damaging life stage(s). This grouping includes primarily leaf-feeding coleopteran and lepidopteran larvae as well as root feeders with high damage potential (e.g. black vine weevil in the vicinity of newly transplanted host plants). Those pests with low to moderate damage potential that can increase rapidly in numbers (e.g. spider mites, thrips, and bud mites) should also be treated when found if conditions for population growth are favorable, especially if monitoring frequency is expected to be low because of unavailability of labor.

The remaining insects – sawfly larvae, leafminers, leafhoppers, scales, twig/shoot feeders, tree crickets, and twig galls – are ones for which thresholds should be employed when making treatment decisions. No published thresholds exist for these pests, however, so thresholds based on logic will have to suffice for the movement. I have suggested thresholds for these pests in Table 2. The values there are based on the notion that defoliation from 25 to 50% can be tolerated before damage is done to a

woody plant, but I have used the more conservative end of this range for most of these pests. For leafminers, I increased this threshold to 50% because the damage these insects cause to leaves is only partial. For scales, I used the value proposed by Nielsen of 5 mature females per meter of branch length, and for twig gallers, I dropped the infestation rate to 15% of branches infested because loss of branches is much more harmful to woody plants than loss of leaves. These thresholds are merely suggested starting values, and should be modified based on experience with these pest groups and the damage they cause, similar to the approach proposed by Ball and Marsan for establishing action thresholds. Ideally, action thresholds will be the focus of researchers aiming to develop IPM programs for landscape pests.

One important aspect of the pest management thresholds that I am proposing is that they were chosen to preserve plant health, and not necessarily minimize aesthetic damage to woody plants. While aesthetic injury levels aim to keep damage from arthropods below levels that are noticeable by humans, I am suggesting that looser thresholds be followed that, while they may result in plant damage that is unappealing to the human eye, will not seriously impact the health of the tree or shrub. This involves modification of human tolerance for damage, and will not be acceptable in certain high-exposure landscapes, but as pesticide regulations become stricter and fewer products available for use in landscapes, it may be inevitable that managers and users of landscapes

will need to tolerate more pest damage. Nursery managers are likely to follow stricter thresholds because appearance of plants is critical for maximizing their market value, but for trees and shrubs grown for several years in a nursery, it may be possible to follow the looser guidelines while preserving plant health when plants are young, and then tighten up the thresholds as the plants reach marketable size.

It is important to realize that my classification of pests by pest group is arbitrary to some extent, and this breakdown and the subsequent calculation of the pest index should be modified as necessary to make sure that important pests that differ from others with which they might be lumped are not overlooked. For example, those pests that vector diseases have not been explicitly considered in my classification scheme; such pests may need to be considered separately from others with which they are currently combined. In addition, insects that cause problems unrelated to the damage they do to their woody plant hosts (e.g. dripping of honeydew by sucking insects onto valued objects below) would require action thresholds designed to limit property damage, and not thresholds designed to prevent damage to plant health. In situations where the property owner is more concerned about the appearance of their plants rather than following an approach that will reduce pesticide use while ensuring the health of their plants, treatment guidelines such as these are meaningless because the treatment threshold would be determined solely by aesthetic considerations. However, a number of factors are forcing managers of woody plants to look at pest management differently. Following an IPM approach requires increasing tolerance of pests and pest damage, to levels at which they do not seriously damage the aesthetic value or pose a threat to the health of the plant.

Excerpted from J. Environ. Hort. 26(1):58-62. March 2008.

**New Castle County Yard Waste Ban
Opportunities for the Nursery and
Landscape Industry
James Short, DNREC**

As you all know, the yard waste ban is in full swing and all three of our community yard waste sites are open for business and are VERY popular. To date we have ground the yard waste twice each at the DART and Polly Drummond sites and produced in total about 9,000 cubic yards of mulch which is free to homeowners. Of that amount, about 2 to 3 thousands yards remains between the two sites. I am estimating that we will produce anywhere from an additional 6,000 to 10,000 yards when we grind at all three sites in a month or so. I do not believe at this time of year the public will remove all of the mulch we produce. Therefore I am searching for other “markets.” In the long term it would be beneficial to the program in terms of off-setting costs if we could actually sell some percentage of this material but in the near term we are willing to give it away in order to avoid excessive stockpiles that will require on-going management. Help with marketing, whether it is short or long term help, is why I am reaching out to you.

If you have not seen our mulch I would encourage you to visit one of the two sites where a stockpile remains. Considering it is a smorgasbord of whatever nature of grass, leaves, brush and branches that get deposited at these sites it actually makes pretty decent mulch using a 2 or 2.5 inch screen on the grinder. In addition to the material that comes straight out of the grinder I am also working with Filtrexx (<http://www.filtrexx.com/>) on getting our material approved as a filter media and possibly a growing media. We will accomplish this by screening the yard waste using a one half inch power screen with the larger material (aka “overs” or “½ inch plus”) becoming the filter media and the smaller materials (aka unders or

½ inch minus) becoming the growing media. The unders are of particular interest because of their potential as a growing media/compost and their ability to assist with improved drainage, water retention and nutrients in compacted/poor soils.

I estimate, and it’s only an estimate because we don’t have a years worth of experience yet, that we will produce about 30,000 cubic yards of mulch per year. To help put this in perspective you could cover about 100 acres 2 inches deep with 30,000 cubic yards of mulch ... yeh, we have a lot of mulch here! I am reaching out to the nursery and landscape industry who might e interested in using this yard waste as mulch or organic amendments. In the future, we may have “free loading mulch days” with a backhoe, etc. to increase convenience for homeowners. I’m hoping we can find productive uses for this material we don’t end up with excessive stockpiles.

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Research Briefs

Propagation:

Rooting southern blackhaw. *Viburnum rufidulum* (southern or rusty blackhaw) is a large deciduous shrub or small tree with attractive spring flowers, lustrous green leaves, showy fruit, and beautiful fall color. The species is remarkably drought tolerant and has few insect and disease problems. It is underused due to difficulty with propagation. Results from this study demonstrate stem cuttings of southern blackhaw can be rooted in commercially acceptable numbers using a quick dip of K-IBA (liquid formulations from 6000-9000 pp rooted stem cuttings in 8-10 weeks). Commonly used talc formulations of IBA do not produce sufficient rooting with southern blackhaw. (J.J. Griffin)

Excerpted from J. Environ. Hort. 26(1):1-3. March 2008

Greenhouse Production:

Growth regulators control height of Achillea 'Coronation Gold'. This population perennial has been suggested for flowering pot production as a greenhouse crop, but it is too tall for small containers. This study looked at a variety of growth retardants. The highest quality ratings were found with B-Nine/Cycocel at 3825/1534 ppm, Sumagic at 22 and 33 ppm, and Bonzi at 64 ppm. However, differences between the results of this study and earlier studies highlight the impact of differences in environments, container size, and possible differences in the stage of development when plant growth retardants are applied. (J.R. Kessler, Jr. and G.J. Keever)

Excerpted from J. Environ. Hort. 26(1):24-28. March 2008

Pistill suppressed plant width of verbena cultivars during production.

Verbena canadensis cultivars are very popular herbaceous perennials. However, their vigorous spreading growth habit can be a problem during production. Long trailing shoots growing well beyond the rim of the container make maintenance and shipping difficult and expensive. Plants are also more subject to damage during handling and planting. This research showed that a single spray application of Pistill (ethephon) at 500 to 1000 ppm suppressed plant width of 'Taylortown Red' verbena at 2 weeks after trt and 'Homestead Purple' verbena at 4 weeks after trt. Height and width of both cultivars were suppressed up to 7 weeks after trt with 2 applications. No phytotoxicity symptoms were observed and all treated plants were of marketable quality throughout the study. (T.J. Banko and M.A. Stefani)

Excerpted from J. Environ. Hort. 26(2):67-69. June 2008

Greenhouse crops produced with municipal solid waste compost. Municipal solid waste (household garbage) is a locally available by-product and composting is encouraged as an effective pathway to reduce volumes of municipal solid waste (MSW). Production studies with dusty miller, petunia, Japanese holly fern and begonia showed that replacement of pine bark with 25-33% MSW often increased plant growth. However, blending of pine bark with higher than 50% MSW is species specific (some species show enhanced growth and others show equal or reduced growth). (W.Lu, X.Yang, J.L. Sibley, C.H. Gilliam, J.S. Bannon and Y. Zhang)

Excerpted from J. Environ. Hort. 26(2):75-79. June 2008

Paclobutrazol (Bonzi) improves postproduction shelf life of bedding plants. Paclobutrazol (Bonzi) application to petunias and salvia during production promoted compactness and enhanced market quality with minimal or no delay to flowering. While exposed to drought-stress cycles in a simulated retail environment, plants previously treated with Bonzi wilted in much lower percentages and maintained consistently higher quality than control plants. Results suggest that application of Bonzi during production, a standard practice in growing many bedding plants has a positive impact of postproduction shelf life and may benefit sales in retail outlets where plants are often subjected to frequent drought stress. (G.J. Keever and J.R. Kessler, Jr.)

Excerpted from J. Environ. Hort. 26(2):123-127. June 2008

Flowering of *Phlox paniculata* ‘Ice Cap’ for cut flower production. Although *P. paniculata* does not have an obligate cooling requirement for flowering, these data confirm that cooling *P. paniculata* ‘Ice Cap’ plugs can increase stem length and flowering stem yields. Use of HID supplemental lighting can accelerate flowering in the absence of cooling and promote longer stems and higher yields when forcing this crop for cut flower production. (J.M. Gerner and A.M. Armitage)

Excerpted from HortScience 43(3):707-709. June 2008.

P in hydroponically grown *Scaevola aemula*. As a result of rapid accumulation of P in foliage and subsequent reductions in flower number and shoot elongation, fan flower should be fertilized with no more than 20 mg/L P. (S.E. Burnett, D. Zhang, L.B. Stack and Z. He)

Excerpted from HortScience 43(3):902-905. June 2008.

N, P and K requirements for optimizing growth and flowering of the nobile dendrobium as a potted orchid. 100 mg/L N, 25 mg/L P and 100 mg/L K are recommended for optimal vegetative growth and reproductive development of *Dendrobium cv* Red Emperor ‘Prince.’ Consumers prefer that leaves remain on nobile dendrobium potted plants when in full flower. No or inadequate N caused severe leaf loss, giving plants a less than appealing appearance. Excess N is considered a common cause of poor flowering. (R.G. Bichsel, T.W. Starman and Y Wang.)

Excerpted from HortScience 43(2):328-332, April 2008.

Forcing ‘Bath’s Pink’ dianthus requires vernalization. The wholesale value of herbaceous perennials produced in the US has grown by 63% in the past 5 years. This can be partly attributed to the increasing ability of producers to force and market perennials in flower for scheduled market dates. *Dianthus gratianopolitanus* ‘Bath’s Pink’ requires vernalization for forced flowering. The shortest vernalization period that elicited 100% flowering was 3 weeks at 5°C. The maximum temperature for vernalization is about 10°C. Compared with other treatments, more flowers were produced after 8 weeks at 0°C and 6 or more weeks at 5°C. (S.R. Padhye and A.C. Cameron)

Excerpted from HortScience 43(2):346-349, April 2008.

Types of N that promote growth and flowering of *Phalaenopsis*. When high fertility is provided to *Phalaenopsis*, whether grown in pure sphagnum moss or in a bark mix, the data suggest that a minimum of equal proportion of NO₃-N and NH₄-N must be provided. Providing 75% NO₃-N and 25% NH₄-N further improves vegetative growth and flowering of

Phalaenopsis. (Y. Wang)

Excerpted from HortScience 43(2):350-353, April 2008.

Growth and flowering of florists'

hydrangeas. N status of container-grown florists' hydrangea during the vegetative stage of production influences both vegetative growth and flowering during forcing. Spraying plants with urea in the fall before defoliation improves growth and flowering performance of florists' hydrangea during forcing, and N application during forcing also plays an important role in sustaining plant growth and flower development. Although urea sprays in the fall have the potential to improve N storage, decrease overall fertilizer input, and optimize growth during production of container-grown florists' hydrangeas, the optimum rates and timing of urea applications still need to be evaluated. (G. Bi, C.F. Scagel and R. Harkess)

Excerpted from HortScience 43(2):472-477, April 2008.

Nursery Production:

***Alnus maritima* symbiosis with soil borne *Frankia* bacteria.** Actinorhizal species are trees and shrubs that function as pioneer plants on N-poor soils. Their potential to provide much of their N requirements through N-fixing symbioses with soil-borne *Frankia* bacteria makes them logical candidates for development as sustainable crops for landscaping. *Alnus maritima* (sea side alder) is a stress-tolerant large shrub especially adapted to full sun and wet soils. It is fall blooming and native to Delaware (and Oklahoma, Georgia and Maryland). Pendulous catkins are striking in fall and persistent cone-like strobili provide winter interest. Species specific inoculum (soil collected near native populations of alder)

produced the greatest growth increases. But, *Frankia* are capable of forming N₂-fixing symbioses with *Alnus* sp. Have been classified as members of the *Alnus-Myrica-Comptonia* host-specificity group and are capable of nodulating species of these three genera. The ease of preparation and inoculation with soil (refrigerate inoculum until use, add water to saturation, sow seeds or plant seedling in inoculum sufficient to surround roots) and the high level of effectiveness that can be achieved (comparable or better than species-specific, crushed nodule inoculum) may make soil application the preferred method for inoculations in nurseries. (J.A. Schrader and W.R. Graves)

Excerpted from J. Environ. Hort. 26(1):29-34, March 2008

Cyclanilide induces lateral branching in container whips.

A major goal in the production of ornamental whips is to produce small well-branched liners with a crown form similar to that of a mature tree. Pruning is used to induce lateral branching and regulate height, but pruning may result in poor tree quality, reduced whip growth and is labor intensive. Container-grown whips are becoming a popular alternative to bare-root whips. Cyclanilide foliar sprays to actively elongating shoots increased lateral branch development and reduced height growth resulting in one-year branched whips (*Amelanchier*, *Malus* and *Tilia*). Cyclanilide spray produced more lateral branching than terminal shoot pruning and therefore, is a more effective method of inducing branching reducing height. (P. Sternberg, D.K. Struve)

Excerpted from J. Environ. Hort. 26(1):45-50, March 2008

Tolerance of three juniper species to glyphosate. Currently, the use of glyphosate

over-te-top of ornamentals is an off-label use. With field- and container-grown ornamentals, many weed control situations are often encountered where no selective herbicides are available. In these situations, low rates of glyphosate have the potential to provide a low-cost cleanup and rescue treatment of weed-infested ornamentals. From this research, it appears that the three juniper species tested ('Parsoni' juniper, 'Blue Star' juniper and 'Blue Pacific' shore juniper) were tolerant to glyphosate rates as high as 2.5 lb/acre. Glyphosate rates above 2.5 lb/acre caused unacceptable damage. However, growers should use caution in applying glyphosate to nursery crops and should conduct trials before treating their entire stock. (M.A. Czarnota)

Excerpted from HortTechnology 18(2):239-241, April-June 2008.

Weed suppressive biomulches control weeds in containers. Results demonstrate that wood chip mulches from southern redcedar and southern magnolia can be used for weed suppression in container-grown crape myrtle and that southern redcedar mulches can be used for weed suppression in container-grown dogwood. Introduced crabgrass and redroot pigweed were not completely controlled by any treatment including herbicides. The mulches had no negative effects on the host plants. Wood chip mulches may be an attractive alternative to chemical weed control but are only practical when local supplies of mulch exist. This research also suggests that isolation of herbicidal compounds from select species could potentially be useful as bioherbicides or templates for novel synthetic herbicides. (J. Ferguson, B. Rathinasabapathi and C. Warren)

Excerpted from HortTechnology 18(2):266-270, April-June 2008.

WholeTree substrate with supplemental

fertilizer for producing petunia and marigolds. With the addition of an adequate starter nutrient charge. *WholeTree* is an acceptable substrate component replacing the majority of peatmoss in production of petunia and marigold. Additionally, the wide range of particle sizes achieved from the production of *WholeTree* substrate provides needed structure and can eliminate the need for expensive aggregates such as perlite. What is most promising about *WholeTree* is the possibility of an economically sustainable greenhouse substrate, which could be available in close proximity to major horticultural production areas throughout the southeastern United States. (G.B. Fain, C.H. Gilliam, J.L. Sibley, C.R. Boyer, and A.L. Witcher)

Excerpted from HortScience 43(3):700-705, June 2008.

Growth regulators reduce susceptibility to cold injury following warm winter spells in Fraser fir and Colorado blue spruce. Treatments with paclobutrazol (Piccolo) and flurprimidol (Cutless 50W) have the potential to improve Fraser fir and Colorado blue spruce resistance to cold injuries after sudden warm winter temperatures. However, the PGR treatment should probably be applied early enough to allow translocation to all parts of the plant during bud formation. (P. Azokou and P. Nikiema)

Excerpted from HortScience 43(3):742-746, June 2008.

Mustard seed meal suppresses weeds in container-grown ornamentals. Mustard seed meal is a byproduct of mustard grown for oil production. Seed suppression with mustard seed meal generally increased as rate increased from 113 to 450 g/m. Mustard seed meal may be useful for selective suppression of annual weeds when applied to the soil surface of

container-grown transplanted ornamentals. MSM rates used in this study were lower than rates of corn gluten meal used in weed suppression. (R.A. Boydston, T. Anderson, and S.F. Vaughn)

*Excerpted from HortScience 43(3):800-803.
June 2008.*

Subirrigated vs. overhead irrigated coneflower seedlings. Subirrigated coneflowers showed increased seedling quality with more biomass (14%), better nitrogen use efficiency (13%), greater nitrogen content (N; 11%), more height (15%), and lower mortality compared with overhead-irrigated seedlings, plus they produced no leachate. (J.R. Pinto and R.A. Chandler and R. K. Dumroese)

*Excerpted from HortScience 43(3):897-901.
June 2008.*

Clay as a substrate amendment to reduce P application rate and leaching fraction when producing ornamentals in a pine bark-based substrate. Clay-amended substrates increased both water and mineral nutrient buffering capacities of the substrate. Mineral content of P, K, Ca, Mg, S, and Mn in Skogholm cotoneaster increased in clay-amended compared with sand-amended substrate. Clay may act as a slow-release form of P that reduces environmental impact while supplying the plant a portion of needed P. (J.S. Owen, Jr., S.L. Warren, T.E. Bilderback and J.J.P. Albano)

*Excerpted from HortScience 43(3):906-912.
June 2008.*

Turf:

Selective removal of creeping bentgrass from Ky bluegrass with sulfosulfuron. Control of creeping bentgrass was dependent on proper application timing. Late fall applications were

the most effective providing up to 31% control of creeping bentgrass. Single applications of sulfosulfuron late in the fall may be useful in partially removing creeping bentgrass in a heavily contaminated sward of Ky bluegrass. However, the capability of sulfosulfuron at completely removing creeping bentgrass is questionable unless greater control can be achieved. Preliminary data indicate that three fall applications of sulfosulfuron at 0.053 kg/ha provided 93% control of creeping bentgrass. (M.A. Jones, N.E. Christians, D. Weisenberger and Z.J. Reicher)

*Excerpted from HortScience 43(3):919-921.
June 2008.*

Creeping bentgrass control in Ky bluegrass and tall fescue lawns. Creeping bentgrass (CBG) is a common weed in golf courses and home lawns with no registered selective control in cool-season grasses. Mesotrione and triclopyr ester were applied to selectively remove CBG from Ky bluegrass and tall fescue on a 2-week interval two, three, or four times in CT and MD. Three to four applications of mesotrione (0.14 or 0.21 kg/ha ai) provided excellent CBG control. Mesotrione elicited little or no injury to Ky bluegrass but caused objectionable injury in tall fescue for about 7 to 14 d after each application. Triclopyr at 0.56 kg/ha ai reduced CBG cover but the level of control was unacceptable, regardless of application frequency. Three or four applications of triclopyr at 1.12 kg/ha ai effectively controlled CBG with no visual injury to tall fescue, but four applications caused injury to Ky bluegrass. Three summer applications of mesotrione (0.14 kg/ha ai) or triclopyr (1.12 kg/ha ai) provided the best combination of turfgrass safety and CBG control. It should be noted that mesotrione and triclopyr have herbicidal activity on several seed species. Because large areas of bareground may develop where susceptible weed populations are high,

overseeding likely will be required. Hence, future research should focus on potential soil residuals of these herbicides and their impact on overseeded turfgrass species. (P.H. Dernoeden, J.E. Kaminski and J. Hu)

Excerpted from HortScience 43(2):509-513, April 2008.

Pest Control:

Chemigation controls white grubs in nursery production. Drip chemigation is the application of nutrients or pesticides through a drip irrigation system that results in reduced labor and fuel costs, less drift and reduction in worker exposure to pesticides. Imidacloprid (Marathon II), Clothianidin (Celero 16WSG) and entomopathogenic nematodes were applied through drip irrigation and successfully reduced numbers of white grubs in field grown Kousa dogwoods and crabapples. This technique should also work in drip irrigated container production. (M.E. Reding, H.Zhu and R. Derksen)

Excerpted from J. Environ. Hort. 26(2):93-100, June 2008

Crape myrtle resistance to flea beetle feeding.

Lagerstroemia indica cultivars are the most susceptible to flea beetle feeding injury. All of the *L. fauriei* cultivars and most of the *L. indica* x *fauriei* cultivars were resistant ('Biloxi' was the exception). The interspecific hybrids (*L. indica* x *fauriei*) bred by the National Arboretum are hardy to Delaware. (R.I. Cabrera, J.A. Reinert and C.B. McKenney.

Excerpted from HortScience 43(2):403-407, April 2008.

Evaluation of delphinium cultivars for resistance to powdery mildew. 'Blue Bird', 'King Arthur', 'Cameliard', and 'Galahad' were

consistently more resistant than 'Casa Blanca', 'Blue Shadow', 'Belladonna', and 'Bellamosum'. 'Oriental Blue' was moderately resistant. (S.N. Wegulo and M Vilchez)

Excerpted from HortTechnology 18(3):407-409, July-September 2008.

Marketing:

Consumer preference for native plants in Montana study. In general native plants were preferred over non-native plants in built landscapes. Surprisingly, among those participants who were not familiar with the native plants in photographs and those who had not purchased native plants before, a preference for some plants considered to be native was clearly evident in this survey. Consumer awareness of native plants and their interest in using them in the landscape is likely at a critical stage. Plant professionals, both growers and landscapers, are uniquely poised to respond to what should be increasing consumer interest, if not demand. (Y.R. Zadegan, B.K. Behe and R. Gough)

Excerpted from J. Environ. Hort. 26(2):109-114, June 2008

Maintaining plants in a retail nursery with capillary mats. Irrigation with capillary mats compared with overhead irrigation has the potential for saving up to 70% of water compared with overhead spray and even more compared with hand watering that is applied to maintain plants under retail conditions. Plant performance of plants that are relatively large for the container and require frequent irrigation may be enhanced when maintained on capillary mats, whereas plants that require good drainage and drying out between irrigations may be better suited for long-term maintenance under overhead irrigation. Capillary mats are a labor-saving alternative to hand watering in a retail

nursery and will compensate for the higher initial investment within less than 1 year. The overhead sprinkler is the most cost-effective of the three because of a less costly initial set-up and maintenance than the capillary mats. However, overhead sprinklers are not a true alternative to hand watering in most retail situations because they interfere with customer traffic and staff activities. (U.K. Schuch, J.J. Kelly and T. Teegerstrom)

Excerpted from HortTechnology 18(2):250-255, April-June 2008.

Students who use campus green spaces have higher perceived quality of life. The majority of students responding to this study (67%) were ranked as high-users of campus green spaces. Students who used campus green spaces more frequently perceived their quality of life as higher when compared with students who used campus green spaces less frequently. Results suggest campus green spaces and their availability could potentially be a contributing factor in student retention, particularly among students new to the university. Student use of campus green spaces did not appear to benefit any particular genders or ethnic group more than others. (A.L. McFarland, T.M. Waliczek, J.M. Zajicek).

Excerpted from HortTechnology 18(2):232-237, April-June 2008.

Estimating U.S. Consumers' Choice of Floral Retail Outlets. The entire ornamental plant industry is experiencing a transition that higher percentage of transactions occurred in box stores and general retail as a result of the ever-expanding reign of chain stores and mass merchandisers. The percentage of transactions have been falling in traditional retail (TR) and increasing in box stores (BS) and general retailers (GR), yet market share of TR is still the highest among others. Determining how to

compete against each other and gain market share is perhaps the most important challenge that all the retail venues face. Understanding consumers' behaviors and purchasing pattern is of great significance for retailers' market decision. The comprehensive consumer tracking study conducted by AFE allows us to thoroughly investigate U. S. consumers' patronage pattern of different retail venues. U.S. consumers' choices of retail venues differed across different regions. Some retailers may have a competitive advantage in some regions of the country that they may be able to copy or duplicate in other geographic areas. Consumers bought at BS and GR because of low price and convenience, whereas consumers chose TR and direct-to-consumers (DC) because of the delivery, service, reputation, and quality. Consumers were more likely to buy gifts from TF instead of BS. Wealthier consumers tend to patronize TF instead of BS. To some extent, consumers were actually buying "different" products from different outlets, which partly explains why the mean expenditure of products per transaction in TF and DC were higher than that in BS and GR; consumers who chose TF and DC not only bought the products themselves, but also the labor invested in designing and arranging flowers, serving specific needs of customers, and delivering; whereas consumers who bought at BS and GR might not consider themselves as enthusiastic gardeners because they bought on impulse and selected plants based on price. To maintain the market shares, it is important for the retailers to keep their market segments by differentiating products and service from each other. (C. Yue and B.K. Behe)

Excerpted from HortScience 43(3):764-769, June 2008.

Aquatic garden species can be grown in subsurface constructed wetlands in a sustainable nursery enterprise. Taxa that

preferentially allocate nutrients to aboveground biomass allow for the harvesting and removal of topgrowth. Continuous and long-term removal of excess P from constructed wetlands (CWs) can be ensured by regularly harvesting pollution-tolerant species. IN nursery/greenhouse production systems, container-grown aquatic garden plants receiving runoff channeled into nutrient attenuation /production CW beds can also be “harvested” to remove nutrients from the system. Removal of entire plants avoids P export to outflow and downstream environments from senescent, decomposing tissues. Plants with highly efficient N and P recovery rates such as *Thalia* and *Oenanthe* can be placed at the discharge end of a CW to “polish” the effluent. Also, they can be located at the inflow end of CWs because of their ability to assimilate high N and P concentrations. *Thalia*, *Oenanthe*, and *Phyla* may also be suited for SSF CWs in greenhouse production systems because of their ability to assimilate high volumes of nutrient-rich water, which reduces the amount of effluent that must be discarded. The commercial value of aquatic garden plants offsets their production costs, which offers producers a sustainable, cost-effective, and low-maintenance remediation solution compared with conventional wastewater treatment technologies. The results of this study support the use of aquatic garden plants as aesthetic and economically viable alternatives to traditional, obligate wetland plants in CWs. The potential exists for subsurface flow constructed wetlands to concomitantly produce aquatic garden plants and attenuate nutrients in a sustainable nursery enterprise. R.F. Polomski, D.G. Bielenberg, T. Whitwell, M.D. Taylor, W.C. Bridges and S.J. Klaine)

Excerpted from HortScience 43(3):868-874. June 2008.

Container gardens in garden centers. A web

survey was used to determine the effect of price, color harmony and care information on container garden preferences. Relative importance decreased from price (71%) to amount of care information (23%) to color harmony (6%). Survey participants preferred a container garden with a price point of \$24.99, extensive care information and complementary color harmony. A large portion (76%) of participants in this study indicated they would be more likely to purchase a container garden if extensive care information was included with the purchase and 85% of participants said they would be willing to visit an Internet Web site that would provide more information on how to care for and maintain a container garden. Results of this study show there is a potential to increase the value of a container garden by providing educational material with the purchase. (S.C. Mason, T.W. Starman, R.D. Lineberger and B.K. Behe)

Excerpted from HortScience 43(2):380-384, April 2008.

New Plants

Winter hardy Mammoth™ Series Garden Chrysanthemums. Three new *Chrysanthemum x hybrida*, garden chrysanthemum cultivars: Red Daisy, White Daisy and Coral Daisy, are the first in the Mammoth™ series. They are winter-hardy (Zone 3b) herbaceous perennials exhibiting a shrub habit with the cushion phenotype. They attract butterflies, have frost tolerant flowers and are ‘self pinching.’ Currently, rooted or unrooted certified (virus indexed) cuttings of all Mammoth™ cultivars are available in North America from Ball Seed Company. (N. Anderson et. al.)

Excerpted from HortScience 43(3):648-654, June 2008.

‘Tuscan Sun’ Heliopsis. ‘Tuscan Sun’ is a new

cultivar of *Heliopsis helianthoides* possessing a compact growth habit (about 25"). It produces an abundance of flower heads, each with a single row of golden yellow ray florets over 10-12 weeks (typically June through August). 'Tuscan Sun' is a vegetatively propagated cultivar and is adapted to USBA hardiness zones 3 to 9. The compact growth habit of 'Tuscan Sun' offers new versatility, allowing heliopsis to be used in confined garden beds and containers. 'Tuscan Sun' is currently available from licensed propagators from Proven Winners under the brand Proven Selections and is licensed through Plant Haven (Santa Barbara, CA). (D.C. Zlesak and B.J. Hanson)

*Excerpted from HortScience 43(3):927-928.
June 2008.*

'Duet' Beautyberry. This is a variegated sport of *Callicarpa dichotoma* 'Albifructus.' This deciduous, multi-stemmed shrub has inconsequential flowers followed by clusters of 10 to 12 white fruit that ripen in September and persist for 1 to 2 weeks after leaf drop. 'Duet' plants are available from wholesale, mail-order, and a limited number of retail nurseries. The U.S. National Arboretum does not have plants of this cultivar available for general distribution, but can supply cuttings to nurseries wishing to initiate production. (S.M. Reed, G.R. Bachman, W. E. Davis)

*Excerpted from HortScience 43(3):933-934.
June 2008.*

'Betsey Ross', 'Old Glory', and 'Declaration' lilacs. All three cultivars are well suited for use as a single specimen plant, an early-blooming focal point in a mixed shrub border, as a deciduous hedge or screen, or mass-planted in large areas. 'Betsey Ross', the first lilac cultivar released from the U.S. National Arboretum, was selected for its abundant fragrant, pure white flowers, rounded growth habit, and adaptability

to warmer climates. 'Old Glory' was selected for its relatively slow-growing rounded habit, clean medium-green foliage, and fragrant bluish purple flower. 'Declaration' is recommended for traditional cooler lilac-growing regions, where it displays large, fragrant, striking dark reddish purple inflorescences, outstanding deep burgundy fall color, and an open, upright growth habit. The National Arboretum does not have stock of these cultivars available for general distribution but can supply budwood or unrooted cuttings to nurseries wanting to propagate these plants. (M.R. Pooler)

Excerpted from HortScience 43(2):54-545, April 2008.

Publications

Free online pesticide training course available for retail employees

The University of California Statewide IPM Program has released a free online pesticide training course for retail and garden center employees, Master Gardeners, or others who advise residents about pesticides.

In just 40 minutes, participants can learn how to direct residents to least-toxic products and teach homeowners how to review pesticide labels, safely use and store pesticides, or clean up any spills.

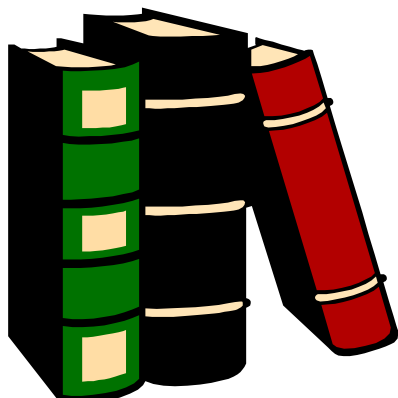
The interactive course consists of two modules—the first on pesticides and pesticide safety and the second on integrated pest management (IPM). The second module on IPM practices is scheduled for release in December 2008 and will complete the course.

Visit

www.ipm.ucdavis.edu/IPMPROJECT/retailtraining.html for the online course.

Mary Louise Flint

Associate Director: Urban & Community IPM
UC Statewide IPM Program and
Extension Entomologist
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(530) 752-7692



Calendar

July 17-18 – PGMS Program in Washington, DC. Further information is available online at

<http://www.pgms.org/2008regionaldc.htm>

Contact Eric Grammer, ericgrammer@assnhqtrs.com

July 18 – Woody Plant Conference, Land Performing Arts Center, Swarthmore College. Registration deadline: July 11. Registration fee includes lunch/refreshments. To register send fax to: Continuing Education, Longwood Gardens Fax: 610-388-9806 or call for more information: 610-388-1000 x507, Monday-Friday, 8am-4pm.

July 20-22 – Planet Legislative Day on The Hill – Renewal & Remembrance at Arlington National & Historic Congressional Cemeteries, L’Enfant Plaza Hotel, Washington, DC. Contact: 800-395-2522, www.LandcareNetwork.Org

July 20-26 – Perennial Plant Association Symposium and Trade Show. Location: Philadelphia, PA. Contact : www.perennialplant.org or call 614-771-8431.

July 22-24 – PA Green Expo-2008. Location: PA Farm Show Complex & Expo Center, Harrisburg, PA 17110. Contact Information: phone 800-789-5068; www.pagreenexpo.co

July 24-26 – The American Horticultural Society presents the 16th annual National Children & Youth Garden Symposium, “Growing Fertile Minds and Communities.” Join leading national children’s and youth gardening experts. The Symposium will be headquartered at the University of Delaware’s Newark Campus. For more information, visit www.ahs.org, E-mail youthprograms@ahs.org or call 703-768-5700 x 132.

August 4-5 – Wetland Training Courses 2008. Advanced Plant Identification, cost \$380. Course Descriptions & Registration available online at www.wetland.org or Call (410)745-9620.

August 6 & 7 – Gardens That Evolve: Directing Natural Succession, Lakeville, CT. New Directions in the American Landscape Program. Contact 215-886-1492 or info@weanerdesign.com.

August 7-9 – SNA Trade Show, Atlanta, GA. For more information call: 770-953-3311, www.sna.org

August 12 – Shade Perennials. Longwood Gardens Continuing Education 2008., Visitor Center Auditorium,

1:00 p.m.-3:00 p.m., cost \$149 passholder, \$159 non-passholder. Code #082EPSQA. Evening sessions: 7:00 p.m. – 9:00 p.m., Code #82EPSQE. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

August 14 – DNLA Summer Turf and Nursery Expo. University of Delaware Botanic Gardens, Newark, DE. Contact Valann Budischak, 610-274-2166.

August 20-21 – Wetland Training Courses 2008. Living Shoreline Design and Construction, cost \$380. Course Descriptions & Registration available online at www.wetland.org or Call (410)745-9620

August 28 & 29 – Meadows and Meadow Inspired Gardens: Making it Work, Easton, PA. New Directions in the American Landscape Program. Contact 215-886-1492 or info@weanerdesign.com.

September 8-11 – Wetland Training Courses 2008. Grasses, Sedges, and Rushes, cost \$700. Course Descriptions & Registration available online at www.wetland.org or Call (410)745-9620.

September 9-11 – ANLA Kick the Dirt Tour. Location: DE, Southern NJ, PA Contact: www.anla.org or 202-789-2900.

September 10-12 – ANLA Landscape Distribution Tour. Location: Mid-Atlantic Region (MD, PA, DE). Contact: www.anla.org or 202-789-2900.

September 10 – Greenhouse and Interiorscape Pests. Walk. Longwood Gardens Continuing Education 2008., Acer Room, 3:00 a.m. – 6:00 p.m., cost \$70 passholder, \$79 non-passholder. Code #082PFGIA. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

September 11 – Pest Identification Walk. Longwood Gardens Continuing Education 2008., Catalpa Room & Outdoors, 9:00 a.m. – 12:00 noon, cost \$70 passholder, \$79 non-passholder. Code #082PFPIM. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

September 11– Plant Disease Identification Walk. Longwood Gardens Continuing Education 2008., Catalpa Room & Outdoors, 1:00 p.m – 4:00 p.m., cost \$70 passholder, \$79 non-passholder. Code #082PFPDA. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

September 11 & 12 – The Cultural Landscape: People, Nature and Art, New Egypt, NJ. New Directions in the American Landscape Program. Contact 215-886-1492 or info@weanerdesign.com.

September 16 – Berks County Landscape Update, 1-4 PM, Berks County Ag Center, Leesport (Bern Township). Contact Nancy Bosold, 610-378-1327. Pesticide update credits will be provided.

September 17 – Montgomery County Landscape Update, 1-4 PM, Montgomery County 4-H Center, Creamery. Contact Mary Concklin, 610-489-4315. Pesticide update credits will be provided.

September 19 – Weed Identification Walk. Walk. Longwood Gardens Continuing Education 2008., Catalpa Room, 9:00 a.m. – 12:00 noon, cost \$70 passholder, \$79 non-passholder. Code #082PFWIM. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

September 19 – Turf for the Professional. Walk. Longwood Gardens Continuing Education 2008., Catalpa Room, 1:00 a.m. – 4:00 noon, cost \$70 passholder, \$79 non-passholder. Code #082PFTPA. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

September 23 –Lehigh County Landscape Update, 4-9 PM, Schnecksville Fire Company Pavilion, Schnecksville. Contact Emelie Swackhamer, 610-391-9840. Pesticide update credits will be provided.

September 23 - Bucks County Landscape Update, 1-4 PM, Neshaminy Manor Center, Doylestown. Contact Scott Guiser, 215-345-3283. Pesticide update credits will be provided.

September 24 - Chester County Landscape Update, 8 AM-12 noon – CPR/First Aid for the Green Industry, 1-4 PM. – Landscape Update. Location: Chester County Government Services Center, West Chester. Contact Cheryl Bjornson, 610-696-3500. Pesticide update credits will be provided.

September 25 – Field Day at Raemelton Farm in Frederick County. Topic includes sensor irrigation. Contact: Suzanne Klick, 301-596-9413.

September 26-28 – Winterthur Garden Fair – Celebrate the Artist and Gardener. For information visit gardenfair.org or call 800-448-3883.

October 1 – November 12 - Grounds School. Location: Neshaminy Manor Center, Doylestown. Contact: Scott Guiser, 215-345-3283. This 7-week course is designed for basic horticulture knowledge to entry level grounds managers. A variety of subjects will be covered.

October 1-November 5 – Deciduous Trees, Longwood

Gardens Continuing Education 2008. Visitor Center Auditorium, 9:00 a.m. – 11:00 a.m., cost \$149 passholder, \$159 non-passholder. Code #082OPDTM. Or evening sessions: 7:00 p.m. – 9:00 p.m., Code #82OPDTE. Phone (610) 388-1000 ext. 559. Website: www.longwoodgardens.org

October 6-8 – Wetland Training Courses 2008. Evaluation for Planned Wetlands, cost \$600. Course Descriptions & Registration available online at www.wetland.org or Call (410)745-9620

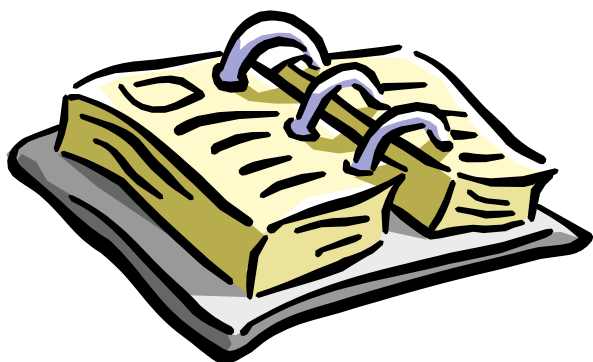
October 6-10 - Tree Climbing School. Location: Brandywine Battlefield Park, Chadds Ford, PA. Contact: Cheryl Bjornson, 610-696-3500. Check out this opportunity starting with basic tree climbing/hand pruning skills.

October 11 - Digital Garden Photography. Longwood Gardens Continuing Education 2008. Auditorium, Outdoors & Conservatories, 9:30 a.m. – 3:30 p.m., cost \$129 passholder, \$139 non-passholder. Code #082BODGD. Phone (610)388-1000 ext. 559. Website: www.longwoodgardens.org

November 10-14 – Wetland Training Courses 2008. Wetland Delineation, cost \$900. Course Descriptions & Registration available online at www.wetland.org or Call (410)745-9620

November 11 - Horticulture Short Course for Spanish Speaking Professionals. Location: Montgomery County 4-H Center, Creamery. Contact Mary Concklin, 610-489-4315. Practical horticulture training day designed for landscape, nursery and greenhouse Spanish speaking professionals. Pesticide update credits will be provided.

January 7-9 - MANTS, Location: Baltimore Convention Center. Contact: mantsinc@aol.com or www.mants.com



PGMS Program in Washington, D.C. Offers Professionals Unique Opportunity to Mix History, Work and Play

(Baltimore, MD) – July 17-18 - Featuring an elegant waterfront dinner at George Washington’s historic Mount Vernon, an array of behind-the-scenes tours at distinguished sites including the Smithsonian Institute and Hillwood Museum and Gardens, and education programs on sustainability and management skills, the Professional Grounds Management Society’s (PGMS) Regional Grounds Management Seminar & Site Visitation in Washington, D.C. is shaping up to be an unforgettable program for Green Industry professionals to attend.

Coordinated in conjunction with PGMS’ DC Branch’s Field Day event at American University and supported by sponsors such as Bartlett Tree Experts and the Davey Tree Experts Company, this program will include behind the scenes visits to five successful grounds management programs in the DC area as well as a series of in-depth leadership/management education classes.

• **Behind-the-Scenes Tour of the Diverse Grounds Programs** - American University, Historic Mt. Vernon, Hillwood Museum and Gardens, Smithsonian Institution's Enid A. Haupt Garden, and Platinum LEED Facility Sidwell Friends School.

• **Education Seminars** on crucial grounds management topics, such as maintaining sustainable landscapes, green roofs, creating a supervisor's toolkit training program, and more

More info online at <http://www.pgms.org/2008regionaldc.htm>
Contact Eric Grammer, ericgrammer@assnhqtrs.com

