

THE *ecological landscaper*

The Newsletter of the Ecological Landscaping Association

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Lawns, Energy, and Health:

With spring emerging at last from another winter of atypical weather, it is time to consider the lawn. America's love affair with large, grassy spaces has led to huge investments of energy, and through synthetic maintenance regimes, an even larger detriment to our ecological health. Let us be agents of change.

REINVENTING THE LAWN

• Alex Feleppa

There is no question that lawns are a fundamental part of American landscape design. From Olmsted's Central Park to our own front yards, lawns are an element in the landscape that we rely on. From an environmental standpoint, whether urban or rural, lawns reduce soil erosion and runoff, reduce glare, and help reduce traffic noise. In terms of function and design, they provide a foreground, add spaciousness to an area, help to define space, accentuate other forms in the landscape, and soften the look of hardscaped surfaces. We can accept

lawns as an important component in the landscape while exercising our knowledge and creativity by employing alternatives to typical lawn species.

The reasons to choose alternatives are straightforward and the methods we adopt do not have to be insurmountable. Picking the right plant for the right site does not apply only to our garden beds. Reduce water consumption by selecting species that require little or no supplemental water during the growing season. Matching species and selections to your individual site reduces the need to overfertilize, allowing the use of organic slow-release fertilizers. Planting the right species, or combination of species, and creating a healthy ecological balance eliminates our dependence on chemicals. There are both broadleaf species and alternative grasses that can be applied to the landscape while still providing ideal texture, height, and color on which we can play, sit, and enjoy.

Tom Cook, of Oregon State University, has worked for over ten years incorporating beneficial broadleaf legumes into lawns of perennial ryegrass and Kentucky bluegrass to

create "ecolawns" of ecologically stable mixtures that persist with fewer inputs than a traditional lawn. Accepting that grasses and broadleaf species should be planted together, Cook has documented gorgeous green carpets of two inches or higher that require mowing every two or three weeks at most, thrive with one-third to one-quarter the amount of water, and recycle their own nutrients so that fertilizing is reduced to a one- or two-time application. Realistically the plots take a year to achieve a mature appearance, and require initial irrigation and possibly a fertilizer application for successful seedling establishment. The result, however, is an ecological system that remains stable and requires no future treatments of insecticides or fungicides.

Successful ecolawns consist of a 10% mixture of legumes added to 90% grass seed. In trials white clover, *Trifolium album* was considered too vigorous and produced more dry matter than was desirable, but strawberry clover, *Trifolium fragiferum*, proved much more useful. Without being overly aggressive, strawberry clover blends well with other components,

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remaining dense, low, and compact through the hot summer months. In both cases the only notable drawback was that the intense flowering of clover attracts bees to the lawn which can be a problem for bare feet. Yarrow, *Achillea millefolium*, was selected for its dark green foliage, rhizomatous habit, plus drought and wear tolerance. It quickly stole the show. Providing green while the grasses begin to go dormant, yarrow mowed every three weeks creates a dense, non-flowering texture that surprises even the most conservative lawn enthusiast. A third broadleaf of importance is English lawn daisy, *Bellis perennis*. Mixed alongside clover and yarrow, the English lawn daisy provides a strong flowering of white to red blossoms from March through May, even while mowing on a three-week cycle. Though the daisies slowly dwindle in population over four or



Carex pensylvanica, as fine as any grass. Photo by Tom Smarr.

five years the springtime flower adds sparkle to our traditional green expanses. Honorable mention goes to baby blue eyes, *Nemophila menziesii*. Planted in the fall, baby blue eyes is stunning the following spring with its attractive blue flowers. The drawback is that you will have to sow yearly to enjoy this plant.

If you decide that a traditional turf look is what you are after, then familiarize yourself with these alternatives for full sun applications. Buffalo grass, *Buchloe dactyloides*, forms a finely-textured blue-green turf which turns gold in autumn. Spreading by seed and stolons, buffalo grass garners praise

for its dense weave as a deterrent to invasive weed seeds. Native to American prairies, this naturally low-growing perennial proves very water efficient and rarely needs mowing. This species, however, is not an effective choice for consistently wet soils. Considered hardy from zones 3 to 5, cultivars are being bred for performance in more moist northern zones, such as 'Tatanka' and 'Texoka'. In warmer zones red fescue, *Festuca rubra*, is another sun-loving, drought-tolerant species. Also a short, fine-textured plant, red fescue prefers infertile soil, so do not fertilize. Cutting back on mowing and allowing it to get a little higher during the hottest months of the summer will provide your lawn with a soft look and feel, while also preventing your lawn from going semi-dormant. Lastly, if you have a full sun application with significantly more moisture, consider sheep's fescue, or *Festuca ovina*. Native to both the U.S. and Europe, this fescue naturally tolerates more dampness than buffalo grass or red fescue.

For turf style grasses in a shady environment turn to the sedges. Catlin sedge, *Carex texensis*, is a fine, short sedge well-suited for partial to full shade. Even though considered to be tolerant of sun, you might find that too much sun will lead to faded foliage and the need for more water. Hardy from zone 6 down to zone 10, this is an excellent choice for hot climates of the south. For the same success in cooler locations, turn to Pennsylvania sedge, *Carex pensylvanica*. Also a



Festuca rubra lawn. Photo by Anike Schmidt.

short, fine sedge for shady applications, Pennsylvania sedge is a strong alternative due to its tolerance for a wide range of soils. An amazing characteristic of both these sedges, as passed on by a colleague of mine, is that they only need to be mowed two or three times a year. The third recommendation for this category is the finest textured of the three, *Carex senta*, or Baltimore sedge. Very similar to *Carex texensis*, Baltimore sedge performs excellently in shade. For this sedge, however, you may find that it requires more regular mowing than others.

Finally, let's discuss a few clumping grasses for both sun and shade. Sometimes a lawn can become much more manageable if it is simply made a little smaller. Or in the case of my work, dealing mostly with front plots in crowded urban settings, these grasses are an easy way to add form and texture to small, nonfunctional spaces. June grass, *Koeleria macrantha*, is a taller candidate (16"-20") that can be mowed or left to grow tall. Junegrass is fabulous for its ability to thrive in full sun and infertile soil. Little bluestem, *Schizachyrium scoparium*, is another option for infertile soil. Tolerant of a dry setting, little bluestem looks great all year and provides winter interest with an upright stature and rich rust-gold color. Like the sedges described before, little bluestem only requires mowing a couple times a year. Another candidate which I really enjoy working with is purple love grass, *Eragrostis spectabilis*. Not only is this plant drought-tolerant, but it also adapts to a wide range of soils, from sand to heavy clay. Lower than little bluestem, purple love grass gets its name from their showy seed heads. To propagate, rely on seed or division of the rhizomes. The last clumping grass for sun is common hairgrass, *Deschampsia flexuosa*. As the name might imply, this grass provides a very fine, low texture in the landscape. Tolerant of average soils and some drought, this is another

alternative which, when left unmowed, creates a soft look through the summer. Suggest leaving the taller species unmowed for fall and winter interest.

Always searching for new shade alternatives myself, here are two last clumping sedges to consider for shadier locations. Plantain-leaf sedge, *Carex plantaginea*, forms neat clumps in average soil. This species puts out eye-catching seed heads early and holds up well when summer's dryness takes hold. Mow this grass right after



Carex platyphylla. Photo by James Cachat.

it blooms for a fresh and attractive tussock. Broad leaf sedge, *Carex platyphylla*, also forms neat clumps like *C. plantaginea*. You will find the puckered leaf adds an extra textural interest.

Alex Feleppa is the Director of Horticulture for the Horticultural Society of New York, a 107-year-old nonprofit organization located in midtown Manhattan, devoted to improving the lives of New Yorkers through horticulture.

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- Smarr, Tom. "Where Conservation and Lifestyle Meet: Alternatives to Lawn Obsession," New England Wild Flower Society, 2007.

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ATTENDEES OF THE ELA WINTER CONFERENCE AND ECO-MARKETPLACE:

We hope you enjoyed our 13th Annual Winter Conference and Eco-Marketplace at its new location in Springfield, Massachusetts. There was much to learn and many to meet; our thanks to one and all for a successful event. ELA wants to hear from you and gain your input on our Winter Conference and Eco-Marketplace. For those of you who were not able to complete evaluations before leaving the conference, forms will be available on our website at www.ecolandscaping.org.

For further information, you may contact us at ELAinfo@comcast.net.

Evaluations can also be mailed to ELA 60 Thoreau Street #252 Concord, MA 01742-2456.

LAWN AND GARDEN CONEHEADS

• Bruce Wenning

The Proturans are not your typical soil-dwelling insects. They are in the Order Protura. Blind, slow-moving, and white-colored, they are tiny (0.6 to 1.5 mm) and have no antennae. Proturans are affectionately referred to as “coneheads” because of their uniquely-shaped conical heads. Adult and immature proturans look alike and utilize the same food sources. The larvae have nine abdominal segments. As they grow (molt) to adults they gain three more abdominal segments, one at each molt.

Unlike most insects, proturans’ front legs serve as antennae and are full of specialized sensory hairs that aid them in finding food, mates, and suitable habitats. Proturans hold their specialized front legs outstretched, meticulously tapping and stroking as they feel their way between soil particles, crevices, along plant root channels, and among organic compounds. Their front legs are their “eyes”.

Proturans are subterranean and like moist but well-drained soils, the same conditions necessary for growing most plants in gardening and lawn care. They require dark conditions to exploit substrates such as rotting logs, leaf mold, humus, and soils high in organic matter. They are true soil-dwellers and are beneficial insects in pest control. The feeding activities of all soil decomposer organisms help to compete against potential plant pathogens.

There are nearly 500 species of proturans worldwide, but only about

twenty in North America. These tiny insects are much less numerous than soil mites and springtails, but they are important components of the soil ecosystem. They are common in the soils

of deciduous and evergreen forests, meadows, woodlands, organic lawns and gardens. Like other decomposer organisms, such as earthworms, soil mites, springtails, and millipedes, they contribute to soil fertility by feeding on organic compounds produced by fungal and bacterial activity. The waste products produced are slowly released

as nutrients for uptake in plant roots. Thus, these insects perform a dual role in sustainable landscapes.

This article originally appeared in the Newton TAB. To learn more about the author, please see “Soil Food Web: Common Denominator in the Landscape” in this issue.

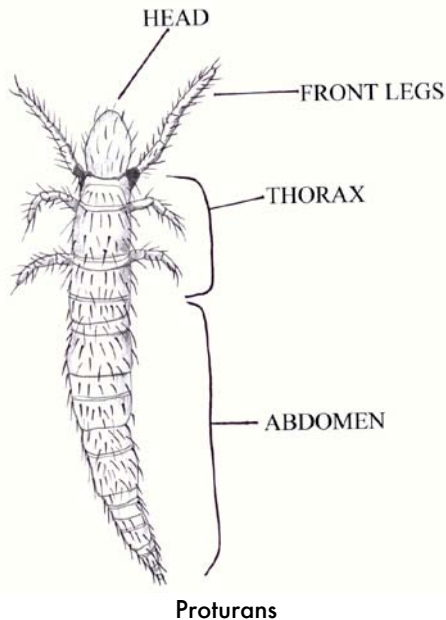
NEW WAVES IN LANDSCAPE REMEDIATION

• Scott LaFleur

Landscape remediation is a fast-growing sector of the land management industry that is nurtured by the innovative spirit of its practitioners. Though many projects in remediation are large-scale and overseen by municipal entities, the benefits of new insights and techniques are becoming available to the average homeowner.

Erosion of soil and nitrogen-loading of ponds and lakes from runoff are two major landscape issues being addressed by the Midwestern, founda-

tion-based JF New ecological services company. Three innovative products employed in these efforts are biologs, live stakes, and floating islands. Biologs and live stakes are used as part of a riparian anchoring system. These devices will accommodate various slope ratings, channel speeds and biodegradation requirements. The ecological beauty of these products is their ability to become part of the solution. Biologs are made of coconut fiber, filled with soil, and planted with native species that are appropriate to the site and of local origin. The biologs are then held in place with live stakes. These live stakes, usually *Cornus*, *Salix* or *Sambucus*, are harvested when dormant and stored under climatic control. When installed to support biologs these live stakes will begin to sprout. The stakes send out roots, aiding in erosion control, and vegetative growth to support the diversity of



Biologs installed. Photo courtesy of JF New.

life that occurs near the water’s edge. These systems need never be removed, and within five years they are an unnoticeable part of the landscape. Stabilized, vegetated riparian zones help to impede future contamination of ponds, lakes, and streams.

Vegetated floating islands, created by Floating Islands International in Shepherd, Montana, are unique native wetland gardens, used to help restore and maintain an ecological balance in ponds and lakes. Floating islands are an excellent water stewardship tool. Using a recycled polymer matrix and bonded with extra buoyant marine

Styrofoam set on a lightweight aluminum frame, floating islands are a state-of-the-art design. This technology creates a super-wetland that allows water to circulate and plant roots to grow through the island. This enhanced wetland improves water quality by removing nitrates, phosphates, ammonia, and heavy metals.

Floating islands create critical riparian habitat used by all types of creatures from microbes to birds. They control erosion by reducing wave action and they beautify the aquatic environment.

Floating islands work by enhancing a naturally-occurring symbiotic relationship. This relationship involves



Floating Island at work. Photo courtesy of Floating Islands International

native plant communities and naturally-occurring microbes to remove excess nutrients and pollutants from the pond environment. The roots of the plants are in direct contact with the water and are constantly extracting nutrients. Nutrients in the pond are not always in a form that is readily available for plant uptake; this is where

the microbes come in. The microbes work to break down the nutrients, making them available to the plants. Non-plant microbes, such as fungi and bacteria, grow quickly and process nutrients faster than algae. This in turn starves the algae, reducing algal blooms and the resulting damage to fish and other aquatic populations.

Floating islands are more effective than naturally-occurring wetlands because of increased surface area. The matrix

of fibers used in construction of the island in conjunction with root hairs provides high specific surface area for colonization of nitrate- and phosphate-reducing microbes. This allows bio-filtration and nutrient removal to occur quickly. Aerobic microbial purification occurs by direct oxidation of biodegradable matter and by endogenous respiration where organic material is oxidized. During this process the water is oxygenated, allowing fish, frogs and other aquatics to breathe and to thrive.

This new breath of life given to the aquatic environment allows the "circulatory system" of a pond to function correctly. In turn, the symbiotic relationship of the pond and all its inhabitants reestablishes itself. The floating islands provide food for many creatures and while creating a physical refuge for fish hiding from herons or other predators. Frogs will deposit their eggs on the roots. Turtles will climb aboard to bask in the sun. Birds will stop to rest and ducks will nest. Salamanders will patrol the waterline and the buzz of activity will crescendo with the myriad of bees, damsel flies, and nectar-feeding insects. Floating islands provide us all at once with a way of actively participating in the conservation of native flora, cleaning our polluted waterways, and artfully enhancing the beauty of our surroundings.

The beauty of these products is that they are simple enough to be used by anyone and on projects large or small. Not only are erosion and water pollution controlled, but habitat is created in the process. While floating islands, biologists and live stakes on their own are not a complete solution to our polluted water ways, they are an accessible and versatile part of the solution.

Scott LaFleur is Senior Horticulturist at New England Wild Flower Society and its Botanic Garden, Garden in the Woods, in Framingham, MA.



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GROWING A GREEN LAWN BUSINESS

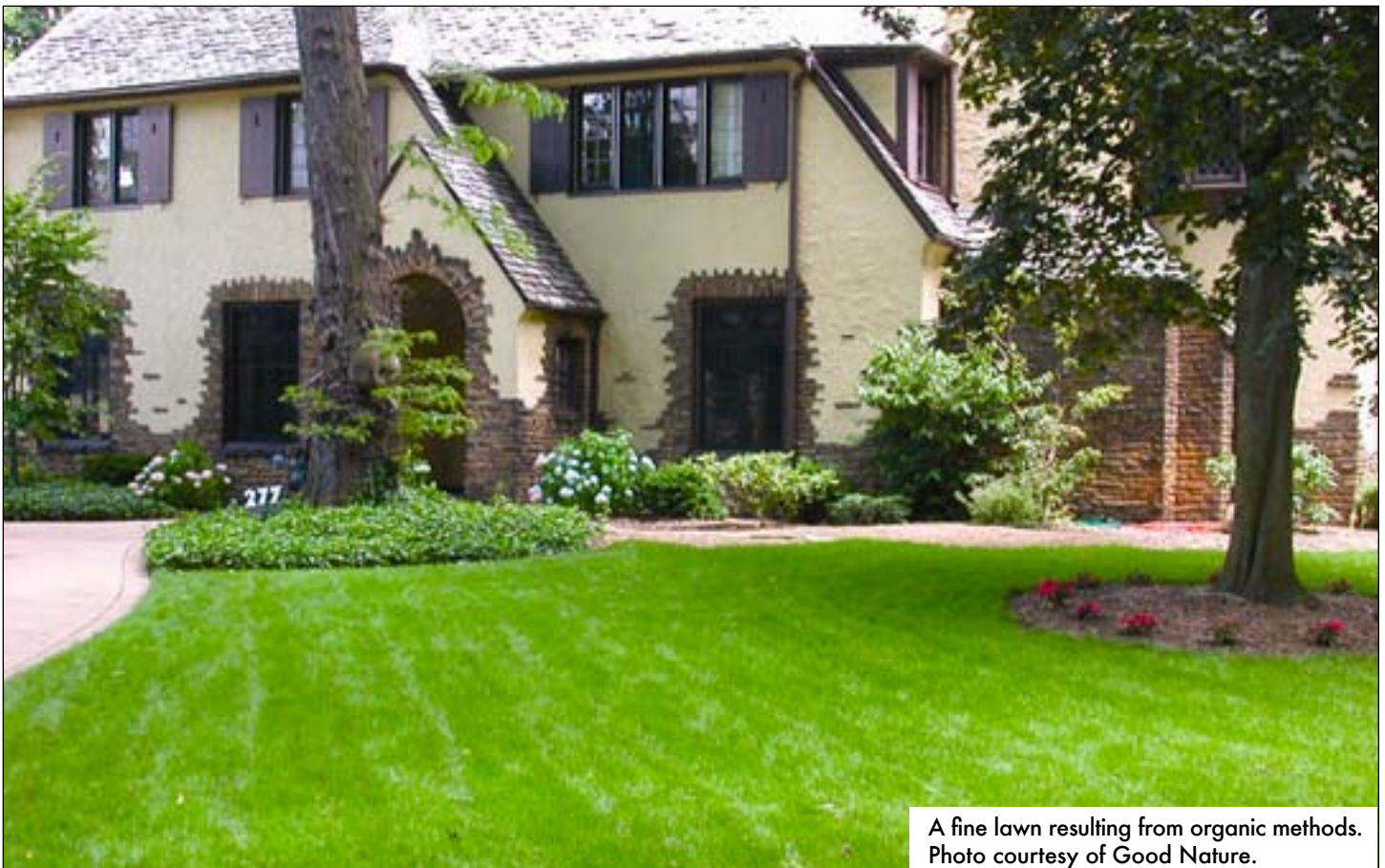
• Dan Norris

Starting an organic lawn care company in Ohio where Chemlawn, Scotts, and Lesco were all founded poses a pretty good challenge. Add to that the decades-long advertising campaigns that Americans have been exposed to touting the latest advancements in chemical lawn care and you have quite a task ahead. But that is exactly what Alec McClennan, founder of Good Nature Organic Lawn Care, did in 1999. After graduating college, Alec set out to start an organic lawn care service in Cleveland, Ohio. First by word of mouth, and later by forming important relationships, the company has grown today to serve over 1500 clients throughout Northeast Ohio.

One of the keys to the success of Good Nature, thus far, has been reaching out to local environmental groups

whose members fit our target market. Being environmentalists and attending local meetings and events enabled us to connect with key people. We looked at groups with similar philosophies in terms of protecting air and water quality, and also groups that involve parents, children, and their pets who are concerned with exposure to lawn chemicals. We connected with non-profits who are committed to a common goal rather than just looking at the bottom line. Offering to speak at local events and meetings to educate people on organics has helped tremendously. Good Nature typically does not charge for speaking engagements but there is a reward when attendees become clients. Groups like the Sierra Club, Earth Day Coalition, Entrepreneurs for Sustainability, Holistic Moms, Ohio Coalition Against the Misuse of Pesticides (OCAMP), and local garden clubs have all hosted talks by Good Nature or allowed us to exhibit at annual events.

The educational and informational talks we give will typically cover topics such as: “What is Organic?” “Why Organic?” “How do I go Organic?” and “What products do I need to go organic?” There does seem to be some confusion about what is organic and many people automatically think of manure when they hear the word organic. We inform them that our main fertilizer is made from corn, soy and alfalfa. We next cover why organic is important and explain the water quality, environmental impacts, and possible risks to pets and humans of using lawn chemicals. Then we tell them one of the best reasons to go organic is that the plants and lawns love it! A lawn’s health and ability to fight diseases and insects is directly related to a healthy microbial population which is fed by the organics. But still people wonder do organics really work? We tell them yes – but it is a process and they probably won’t see results as fast as with a chemical program. Then there is the



A fine lawn resulting from organic methods.
Photo courtesy of Good Nature.

question of cost. Although the initial cost of an organic program may be more, by creating a healthy lawn with less diseases and insect problems, you are eliminating potential problems and costs down the road. Overall, people have many misconceptions about lawn care, grubs, and what causes thatch. Potential clients have been exposed to endless advertising about lawn-destroying insects and diseases and which chemical solutions you need. Local veterinary offices have also proven to be a great place to display our advertising materials and we have talked to many vets who share our concern for pets and exposure to lawn chemicals. Some local communities have actually passed ordinances banning pesticides on municipal property and Good Nature provides services and products to care for their lawns and landscapes.

The Cleveland Metroparks Zoo has committed to an organic approach to the care of their lawn and landscapes. They started on an organic program about eight years ago after a local activist spoke at the zoo about the dangers of pesticides. After a couple years of trying on their own they then contacted Good Nature to see if we could help. Good Nature has worked closely with the zoo for lawn care as well as plantings in and around the animal exhibits. The zoo allows us to post our signs and people are quite impressed to hear we are taking care of such a popular Northeast Ohio attraction. Additionally, the manager of horticulture has agreed to be on our reference list. This sort of collaboration an awareness-raising is essential.

Reaching the "other" group of people who may not be so organic-minded is more of a challenge. Home-owners need to be shown that an organic approach works better, but they may need to live with less than the "golf course" look to their lawn for the first couple seasons. When people understand an organic approach may

take longer to achieve the same results as a chemical program, but that the results are ultimately more effective, they are more apt to sign on and be more patient.

Our programs and services utilize a corn gluten-based granular fertilizer for pre-emergent weed control.

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SOIL FOOD WEB: COMMON DENOMINATOR IN THE LANDSCAPE

• **Bruce Wenning**

As speaker for the Pre-Conference Dinner at ELA's 13th Annual Winter Conference & Eco-Market-

place, Dr. Elaine Ingham reviewed the principles of a healthy soil food web. She covered the major groups of soil organisms involved in mediating the release of nutrients from organic matter and specially designed compost teas. Dr. Ingham stressed that we must return the proper balance of soil food web organisms back to the soil for maximum plant health and sustainability. We should not use inorganic fertilizers; pesticides, gypsum and other similar compounds, because the salts from these chemical compounds kill off beneficial soil organisms.

Organic matter decomposition occurs even during the winter months and it can be quite rapid. Therefore, Ingham stated that it is important to pay attention to habitats and seasons of different species of microbes. The

The Ecological Landscaping Association Wants You!

Once again, we want to let you know that we welcome motivated, energetic individuals who support our mission and purpose to join us in developing and administering the programs and initiatives of our organization. Our past success and the ability to improve and expand ELA in the future depend on the support and involvement of many people. Your interests, enthusiasm and talents may be just what are needed. Different opportunities for participation are available:

Board of Directors – The board is a core group of volunteers who do the month-to-month work to keep the organization healthy, growing and vital: policy setting, program development, strategic planning and financial management. We're especially looking for people with some experience in finance, grant writing and fundraising, computer technology, marketing, public relations and organizational development. The board generally meets once per month between September and April.

Committees – The various committees play a vital role in carrying out the work of the organization. Participation on standing committees or helping with specific projects might be something you could offer. Opportunities are available in conference planning, fundraising, publications, national governance, public relations, board recruitment, membership services, and on ad hoc committees. Creativity, enthusiasm, writing/communication skills, dedication, and of course, a little free time are what we need. Do you have any to lend?

Getting involved is as simple as calling our phone line at (617) 436-5838, or drop us a line at ela.info@comcast.net. Let us know how and when to reach you and we will get in touch.



Oribatid mite. Photo courtesy University of Graz (Austria).

cold temperature species are not active during warm weather and vice-versa. Soil life is diverse and metabolizes organic compounds under different soil moisture and temperature regimes so organic matter breakdown is a dynamic and natural process. When soil biology is unbalanced or incomplete, that is when nutrient cycling and recycling are insufficient for the natural fertility process to adequately support plant growth.

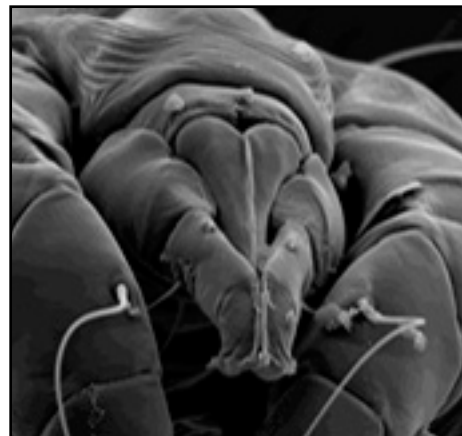
Think of your landscapes as habitats. Habitat diversity relates to species diversity. According to Ingham, the greater the types of food, and levels of temperature, oxygen, moisture, carbon dioxide, and other physical gradients, the greater the selection is for species diversity. Ingham stressed that when thinking about soil organisms we should always keep in mind active species vs. non-active species.

Dr. Ingham gave a brief description of the main types of soil organisms. The “photosynthesizers” are plants, algae and certain species of bacteria. These soil organisms capture solar energy to fix CO₂. The “decomposers” include bacteria and fungi, organisms that break down plant and animal organic compounds. There are primary and secondary saprophytes, or “decomposers.” The “mutualists” also include certain species of bacteria and fungi that enhance plant growth. Some protect plant roots from pathogens. Some bacteria fix N₂ and some fungi are mycorrhizal, enhancing water and nutrient uptake by plants. Soils also

harbor pathogens (bacteria and fungi) and parasites (nematodes and microarthropods). These organisms attack living plant tissues and each other.

The root feeding organisms comprise certain nematode species and various macroarthropods (i.e. mostly insects) such as beetle grubs, cutworms, aphids, and some symphylans. Protozoa (single-celled soil dwellers including amoebas) and certain species of nematodes feed partly on bacteria, as well as each other. Most soil nematodes are free-living, microscopic, unsegmented worms that live in water films between soil particles. The protozoa and nematodes help keep in check disease-causing bacteria and help release nitrogen and other nutrients when feeding.

The fungal feeders are fungi-feeding nematodes and many species of microarthropods including oribatid and astigmatid mites; insects including springtails, and many species of



Astigmatid mite. Photo courtesy University of Bristol (UK).

beetles, flies, and thrips to name a few. These tiny arthropods feed on the fungi and bacteria thriving in organic matter, ingesting and digesting these compounds. When this digested matrix of microbe-filled organic matter picks up more bacteria from the gut of these arthropods, the waste deposited is further subjected to microbial attack, releasing available nitrogen and other nutrients for uptake by plant roots.

The shredders are earthworms

and macroarthropods (larger beetles and millipedes) that feed on bacteria and fungi in organic matter. As they burrow through the soil they feed and release nutrient- and microbe-laden waste like the microarthropods. The waste contributes to enhancing soil structure, such as undigested lignins.

Lastly, there are the higher-level predators which include larger insects, spiders, centipedes, plus small and large vertebrates. These are the predators that keep the lower trophic level predators and prey in check. Again, their waste helps improve soil structure and provides substrate for the lower trophic level decomposer populations.

REPAIRING DAMAGED SOILS

Damaged soils have many groups of soil organisms out of balance in relation to each other and with the particular plants they help support. Dr. Ingham stressed that repairing such soils should not be done on a trial-and-error basis, but on a custom compost formula derived from a microbial soil life profile.

For example, Dr. Ingham reported that a large tomato grower used 12 kg of synthetic chemicals to produce 50 tons/hectare of tomatoes. When the grower switched from synthetic chemicals to a compost tea system, the tomato harvest increased to 210-220 tons/ha. Ingham emphasized that in using the compost tea system no inorganic chemicals were used to produce more tomatoes than chemical system produced. Dr. Ingham repeated that compost, if made correctly, has enough food sources to grow and sustain soil fungi, bacteria, protozoa, micro and macroarthropods, and others for balanced soil fertility. Compost enhances the soil biology and nutrient fertility system allowing for a more sustainable and natural approach to growing plants.

Dr. Ingham described another example of damaged soils; compaction.

Most plant roots do not grow in compacted soils because of the low oxygen content. Microbes tolerant of compaction release plant-toxic compounds with characteristic odors in various amounts. Alcohol, formaldehyde, phenols and other toxins detrimental to plant root growth and establishment are produced under anaerobic conditions that also inhibit the growth of oxygen-loving microbes.

Dr. Ingham stated that alcohol damages any living cell membrane at 1 ppm. Anaerobic soil or compost



Garden Symphylan. Photo courtesy of USDA.

produces alcohol as high as 25 ppm. Now we have a better understanding why disease-causing organisms and weeds adapted to low oxygen tend to do better in such conditions. They tolerate the low-oxygen microbial toxic compounds produced better than the oxygen-loving plant species and microbes. Anaerobic microbes are better able to out-compete beneficial organisms because of the specific acid waste products produced, decreasing soil pH, and enhancing their growth and survival.

However, when the soil biology is balanced, disease organisms and most annual weeds do not compete very well. According to Ingham, we traditionally use high nitrate (NO₃) fertilizers in landscaping and agricultural systems. However, these fertilizers tend to select for disease organisms. Pesticides and other inorganic compounds maintain these growing systems in an unbalanced food web condition. Dr. Ingham stressed that

for soils to be most productive, all of the necessary soil biology components must be present, the full diversity of organisms. She stated that you do not get the benefit of the full diversity of the soil food web when you apply inorganic chemicals.

WHAT IS A COMPOST TEA PROGRAM?

Instead of relying on inorganic chemicals for plant production, Dr. Ingham suggested the following guidelines for implementing a compost tea program for better plant productivity. First, the Soil Food Web program determines the missing pertinent soil organisms and unbalanced soil chemistry from field and lab test procedures. Second, the test results suggest the right species and blend of soil organisms for application (compost tea, Act, inoculants, bio-controls) and any additional food for beneficial organisms. Third, the added soil organisms are kept active by having foods to consume (adding compost tea). Dr. Ingham stressed that this procedure, if done in the fall, can improve soil biology and soil structure through the winter. Fourth, Dr. Ingham emphasized the importance of soil biology monitoring. You must know what organisms survived and what compounds are needed to keep the compost tea and soil biology complex functioning.

For pre-plant conditions, she suggested that one should apply soil organisms and foods based on soil monitoring preferably done in the fall. For seed, apply soil organisms, foods, and mycorrhizal fungi to the actual seed or to the soil beneath the seed. Dr. Ingham added that foliar applications of microbes can help protect plant leaves from most diseases and provides nutrients.

Dr. Ingham repeated that “without soil biology, you are stuck with soil pH as the sole arbitrator of what nutrients are available to plant roots, but when you add soil organisms, plant nutri-

tion is no longer ruled by chemistry alone.” Therefore, getting the right soil biology complex back into the soil is critical for soil organism-mediated fertility. It’s better for plants and safer for the environment.

Bruce Wenning holds B.S. degrees in Plant Pathology and Entomology from U Mass/Amherst and a Master’s degree (Biology) from Harvard University Extension School. Bruce has worked for the U Mass Suburban Experiment station in Waltham and as Horticulturist grounds manager for Mass Audubon’s Habitat Sanctuary in Belmont. Currently, Bruce serves on the ELA Board of Directors.

Further reading:

Soil Biology Primer by Elaine Ingham, Andrew Moldenke and Clive Edwards. Published by the Soil and Water Conservation Society. © 2000. Ankeny, Iowa.

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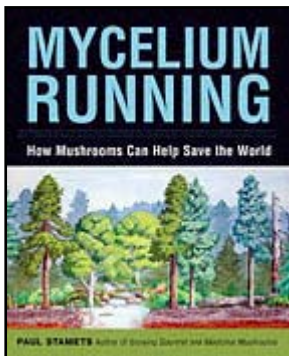
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A BRAVE NEW WORLD: FUNGI AND OUR FUTURE

• Editor

Paul Stamets, pioneer mycologist and author, likes to refer to “tsunamis of mycelia.” Using this figurative term for the enormous biomass fungi produce in startlingly little time, Stamets describes the massive output of his laboratories, the rapid integration of organic matter into living tissue in old growth forests, and the potential for quick and effective use of fungi in landscape remediation. “Tsunami” is also an appropriate image for the wave of information and innovation that



emanates from Stamets in his new tome, *Mycelium Running*.

As Keynote Speaker on this subject for the ELA's 13th Annual Winter Conference, Stamets had to pause regularly to allow his audience to absorb the enormous weight of new information. With so much to present, the challenge was to make the information digestible. *How Mushrooms Can Help Save the World* is the chosen subtitle. Though this may sound to some farfetched, this could well be argued as an understatement. Stamets has more than put in his time on basic research and endless lab hours. His knowledge of fungi is seemingly inexhaustible.

Part I of *Mycelium Running* is “The Mycelial Mind.” This discussion may be too far-reaching for some, comparing fungal mycelia to the internet and positioning fungi as the ecological ‘masterminds’ of the earth's self-sustaining land-based systems. The reader would be ill-advised to stop here, however. Stamets makes good arguments for his philosophical venture, and presents this for good

reason. He is working uphill against the misconception that fungi are any more pathogenic than many other life-forms. The paradigm that all life on earth depends on plants is challenged here. Stamets illustrates that plants are entirely dependent on fungi and bacteria to thrive (because they cannot make nitrogen and other nutrients sufficiently available on their own). Fungi, however, like many bacteria, can acquire energy without photosynthesis. Delving into fungal life cycles, some of which remain poorly understood, Stamets reveals fungi's incredible diversity. Coupled with this extreme level of adaptive diversity is the extreme propensity of fungi to form symbiotic relationships with, well, everything. On every level, fungi are amazingly complex, illustrated by the fact that a single species of fungus can behave as a pathogen or a symbiont in the same lifespan, or can be a mold at one time and a mushroom-forming basidiomycete at another, leading to much taxonomic confusion.

Belonging now to the super-kingdom Ophisthokonta, fungi are classed with animals. Such reclassification understands such realities as the fact that antibiotics produced by fungi are commonly equally effective for use by humans. In fact, fungi seem able to empower life and growth for every creature under diverse stressors through their incessant gift of water, nutrients, and anti-pathogenic compounds to plants and animals. This much was known to ancient Otzi, the Ice Man discovered in the Otztal Alps, who carried among his treasured necessities both fungi and lichens having many known uses both mundane and medicinal today, and likely in Otzi's time as well. Stamets speaks of the medicinal forest and the vast potential for fungi to heal. Fungi have been tested with effectiveness against everything from smallpox to Serin gas; such is their ability to neutralize pathogens and toxins.



Bridgeoporus (Oxyporus) nobilissimus, the first mushroom declared endangered, grows on this noble fir. Photo by Dusty Wu Yao.

That fungi can heal more than individual human illnesses and ailing forests is shown in Part II, “Mycorestoration.” Under “Mycofiltration,” Stamets outlines some of his own innovations in using mycelia to remove toxins and pathogens from the landscape. The simplicity and efficacy of his methods are unique. As well, he suggests the possible future scope of such methods. Through mycoforestry, Stamets suggests, we can arrest decline of compromised forests, help prevent massive forest fires, and recover in a few years eroded and altered terrains that would take generations to heal on their own. Stamets is not finished amazing his audience yet.

In “Mycoremediation,” Stamets touts a field test operated by the Washington State Department of Transportation. In these trials, soil heavily contaminated by diesel fuel was treated with a variety of chemicals, bio-engineered microbes, and oyster mushrooms. The only method that showed significant decontamination of the soil was the fungal method. Oyster mushroom mycelia rapidly digested hydrocarbons of the diesel, producing

soil almost completely free of contaminants, and a bumper crop of perfectly edible mushrooms as well. This is but the starting point, as Stamets recounts trials that have shown fungi effective in the hyper-concentration of toxic heavy metals from soils. Though no longer edible, the mushrooms selectively remove toxins without much energy input with an efficiency that cannot be matched by other methods. Following the horrors of Chernobyl, Ukrainians engaged in age-old traditions of wild-harvesting mushrooms discovered that fungi can also hyper-concentrate radioactive isotopes. The unique biochemistry and evolution of fungi enables us to employ them in the undoing of seemingly any contamination we have created.

“Mycopesticides” enters a realm never before explored. While fungi have proven a panacea for antibiotic needs, not much has been investigated in their use against insect pests. Stamets has managed to secure one of his several patents in the use of fungi to control insect infestations through his creative application of symbiotic/competitive dynamics. Having observed through well-known literature the parasitizing of ants by certain fungi (although ants also farm other fungi), Stamets was able to arrest a destructive infestation of carpenter ants in his own home. Ever-insightful, he conducted trials on sectors in cultured fungal strains that were thought to be attenuated and not of much use. By culturing these sectors instead of excising and discarding them from cultures, Stamets established that these unusually-pale strains exhibit delayed sporulation. Under normal sporulation, ants are able to recognize, and diligently avoid, lethal fungal infestations. The delayed sporulation of these strains fools the ants’ early warning system until it is too late. The resulting patent was the first of its category.

Part III, “Growing Mycelia and Mushrooms,” demonstrates again the

incredible versatility of fungi. Fun and funky, the methods given range from homespun to high-tech; some would even make great projects for young children and their parents. Delicious culinary and medicinal mushrooms can be grown recycling such materials as cardboard, rope, and wooden dowels, or as a disposal method for yard debris, unwanted logs, and wood chips. Instead of burning these ‘wastes’ and loading more carbon into the air, the average suburban homeowner could supply the diner table with gourmet mushrooms at very low cost. Mushrooms can also be integrated with garden vegetables to increase vegetable yields and lessen irrigation. Stamets ends with a superb descriptive gallery of mushrooms, plus a thorough glossary and resource list.

At times visionary and other times whimsical, *Mycelium Running* will overwhelm you with possibility, amaze you with complexity, and give you reason to find hope in a healthier future. This book and the ideas within its covers are a splendid interaction between pure geek science, pop culture, and the pressing need to provide a safe and viable home for ourselves. Fungi also point out a valuable lesson in perspective: for decades largely ignored and looked upon as pathogens, fungi are now better understood as a longstanding antimicrobial savior of the human species, and a paradigm for recovering vibrant ecosystems that we have damaged.



Reishi growing on potted alder log.
Photo courtesy Fungi Perfecti.

NORRIS continued from page 7

Depending on the time of year, we also use a molasses-based liquid fertilizer that has pre-emergent weed control properties, and when applied often enough (i.e. once a week), has shown to have some post-emergent control as well. Good Nature employs the use of beneficial nematodes for grub and insect control in both the spring and late summer. Efficacy rates for nematodes and white grub control are at or above 80%, according to studies done at the Ohio State University. Nematodes have also been shown to control fleas and ticks (this can be important to those who have pets). Diatomaceous Earth is applied around the foundation of homes for perimeter pest control and is available for DIY applications too. Natural Garlic Sprays applied in the summer are quite effective in deterring mosquitoes, deer and geese. As for tree and shrub care, Good Nature offers natural health care sprays consisting of a seaweed mixture combined with liquid nutrients and a fall deep root feeding incorporating mycorrhizae to enhance ability to absorb water and nutrients. We have noticed our clients’ landscapes becoming healthier with less insect and disease problems.

By aligning with like-minded groups and organizations, we are helping to spread the message about alternatives to traditional lawn care. In addition, by showing results we are gaining customers that believe the organic approach is the way to go. By collaboration, outreach, and education, green lawn professionals are changing how of American homeowners view landscape health.

Dan Norris is a Certified Turfgrass Professional through the University of Georgia with additional studies at Ohio State University. Dan has combined his sales and environmentalist background to do something he always wanted to do: help the environment.

Miscanthus, Ornamental and Invasive Grass

This is an information site about *Miscanthus*, an ornamental grass that has naturalized and invaded native plant communities in parts of the United States. This site has been prepared as part of a research project in coordination with University of Minnesota and the National Park Service. Ornamental cultivars of *Miscanthus sinensis* should only be planted in managed landscapes where they can be watched for self-seeding.

Mary Hockenberry Meyer, Professor of Horticultural Science at UMN. Visit <http://horticulture.coafes.umn.edu/miscanthus>



Woodborer Update: Asian Longhorned Beetle, Emerald Ash Borer, And Sirex Wood Wasp

(March 21, 2007):

Wood boring insects have arrived to the United States though solid wood packing materials in shipments of foreign goods. Asian longhorned beetle (*Anoplophora glabripennis*), emerald ash borer (*Agrilus planipennis*), and Sirex wood wasp (*Sirex noctilio*) are three introduced wood-boring insects currently affecting the United States. The Asian longhorned beetle (ALB) was introduced to North America in solid wood packing material from China. ALB was first reported by a resident of Brooklyn, NY in 1996. Since that time it has been found in Chicago (1998), New Jersey (2002), and Ontario, Canada (2003). Eradication projects are being conducted at these locations. Maps of

the current ALB infestations can be found here: <http://www.uvm.edu/albeetle/infestation/index.html>

The Asian longhorned beetle is a large (1-1½ inches long), shiny, black beetle with white splotches on its back. Its antennae have alternate black and white bands and are 1 to 2½ times the insect's body length. Look for damage caused by ALB on hardwoods including maples, horse chestnut, willow, poplar, and elm. Exit holes created by the beetle are approximately ½ inch in diameter and have well-defined edges, resembling precisely drilled holes. There are no pheromone traps for ALB so we have 2 methods to look for them. 1) Go to areas where solid wood packing materials have entered Massachusetts and look for signs of ALB. 2) Investigate ALB sightings reported by the public. ALB was not detected in Massachusetts in 2006. 2007 ALB News: A new infestation has been discovered outside the current quarantine area in NY on Prall's Island, an 80-acre, uninhabited island lying between Staten Island, N.Y., and northern New Jersey. In Canada, an additional 16 infested trees were found within the current quarantine area in Toronto in January.

The Sirex wood-wasp (*Sirex noctilio*) is a native of Europe that attacks pine trees. The adult wasp has a steel-blue, cylindrical body and is ½ to 1½ inches in length. Males have a patch of orange on their abdomen. The female wasp injects a toxic mucus and fungus into the trees when she oviposits eggs. The mucus and fungus work together to kill the tree and provide a suitable environment for the developing wasp. The first detection of the Sirex wood-wasp in the United State was in 2004 in Oswego County, New York. As a result of surveys in 2005 and 2006 conducted by state and federal officials, the Sirex wood-wasp has been detected in an additional 24 counties in New York and 2 counties in Pennsylvania. The Sirex wood wasp has also been reported in 6 locations in southern Ontario, Canada. In Massachusetts, the MA Dept. of Agricultural Resources and MA Dept. of Conservation and Recreation are cooperating with the USDA, APHIS and U.S. Forest Service in conducting Sirex surveys. An

alpha/beta-pinene mixture is used to lure the insects into a trap. To date we have found no Sirex wood-wasps in Massachusetts.

The emerald ash borer (*Agrilus planipennis*) was first discovered in Michigan in June 2002. Since its initial discovery in Michigan, emerald ash borer (EAB) has been found in Illinois, Indiana, Ohio and Ontario, Canada. In order to limit the human-mediated spread of EAB, Michigan, Illinois, Indiana, and Ohio are under a federal quarantine that prohibits movement of ash tree materials and hardwood firewood outside the quarantine area. In 2003 infestations in Maryland and Virginia resulted from nursery stock brought in from Michigan. Maryland has a state quarantine in place to prevent movement of materials that could harbor EAB. The emerald ash borer is a golden green beetle with darker, metallic emerald green wing covers and is about ½ inch in length. In the United States EAB has attacked white ash (*Fraxinus americana*), black ash (*F. nigra*), red ash (*F. pensylvanica*), green ash (*F. pennsylvanica* var. *subintegerrima*) and several horticultural varieties of ash. Distinct S-shaped tunnels beneath the bark are formed from larval feeding. Adults emerge in June to early July leaving D-shaped exit holes 3-4mm in diameter in the bark.

For more information and photos of these introduced woodborers visit:

- **Asian Longhorned Beetle:** <http://mass-nrc.org/pests/pestFAQsheets/asianlonghorned.html>
- **Emerald Ash Borer:** <http://massnrc.org/pests/pestFAQsheets/emeraldashborer.html>
- **Sirex Wood-Wasp:** <http://mass-nrc.org/pests/pestFAQsheets/european%20woodwasp.htm>

This pest alert is from the Massachusetts Introduced Pests Outreach Project, a collaborative project between the Massachusetts Department of Agricultural Resources and the UMass Extension Agriculture and Landscape Program aimed at preventing the establishment of new pathogens and pests in Massachusetts. Visit the project website (<http://www.massnrc.org/pests>).



announcements

Massachusetts Arbor Day Celebration to Feature Tree Plantings across the Commonwealth

Urban Youth Take Action against Global Warming and For Community Health

Urban youth groups will plant more than 200 trees, 100 in **Boston** and the rest distributed across 12 other municipalities: **Belmont, Brockton, Cambridge, Fall River, Holyoke, Lawrence, Lowell, New Bedford, Quincy, Somerville, Springfield** and **Worcester**. This statewide Arbor Day celebration on Friday, April 27, 2007 will be coordinated by **Eagle Eye Institute** in partnership with the **Massachusetts Coalition of YouthBuild USA** and is funded in large part by an Urban Forestry Challenge grant from the DCR as part of a nine-month Green Industries Career Pathway program conducted by Eagle Eye Institute. The tree planting celebration at each site is expected to draw state and local leaders in the public, private and non-profit sectors, as well as local youth and community members. All sites have been chosen with an emphasis on restoring equity across the city, planting trees in areas where they are needed most, primarily in low-income neighborhoods, where tree canopy has traditionally been low, and where the increased shade and health effects of these trees will be well-appreciated. "We're extremely excited to be partnering with the Massachusetts YouthBuild Coalition to coordinate this tree planting effort on a statewide level for this year's Arbor Day," said Eagle Eye Institute Executive Director Renee Toll-DuBois. "The events bring together local youth, professional arborists, and government and community leaders and will demonstrate how important trees are for the overall health of our communities. As active participants in the plantings, the local youth gain valuable experience and training, bringing to life our slogan that we are 'planting roots for our future.'"

For more information on the 2007 Massachusetts Arbor Day celebration,

including sponsorship information, please contact Renée Toll-DuBois or Emma Lathan at Eagle Eye Institute at (617) 666-5222 or elathan@eagleeyei.org or visit Eagle Eye Institute's website at www.eagleeyeinstitute.org



GO WILD with "The Art of Livable Landscapes" Symposium

New England Wild Flower Society marks the 75th anniversary of **Garden in the Woods** in 2007, beginning with "**The Art of Livable Landscapes**" Symposium on Friday, May 18, 9:00 a.m. - 4:30 p.m. Held at the Crowne Plaza Hotel, Natick, MA, three of America's influential horticulture and design visionaries come together to discuss the coming revolution in native plants — as artistic garden features, as expressions of regional identity, and as key components of livable sustainable environments. The symposium promises to fuel creative inspiration and bring powerful design ideas to clients, and to our gardens. A luncheon follows the morning programs. The symposium includes a first-hand preview of the Garden's new exhibit, "**ART GOES WILD: Innovation with Native Plants**," with the artist, W. Gary Smith, followed by an informal Garden reception.

Rick Darke speaks on "Native Plants and Livable Landscapes." He invites us for a fresh look at the "native" theme and the opportunities for creating and conserving truly livable regional landscapes. His books, *The American Woodland Garden: Capturing the Spirit of the Deciduous Forest* and his latest, *The Encyclopedia of Grasses for Livable Landscapes*, are both available for signing and purchase at the event.

In "Artistic Approaches to Design," award-winning landscape architect W. Gary Smith explores the intersection of ecological design and artistic abstraction, where plants and other artful materials simultaneously reach their sustainable and aesthetic potential. In 2005 he completed

the Gardens Master Plan for the Lady Bird Johnson Wildflower Center in Austin, Texas. Smith lives in Toronto, Ontario.

New England Wild Flower Society's Executive Director Gwen Stauffer discusses the synergistic roles of private and public gardens in helping to achieve effective plant conservation in "Cultural Landscapes and Plant Conservation." Prior to joining New England Wild Flower Society in 2005, Stauffer was Executive Director of Gardens at Calloway Gardens in Georgia.

Symposium participants will board motor coaches for a short ride to Garden in the Woods and a **special preview tour of "ART GOES WILD: Innovation with Native Plants."** W. Gary Smith will introduce the exhibit, which **opens to the public on May 19th**. This exhibit runs until October 31.

The New England Wild Flower Society is pleased to co-sponsor "The Art of Livable Landscapes" with Arnold Arboretum of Harvard University, Massachusetts Horticultural Society, and Wellesley College Friends of Horticulture. The symposium fee is \$125 for members of the Society and co-sponsoring institutions, and \$150 for non-members. The fee includes parking, morning/afternoon refreshments, luncheon, and transportation to and from Garden in the Woods for the exhibit and reception. Please register by calling New England Wild Flower Society at 508-877-7630 ext. 3303 or by emailing registrar@newfs.org. Special symposium lodging rates on Thursday and Friday are available at the Crowne Plaza Hotel.

Call 508-653-8800 for reservations.



Smart Growth Resources for Massachusetts Cities and Towns

This booklet from the Commonwealth of Massachusetts provides a comprehensive listing of financial and technical resources for cities and towns interested in promoting smart growth. The publication is produced by the Office of Commonwealth Development (OCD), which integrates energy, environmental, housing, and

transportation policies, programs, and regulations, and coordinates capital spending programs that affect development patterns. In *Smart Growth Resources for Cities and Towns*, you'll read about OCD programs that touch on the following topic areas:

- Planning and Zoning
- Downtown Redevelopment
- Housing
- Economic Development
- Bicycle and Pedestrian
- Water Transportation
- Transit Oriented Development
- Open Space Preservation
- Water/Sewer and Other Municipal Services
- Brownfield Redevelopment
- Energy Efficiency & Renewable Energy

Program descriptions and contact information are provided in the 28 page (4.3mb) booklet; available online as a PDF document at the resource link below. Resource: http://commpres.env.state.ma.us/publications/smart-growth_OCD.pdf



Native Plants in the Landscape

17th Annual Conference will be held at Millersville University, Millersville, PA, June 7-9, 2007. Topics include: Green Architecture & Biophilia, Sustainable Residential Property, Garden Design Inspired by Plant Communities, Restoring Diversity in Your Garden. For more info: www.millersvillennativeplants.org

Sustainable Local Agriculture Series

• Sustainable Local Agriculture Series Part I: **Wednesday, May 16th at 7pm**, at **NRWA**. **“Local Sustainable Agriculture versus Factory Farming: the Future for America”** with Jack Kittredge (Social Action Coordinator for MA NOFA and organic farmer in Barre, MA) and Kim Greenough (New Beginnings Farm in Townsend, MA) who will also address grass-fed livestock systems.

• Sustainable Local Agriculture Series Part II: tentative date, Thursday, May 24th

at 7pm, at NRWA. **Heirloom / Heritage-Breed (Rare and Endangered) Farm Animals.**

• NEW: Sustainable Local Agriculture Series Part III: tentative date, Tuesday, June 5th at 7pm, at NRWA. **“Introduction to Permaculture: Ecological Vision, Design System, and Global Movement” with Dave Jacke** who has been a student of ecology and design since the 1970s, and has run Dynamics Ecological Design firm. For more info: his website – [Edible Forest Gardens.com](http://EdibleForestGardens.com) – is dedicated to offering inspiring and practical information on the vision, ecology, design, and stewardship of perennial polycultures of multipurpose plants in small-scale settings.

• Sustainable Local Agriculture Series Part IV: **Natural Step with JoAnne Sunshower of New England Small Farm Institute.** Since 1988, The Natural Step has worked to accelerate global sustainability by guiding companies, communities and governments onto an ecologically, socially and economically sustainable path. The Network is part of the international network of The Natural Step, a non-profit, research, education and advisory organization that uses a science-based framework to help organizations, individuals and communities move toward sustainability. *June date to be announced.*

unclassifieds

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