

Mid-Atlantic Exotic Pest Plant Council Annual Conference
Invasive Plants: Perspectives, Prescriptions and Partnerships
August 16 and 17, 2005 (Revised Sep. 7, 2005)

Talk Abstracts

ABSTRACTS

DAY 1 Tuesday, August 16

Keynote Presentation. *Invasive Plants--Vision 2010.*

Dr. Nelroy E. Jackson, National Invasive Species Advisory Committee

Nelroy knows what has happened, what has not ... and maybe even why! Most importantly, he is as well placed as anyone to tell us how the nation should deal with the invasive plant species issue. Come hear the real scoop on invasive weed policies - especially, what we can hope for in the future - and what we can do to ensure that we get it! Weed warriors at local and regional levels need help from the federal government to fund weed control programs, to develop better control methods and especially to help prevent new introductions. The federal government has taken some helpful steps in the past 15 years, such as approving a National Management Plan for invasive species, establishment of a nation-wide early detection system, establishment of an education/outreach campaign to inform the public about the damage caused by invasive weeds and other invasive species, and the efforts under way to reduce that damage (see invasivespecies.gov). But much remains to be done including requiring screening of plants to determine their "weediness" before they may be imported or sold, prohibitions on sales of plant species known to be invasive, upgrading of the invasive plant program within APHIS – in order to list significant numbers of plants as "noxious weeds" and to take effective action to prevent their introduction or respond promptly to newly detected outbreaks.

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**Concurrent Session 1. *Herbicide Use Primer: Using Herbicides to Manage Invasive Plant Species in Natural Areas.*** Art Gover, Research Support Associate, Penn State Department of Transportation (DOT) Roadside Research Program

Art will discuss the basics of managing weeds with herbicides and the approaches for using herbicides in natural areas where desirable native plants are interspersed with targeted invasive weeds. Along the way, he'll also discuss integrated pest management, the need for good planning, and the benefits of looking at the bigger picture including assessing the symptoms vs. the cause of an infestation. A variety of methods and types of herbicides will be presented based on Art's extensive field experience. Some methods may even surprise you!

**Concurrent Session 2. *Protocols for Controlling Invasive Plants in the Mid-Atlantic National Parks.*** Susan Salmons, Liaison, National Capital Region Exotic Plant Management Team, National Park Service

Cut off behind a wall of vines? Inundated in a sea of Japanese stilt-grass? Buried under a bank of

exotic bushes? Sue will illustrate successful and less than successful treatments for some of the worst offenders in the mid-Atlantic region including woody vines like Oriental bittersweet, porcelain berry, English ivy, Japanese honeysuckle, and Chinese and Japanese wisterias; shrubs like autumn olive, burning bush, double-file viburnum and linden viburnum, and Amur and Morrow's bush honeysuckles; and a few of our tallest woody weeds with names like "tree-of-heaven" and "Empress tree". And of course, Sue will tell us how she deals with some of the herbaceous invaders like mile-a-minute vine, garlic mustard, and stilt-grass.

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Concurrent Session 3. *Herbicide Panel: Herbicide Alternatives to Glyphosate.*

Art Gover, Session Coordinator

A panel of herbicide industry representatives will make short presentations on selected products and uses and then take questions from the audience.

Concurrent Session 4. *On-the-Ground Management: Techniques, Tools and Equipment.*

Steve Manning, President, Invasive Species Control, Inc.

Steve Manning has been involved with management of invasive plants for nearly a decade. He will discuss the specific tools and equipment used by his company Invasive Plant Control, Inc. and learned from years of experience. Steve will show you nifty tools and products you probably didn't even know existed and maybe just what you need to get rid of your favorite invasive plants. From sprayers to chain saws to personal protective equipment, Steve will show you what you need to get the job done effectively and safely.

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**Concurrent Session 5. *Biocontrol Panel***

**⌘ *Classical Biological Control of Invasive Weeds with Plant Pathogens: Concepts, Procedures, Successes, and Prospects.*** Dr. Dana Berner, Plant Pathologist, USDA Agricultural Research Service

Classical biological control of weeds with plant pathogens is a unique scientific endeavor. Candidate plant pathogens must satisfy stringent criteria for efficacy and safety before they enter the release process. In this presentation, the concepts and processes involved in developing exotic pathogens for classical biological control of weeds in the United States will be discussed. Past successful pathogen releases and future prospects for release will be examined. Safety issues specific to non-target effects of plant pathogens will be discussed in relation to host-range determination. The material presented is based on accepted scientific practices and experiences accumulated at the Foreign Disease-Weed Science Research Unit of the USDA-Agricultural Research Service.

**⌘ *Biological Control of Mile-a-Minute Weed.*** Dr. Judith Hough-Goldstein, Professor, Department of Entomology and Wildlife Ecology, University of Delaware

Several potential biocontrol agents for mile-a-minute weed were studied in China and in quarantine in Delaware between 1996 and 2004. A stem-boring weevil, *Rhynoncomimus latipes*, was determined to feed only on mile-a-minute weed, and a permit for its field release was

granted in July 2004. Preliminary results of releases conducted in Delaware, New Jersey, Pennsylvania, and West Virginia will be presented.

**🔗 *Garlic Mustard Biocontrol: Coming Soon?*** Victoria Nuzzo, Natural Area Botanist, Natural Area Consultants.

Biological control of garlic mustard (*Alliaria petiolata*) has been in development since 1997. Four weevil species (*Ceutorhynchus* sp.) have been identified as potential biocontrol agents, and host specificity tests are being conducted in Switzerland and Minnesota (under quarantine conditions) to determine efficacy and specificity of the weevils. Concurrent with host specificity tests, impacts of garlic mustard on native vegetation and wildlife are being assessed using a combination of field studies and experimental venues. Garlic mustard had no discernable direct impacts on groundlayer vegetation, red-backed salamander abundance, or ground beetle diversity or abundance. However, increased residence time was associated with a decline in garlic mustard biomass, indicating presence of garlic mustard-specific pathogens in soil previously occupied by garlic mustard history. Native species face numerous ecological stresses, including plant invasions, earthworm and invertebrate invasion, and deer herbivory. Reducing stress on native communities can lead to recovery, and a multi-pronged approach incorporating biocontrol and reduction of deer herbivory is recommended. Long term monitoring is necessary to document both impacts and recovery.

#### **Concurrent Session 6. *Barberry Ecology and Cultivars***

**🔗 *Barberry Cultivars: Determining their Invasiveness and Developing Sterile Plants.***  
Dr. Mark Brand, Professor, Plant Science, University of Connecticut

More than 80% of 235 woody plant species widely considered invasive were introduced for ornamental purposes. Many species of horticultural origin have been placed on lists of invasive species compiled by state and regional authorities. As species are evaluated for invasiveness, one question that must be addressed is the invasive potential of cultivars. If a species is documented as invasive, will cultivated varieties of that species be considered invasive as well? Current policy is ambiguous, in part, due to a lack of scientific information about the role cultivars play in invasive plant biology and ecology. Japanese barberry (*Berberis thunbergii*) is a popular landscape shrub that enjoys extensive use due to its appealing ornamental traits and ability to tolerate challenging landscape situations. Unfortunately, barberry possesses invasive qualities and is established and spreading in many parts of the United States. Japanese barberry used for ornamental purposes today does not resemble the wild type species introduced in the late 1800s. The barberries cultivated today possess purple, yellow, or variegated foliage and most have dwarf phenotypes. My research is investigating what role horticultural cultivars play in the biology and ecology of invasive plants using Japanese barberry as a model. There are four primary objectives: (1) Determination of the extent of variability that exists in fruit production, seed production, germination capacity and seedling vigor among cultivars of Japanese barberry; (2) Comparison of the ability of seedlings from purple and green barberry genotypes to establish and grow in different natural environments with various light levels, vegetation types, soil moisture and organic litter layers; (3) Comparison of the performance of seedlings from purple and green barberry genotypes under heavy shading and determine how the expression of purple

foliage phenotype is affected by the level of shading; (4) Use DNA fingerprinting (AFLP) to determine the genetic origin of Japanese barberry in invasive populations, specifically whether these plants are derived from cultivars and/or the wild type green form of the plant. In addition, efforts are underway to create sterile horticultural forms of barberry. Tetraploids of cultivars are first created using mitotic poisons and they are backcrossed to diploid cultivars to make sterile triploids.

☞ ***Forest Ecology Before and After Barberry Invasion.*** Dr. Sylvan Kaufmann, Conservation Curator, Adkins Arboretum

Japanese barberry (*Berberis thunbergii*) is an ornamental thorny shrub introduced from Japan in 1875 that now invades woodlands, fields, and riparian areas. It is tolerant of many soil types and moisture levels and can persist in very low light levels. Under high barberry cover tree seedling density and species diversity declines and the composition of the community changes. Barberry also changes soil chemistry and soil communities. While barberry fruits provide food for turkeys and some other birds, it is not a primary food source. It would be valuable to study long-term changes to communities following barberry removal and to study interactions between barberry, herbivory by white-tailed deer, and other invasive species and the native plant and animal communities.

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Walking the Line: Invasive Plants and the Nurseryman's Perspective. Barry Yinger, Owner, Asiatica Nursery, Pennsylvania

For several years a highly emotional debate about the impact of introduced plants on native plant communities has raged among academics and in the popular press. There is a widely held view that escaped introduced plants from home gardens are a serious threat to biodiversity and the future of healthy native plant communities. While it is clear that a small number of introduced plants have caused damage to native plant communities, there is little evidence that home gardening has played a major role. The gradual acceptance of the idea that exotic plants are likely to be harmful, and that plants that are vigorous and aggressive in garden situations are destined to be harmful invasives, is harmful to the green industry. Some proposed solutions to this perceived problem would seriously harm a vital, growing industry. It is essential that we are honest about the primary sources of damaging introduced plants, and the role of activities other than plant introduction in that process. A combination of carefully designed programs administered through the state land grant university system, combined with programs designed by the nursery industry, needs to be put in place to insure that dangerous plants do not escape from home gardens in numbers that would be likely to damage the natural environment.

DAY 2 Tuesday, August 17

Global Warming, Rising CO2 and Invasive Plants. Dr. Lewis Ziska, Plant Physiologist, USDA Crop Systems and Global Change Lab

Although carbon dioxide (CO₂) is the principle greenhouse gas, it also represents the sole source of carbon for plants, and hence for almost all terrestrial life. Because current levels of

atmospheric CO₂ are less than optimal for plant growth, recent and projected increases in this gas are expected to stimulate the growth of a number of plant species. Although this aspect of climate change can be viewed as beneficial, the rise in carbon dioxide is indiscriminate in stimulating the growth of both wanted and unwanted plants. Because international trade has increased the biotic mixing of flora across many parts of the globe, unwanted plant species are becoming widely established. The severity of damage induced by these species and their panoptic scale has produced a new class of unwanted plants: invasive, noxious weeds. To determine whether rising carbon dioxide has been a factor in the establishment and success of such plants, we have compared the potential response to recent and projected changes in carbon dioxide between invasive, noxious species and other plant groups, and assessed whether CO₂ preferentially selects for such species within ecosystems. A synthesis of literature results indicates that invasive, noxious weeds on the whole have a larger than expected growth increase to both recent and projected increases in atmospheric CO₂ relative to other plant species. There is also evidence from a majority of studies, that rising CO₂ can, in fact, preferentially select for invasive, noxious species within plant communities. Furthermore, there is initial data suggesting that control of such weeds may be more difficult in the future. However, the small number of available experiments makes such conclusions problematic and emphasizes the urgent need for additional studies to address the biological and economic uncertainties associated with CO₂-induced changes in the ecology of invasive, noxious weeds.

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**Concurrent Session 7. *New Species Importation: Pre-import Screening.*** Al Tasker, USDA National Noxious Weed Program Manager

The U.S. Department of Agriculture's Animal and Plant Health Inspection Service is considering substantial revisions to the regulations known collectively as Quarantine 37 (7 CFR Part 319.37). The regulations are also variously known as the quarantine on: Nursery Stock, Plants, Roots, Bulbs, Seeds, & Other Plant Products; aka Propagative Materials and Nursery Stock Quarantine; aka Plants for planting; aka Q-37. Changes in patterns of transportation and world-wide production and marketing have exposed problems with the current regulatory scheme. Proposed changes include: 1) establishment of programs to reduce risk of entry and establishment (e.g. a clean stock program); 2) establishing a new import entry category of plant taxa to be excluded from import pending risk evaluation; 3) improved data collection to determine taxa imported, origin, and volume; 4) reevaluation of taxa currently prohibited; and 5) consolidation of all plants for planting into one regulation. The proposed changes were the subject of an ANPR (advanced notice of proposed rulemaking) published Dec 10, 2004 as Nursery Stock Regulations, Docket No. 03-069-1. APHIS is currently in the process of summarizing and evaluating the comments received. Public comments range from opposition to regulatory changes because of possible impacts on gardening and small businesses (such as nurseries) to unequivocal support for more stringent regulations.

**Concurrent Session 8. *Soil Disturbance—A Gateway for Opportunistic Plants.***  
Dr. John Dighton, Professor, Rutgers University

Soils are a complex association of mineral, organic and biotic components linked together by multiple trophic, competitive and synergistic activities. How many components may be lost or how many linkages broken before the function or integrity of soil fails? Because soil provides

the nutrients for plant growth, the complex interactions and processes in soils provide a 'bottom – up' regulation for plant community assembly rules. However, due to feedbacks, plant communities, their grazers and pathogens can provide a 'top – down' regulation on soil. How this all fits into the picture of plant invasiveness is far from clear. However, I will present some information on the complexities of soil interactions and how processes rates influence nutrient availability. This will lead into some degree of speculation as how these changes could influence rooting or seed germination conditions that influence the susceptibility of site to invasion by exotic plant species. Examples of 'bottom – up' and 'top – down' regulation will be selected from the literature to highlight points raised.

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Concurrent Session 9. *Invasive Plant Species Already in the Trade: What Can be Done to Curb Their Further Spread?*

Representatives from the nursery industry, landscape professionals, government agencies and non-governmental organizations will explore how to respond to the challenge of curtailing further spread of invasive exotic plant species already in the trade.

Concurrent Session 10. *Recent Findings on Long Term Invasive Earthworm Control Studies.*
Dennis Burton, Land Manager, Schuylkill Center for Environmental Education and Dr. Anne Bockarie, Professor, Philadelphia University. Recent Findings on Long Term Invasive Earthworm Control Studies

Invasive earthworms (*Amyntas* spp.) disrupt nutrient cycles, increase soil erosion, remove leaf litter, support the growth of invasive plant species and destroy the forest floor habitat in urban temperate deciduous forests of the Northeastern United States. Studies along the eastern seaboard indicate that worm density increases with urban development and disturbance. Effective earthworm management treatments are needed for successful forest restoration. The purpose of this study was to test twenty-six earthworm control treatments in a pilot study followed by a randomized complete block experiment (RCB) of the best treatments at the Schuylkill Center for Environmental Education, Philadelphia, PA.

The most effective pilot study treatments were 180 g/m² and 200 g/m² of sulfur pellets, 20 whole black walnuts (*Juglans nigra*)/m², and 10 cm of white pine needles (*Pinus alba*). *Amyntas* densities decreased from a mean of 86 worms/m² before treatment to 2 worms/m² after one year. Sulfur applications lowered soil pH from 6.5 to 4.

The most effective RCB treatment was 180 g/m² of sulfur + 10 cm of oak leaf litter. Total earthworm densities and mean weight decreased and this trend persisted up to 20 months post treatment while insect biodiversity and Red-backed salamander (*Plethodon cinereus*) populations both increased. Soil pH dropped as did nitrate levels, but potassium remained unchanged. The Ca/Al ratio was an acceptable 1.01, however regular monitoring for Al toxicity should be done. Further research is needed on the economic and environmental impacts of applying this earthworm management strategy on a larger scale in forest restoration sites.

Manipulating Soils to Manage Exotics. Dr. Joan Ehrenfeld, Cook College, Rutgers University.

Eastern deciduous forests are invaded by plants representing a wide variety of growth forms, including herbs, vines, shrubs and trees. Most invasive plants in forests, however, are understory species, rather than canopy trees. These invasive species occur in a gradient of density from individual plants or small patches of plants to dense, monospecific thickets and expanses covering large areas. Invaded areas also vary in density from diffuse populations to stands of high stem density. These patterns in their spatial patterns of occurrence imply that native species are frequently intermixed with the invasives, and occur under a canopy of native trees. The intermixture of native and exotic plants in forests has important implications for restoring and managing soils to reduce invasions and promote native species.

A review of my previous work on Japanese barberry (*Berberis thunbergii*) and Japanese stilt grass (*Microstegium vimineum*), plus reviews of the literature on exotic invasions, shows that plant invasions are often associated with increased availability of nitrogen, particularly in the form of nitrate. A recent study of the vegetation in urban wetlands in northeastern New Jersey clearly showed that the presence of a wide range of invasive herbs, shrubs and vines was associated with nutrient enrichment. However, sites varied in the identity of the elevated nutrient (N, P, or cations), and different invasives are associated with different enrichment conditions. This suggests that soil management needs to be responsive to a variety of conditions in different sites. Furthermore, studies of native plant establishment in a large deer enclosure, from which a very dense thicket of Japanese barberry was removed, showed that soil conditions fostered the spread of other exotics, and even the invasion of non-native species not previously found at the site. These results suggest that merely removing exotics, without changing the soil conditions of enriched sites, will not be effective at restoring uninvaded communities.

Soil manipulations have been used in restoration ecology elsewhere to reduce nutrient availability. Manipulations can involve amendments of various materials that alter pH and/or alter the availability of specific target nutrients, removals of topsoil, litter, or crop biomass, the use of fire to volatilize nitrogen, and cultivation to mobilize and leach nutrients. However, although such approaches to soil management have been successful in restoring grassland and heathland communities from former agricultural land, they are not suitable for forest management, partially because of the spatial issues outlined above (the intermixture of native species, and the intermixture of the roots of native plants with the exotics). In addition, forests tend to be located on steep slopes, often with rocky soils which prevent any use of mechanized equipment. Thus, I suggest that research on methods of managing forest soils need to concentrate on approaches that can be applied by hand, and that can be implemented by (volunteer) manual labor, and that are both cost-effective and likely to persist over long time periods. I briefly discuss an on-going experiment that is examining the use of wood chips and soil removals within a forest ecosystem. In conclusion, I point out that much research remains to be done on developing methods of soil manipulation that are appropriate for forest ecosystems, and that ultimately, the most effective method may be to aggressively restore native species and let them modify the soil in appropriate ways.

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**Concurrent Session 11. *Invasive Exotic Plant Management Tutorial.*** Lisa Smith, Consulting Ecologist, Pennsylvania

The Invasive Exotic Plant Management Tutorial for Natural Lands Managers provides a “one-stop-shop” for natural resource managers interested in organizing on-the-ground efforts to prevent, manage and control IEP’s. Land managers faced with the daunting task of managing or

controlling invasive exotic plants rely on resources developed by the conservation community to implement effective management, control and education programs. The amount of information available is huge and wading through it and processing it to get what is needed can be as daunting as the invasive plant problems that managers face! The Tutorial provides sufficient background information on the problem along with guidance in the form of a standard management approach so land managers can more effectively apply the information to their specific invasive plant problem. This project was developed with funding from the PA Department of Conservation and Natural Resources, Wild Resource Conservation Fund and, while intended to serve DCNR's land managers, it promises to be useful to agency and land trust staff throughout the Mid-Atlantic region. The Tutorial can be accessed at the following website: <http://www.dcnr.state.pa.us/index.aspx>.

**Concurrent Session 12. *Invasives Red Alert: Silently Stealing New Jersey's Natural Heritage. A Holistic Approach to Managing their Spread and Funding Discrete Habitat Restorations.*** Marc A. Matsil, Senior Policy Advisor, State of New Jersey Department of Environmental Protection

Despite New Jersey's rich vascular fauna with approximately 2,200 indigenous species and varieties--and large assemblages of protected ecological complexes including the Pine Barrens and Highlands, the State is under immense pressure by 1,300 nonindigenous plant species. Many are invasive. In 2004, the Governor signed an Executive Order establishing New Jersey's Invasive Species Council. This presentation will highlight progress by the Council and State to control the burgeoning problem, including issuance of a Policy Directive by DEP Commissioner Brad Campbell to ban the planting of invasive or potentially invasive plants (134 listed) on 700,000 acres of State Parks, Forests and Wildlife Management Areas; NJ Dept of Agriculture's and NJ State Forest Service progress on monitoring and control of pathogenic vectors and invasive pests in the 2.1 million acres of remaining forests in NJ; and examples of discrete restoration projects to restore wetland and forest complexes statewide.

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Concluding Session. *Invasive Plant Atlas of New England (IPANE).* Dr. Leslie J. Mehrhoff, Project Advisor, University of Connecticut, Department of Ecology and Evolutionary Biology

The IPANE Project was created in order to establish a Rapid Assessment Network for New England and to both assess the current status of invasive plants throughout the 6-state region and to create a trained network of volunteers and an informed public that can detect new incursions of potentially invasive species. Further, through knowledge gained from research and data analysis, and because of increased outreach and data dissemination both rapid response to new invasions and management and control of existing populations of invasive plants can be swift and effective.