

Invasive Ornamental Plant Symposium

How Did We Get Here? A Very Brief Introduction to Invasive Ornamental Plants

Sarah Hayden Reichard (University of Washington/ UW Botanic Gardens)

Historically, plants introduced for ornamental purposes have been a significant source of invasive plants in United States wildlands. Many desirable traits of ornamental plants, such as high fruit production, vegetative growth, and pest resistance, also increase the probability of establishment and survival outside of cultivation. Introduction of new species to the trade, however, has traditionally been celebrated as providing innovation and income to various horticultural enterprises. Competing interests have created tension between those benefiting from plant introductions, including both industry and consumers, and those who must manage lands harmed by the escaped ornamental species. Attempts to resolve those conflicts have resulted in U.S. efforts to establish “Codes of Conduct” for consumers, nurseries, public gardens, and others, efforts which more recently have been attempted by the European Union. Such Codes provide a framework not only for behavioral guidance, but also continuing dialogue. For instance, an acceptance by horticulturists that some ornamentals should not be used has led to discussions of sterile cultivars of those species, allowing scientists to more fully explain the opportunities and challenges of plant sterility. The more open communication has also led to increased understanding of the “externalities,” or unaccounted effects of plant introductions, and how they might be addressed. It is critical that these dialogues continue with a culture of respect and collaboration.

Plant invasions and climate change – implications for the nursery industry

Bethany A Bradley (Department of Environmental Conservation, University of Massachusetts, Amherst)

Climate change, including rising temperatures, altered precipitation and increasing atmospheric CO₂ is changing the playing field for both native and invasive plants. Rising CO₂ and extended growing seasons promote weedier plants, which are able to take advantage of increased resource availability to grow faster. Longer growing seasons also increase risks from non-native insect pests and pathogens, which arrive primarily via ornamental plant imports. An estimated 11% of international plant imports are contaminated by some form of non-native pest or pathogen. Altered precipitation and temperature are shifting the ranges of both native and invasive plants, potentially expanding invasion risk. For example, kudzu (*Pueraria lobata*) is expanding northwards into areas where winter frosts have become less severe. Species promoted by the nursery industry have the greatest advantage when it comes to range shifts in response to climate change because we are facilitating their dispersal into tomorrow’s habitat. Choices of plant species to support today will have profound impacts on ecosystems of the future. Focusing on regionally native species (particularly

species native to warmer climates) would promote native plant dispersal in the face of climate change. This presentation will review recent findings related to plant invasions and climate change and their implications for the ornamental plant industry.

Fecundity of barberry and euonymus cultivars to invade natural habitats.

Mark H. Brand (UConn), Jessica D. Lubell (UConn), and Jonathan M. Lehrer (Farmingdale State University)

Japanese barberry and winged euonymus are popular and adaptable ornamental landscape shrubs that have been important for the nursery and landscape industries. Only cultivars, selections with unique traits such as colored foliage or compact habit, are grown for landscape purposes. Because cultivars are so different in appearance and behavior from their wild species forms it has been theorized that cultivars may be less invasive than wild genotypes. To determine the fecundity of barberry and euonymus cultivars, replicated common field plantings were used to measure seed production of reproductively mature plants at two time points. Cultivar seed germination and seedling survival in a deciduous woods was studied to determine establishment rates for cultivars. Seed production and seedling establishment rates were then used to estimate annual contributions of new plants to an unmanaged natural area by each cultivar. For *Euonymus alatus*, mature plants of cultivars were predicted to establish between 588 and 3763 seedlings per year depending on the cultivar. Seedling contributions from barberry cultivars exhibited a much wider range, from close to zero to over 1,800 per year. The data suggest that even plants producing 100 seeds per year could establish a few seeds annual under ideal conditions.

Spread and ecological impacts of Callery Pear (*Pyrus calleryana*) and other ornamentals in Southwestern Ohio

Theresa M. Culley (University of Cincinnati) and Allison Mastalerz (University of Cincinnati)

Escaped ornamental species are often first reported in and around urban areas, where their ecological impacts are initially unknown. This pattern of spread could reflect multiple horticultural introductions into urban areas or increased management scrutiny of natural areas in urban sites relative to rural areas. The Callery Pear is a popular ornamental tree from Asia that spreads via cross-pollination among commercially available cultivars and rootstock. It can rapidly invade transportation corridors and residential areas. Wild trees can flower in their third year, often produce thorns, are potentially allelopathic, and retain their leaves longer into late fall than most co-occurring species. Compared to other species, wild Callery Pear generates more seeds with high germination and which are bird-dispersed. Wild trees also exhibit several ecophysiological advantages; when drought-stressed, wild individuals have higher photosynthetic rates but are less

water-use-efficient compared to cultivated offspring. More recently, Callery Pear is moving into forested understories, contrary to its usual habit in high light environments. In a forest vegetation survey across an urban-to-rural gradient in southwestern Ohio, Callery Pear was found in nearly a third of all forests, with an average percent cover of less than 1% within plots. However, this species was not the sole ornamental invasive detected. Of 39 nonnative plant species observed, 18 were assessed as invasive, and of these, 14 species (78%) have a past or current ornamental use, including the three most common nonnative species (*Lonicera maackii*, *Euonymus fortunei*, and *Rosa multiflora*). As expected, the number of ornamentally-introduced species increased in forests as the surrounding human population density increased. In the case of the Callery Pear, spread is most likely facilitated by a combination of fitness-enhancing traits and continued propagule pressure radiating from urban areas through the ornamental gardening pathway.

Ecological impacts of oriental bittersweet (*Celastrus orbiculatus*) – Research from the field

Stacey A. Leicht-Young (Harvard University/Arnold Arboretum), David N. Zaya (Illinois Natural History Survey), Noel B. Pavlovic (US Geological Survey/Lake Michigan Ecological Research Station), and John A. Silander Jr. (University of Connecticut/Department of Ecology and Evolutionary Biology)

Lianas (woody vines) are some of the most visually dramatic of invasive species, forming large impenetrable tangles on the landscape. They are present in all habitats – from old fields to old growth forests. Lianas can interfere with successional processes and kill host trees. However, lianas, especially those from the temperate zone, are poorly studied. The vast majority of invasive lianas in North America originated from East Asia, mostly as ornamentals, where there is a far greater diversity of species. The relatively liana-poor ecosystems of North America therefore, may provide these Asian species with an empty niche to exploit. Oriental bittersweet (*Celastrus orbiculatus*) is one such liana that has vast negative impacts on the habitats that it invades. Like many invasive species, the threats that it poses to natural environments are multi-faceted. Its plastic growth form, like that of other lianas and vines, gives it the ability to grow in three dimensions, unlike trees and shrubs. This species, when growing in dense tangles, can actually show a positive response to competition. In addition, in habitats where prescribed fire is used as a conservation tool, oriental bittersweet can vigorously resprout after it is damaged, resulting in a potentially worse habitat condition than before. Finally, because of its high numbers on the landscape, oriental bittersweet proves to be a direct threat to the success of American bittersweet (*Celastrus scandens*) both by through superior competitive abilities and via hybridization. As a result of these competitive interactions, American bittersweet has been listed in several states as a plant of concern. Further research on the biology and ecology both of oriental bittersweet, and temperate lianas more generally, is important to predicting species that may prove to be invasive in the future, as well as to combat those that are already established in the landscape.

Amur honeysuckle: Ecology and ecosystem impacts

Brian McCarthy, Ohio University

Three species of Asian bush honeysuckle exist in the eastern United States. These include *Lonicera maackii* (Amur honeysuckle), *L. morrowii* (Morrow's h.), and *L. tatarica* (Tatarian h.)— all belonging to the family Caprifoliaceae. These species were ostensibly imported to the U.S. for their horticultural value prior to escaping cultivation and becoming important invasive species (now banned in several states and present on most state watch lists). They are typically grown for their attractive flowers and fruits and may be used as a hedge. Numerous cultivars exist. The berries contain many small seeds that are dispersed by birds. Because the species thrive in moist shaded woodlands, and because the species are adaptable and successful across a range of environments, many forests understories have now been invaded. Disturbed areas, urban woodlands, forest edges, and fencerows are particularly vulnerable to invasion, with honeysuckle often forming dense impenetrable thickets. Among the three common species, my working group has largely focused on the Amur honeysuckle. I will review the ecology of this species, provide an overview of what research has been done, and demonstrate how Amur honeysuckle has had numerous negative impacts at the population, community, and ecosystem levels. The Amur honeysuckle has been clearly shown to negatively affect plant and animal species diversity, tree regeneration, overstory growth, and impact both terrestrial and aquatic ecosystem services via its allelopathic compounds. In sum, the species has dramatically altered many forest ecosystems in the eastern US. As is typical of many Asian imports that have escaped, the species has life history characteristics that aid its rapid spread across the landscape and is difficult to control. The broad and intense negative impact of this single species draws immediate attention to the need to exercise great care in introducing any non-native species to new ecosystems.

Possibility Place Nursery: A get rich quick scheme that failed

Connor Shaw, Possibility Place Nursery (IL)

Possibility Place, a native plant nursery in Monee, IL, was established thirty-five years ago with the hope of making its owner wealthy. That's not exactly what happened, but along the way he learned a great deal. Connor will talk about why he chose native plants as his product and how that choice has impacted his business. He will also talk about what he perceives as the future of native plant nurseries including their role in restoration efforts and education and outreach.

Plant risk assessment and management protocol for Minnesota and its effects on the green industry

Timothy H. Power, Minnesota Nursery and Landscape Association

Minnesota's designation of purple loosestrife (*Lythrum salicaria*) as a noxious weed in the late 1980's sparked the Minnesota Nursery and Landscape Association (MNLA) to become involved in the state's noxious weed designation process, including the redrafting of Minnesota's noxious weed law in the late 2000's. The 2009 Minnesota legislature passed the updated law, which established Minnesota's Noxious Weed Advisory Committee (NWAC) and directed NWAC to write and employ a science-based risk assessment protocol. Minnesota's green industry was specifically included as a stakeholder and member of NWAC. The "easy" risk assessments of existing noxious weeds were completed quickly. Japanese barberry (*Berberis thunbergii*) is the first risk assessment to be undertaken for a high-value horticultural plant using the new protocol. Japanese barberry's risk assessment will be completed in late 2013, with a NWAC recommendation forthcoming thereafter to Minnesota's Commissioner of Agriculture concerning the plant's future status. There remains a significant knowledge gap about invasive plants in the green industry, largely because of the lack of connection and communication between the natural resources community and the traditional majority of the green industry. The three-year process undertaken by NWAC to complete Japanese barberry's draft risk assessment allowed MNLA time to inform industry members about the invasiveness of this plant, fostering a gradual acceptance of its likely regulation and of the fairness of the process. NWAC and MNLA hope that Japanese barberry's risk assessment will serve as a template by which to deal with other horticultural species that have invasive tendencies. MNLA has taken the position that only the worst invasive horticultural plants should be regulated, but that invasive non-regulated terrestrial plants should be the subject of an ongoing education campaign, both for the green industry and the public. MNLA is intrigued with the PlantRight concept, developing a cadre of knowledgeable certified vendors of non-invasive plants, voluntarily leading the public away from the worst horticultural invaders.

Invasive Plants and Horticulture in California

***†Christiana Conser and *Bob Adams, *Sustainable Conservation/PlantRight, †UC Davis, Dept. of Plant Sciences**

Sustainable Conservation's PlantRight program collaborates with leaders from California's horticulture industry, environmental groups, government agencies and the scientific community to develop cooperative, voluntary solutions to address the continued use of invasive plants in gardening and landscaping. Invasive plants are specifically those plants that cause environmental or economic harm, and are often confused with non-native plants or garden weeds. PlantRight is working with the nursery industry to find voluntarily solutions to stop the sale of invasive plants that are currently in the trade and is developing science-based risk assessment tools to prevent new introductions of invasive plants to our state. PlantRight has created a regional list of invasive plants

for California and a list of recommended non-invasive alternatives, and is currently working to update these lists on an annual basis. The program also provides educational materials that nursery professionals can use to help educate their customers, staff and vendors about invasive plants.

Working Group

The development and validation of a more accurate weed risk assessment tool for evaluating the invasive potential of ornamental plants

***Christiana Conser, *Joseph M. DiTomaso,*†Lizbeth Seebacher, *Rachel Brush-Brownsey**

***UC Davis, Dept. of Plant Sciences, †Washington State Dept. of Ecology**

Weed Risk Assessment (WRA) tools for screening plants for invasiveness have evolved rapidly in the last decade. For commercial adoption by the nursery industry, it is critical that a pre-screening tool not only accurately predict invasive potential of a species, but also accurately predict non-invasiveness. In this study, we compared the accuracy and sensitivity of a new abbreviated WRA tool (PlantRight Plant Risk Evaluation or PRE) to the more widely used Australian WRA tool by screening 177 species known to be invasive or non-invasive with three separate evaluators. The PRE will be part of a system that nursery growers can use when they source and develop new plants to determine the invasive potential of those plants and proactively remove them from the supply chain. PlantRight will integrate four conservation technologies—the PlantRight PRE tool, an integrated set of online mapping programs and plant databases, a nursery management database, and smartphone apps for advanced field data collection—into an online plant evaluation system that will benefit multiple public and private sector stakeholders who are working to prevent the introduction and spread of invasive plants throughout the U.S. Adapting and integrating these proven conservation technologies and customizing them for the nursery industry will create a way to track plant material from the moment of discovery, through propagation trials and evaluation, to production and introduction to the marketplace. Helping the state’s nursery growers keep potential invasive plants out of the supply chain is critical to achieving the nation’s conservation goals and such action would benefit the industry, home gardeners, and the environment.

How to develop consensus on invasive plants: Wisconsin’s approach to assessment and regulation

Kelly Kearns, Wisconsin Department of Natural Resources

Wisconsin began the effort to develop an invasive species rule in 2004. A process was developed that involved extensive species assessments, stakeholder involvement and public input. The rule and

the initial group of regulated species went into effect in 2009. The state is now in the process of revising that rule to add commercially useful species to the list. The presentation will summarize this assessment and listing process, how cultivars were dealt with, and the phase-out process that is proposed for nursery stock. Also covered will be an effort by the National Association of Exotic Pest Plant Councils and ASTM to develop standardized criteria and methods for creating lists of invasive plants. These lists can then be used in green building standards to reduce the use of invasive plants in landscaping.

Development of invasive species ranks and regulations in New York

Troy Weldy, Senior Conservation Manager, The Nature Conservancy of New York

In early October, New York is expected to release its first invasive species regulatory lists and categories of regulation. Multiple states in the northeast have passed invasive species regulations over the past five years with industry, government and environmental groups carefully watching these efforts. As New York evaluated options, we looked to our New England neighbors as well as Wisconsin, Minnesota and other states. Ultimately, we decided upon a very transparent invasive species assessment process that separately looks at the ecological impact and the socio-economic values for each species considered. These assessments are available online (see <http://www.nyis.info/?action=israt>) allowing interested parties to understand the ranking or challenge the ranking. Prior to the final ranks being posted, the assessments are reviewed by an advisory committee which includes academic, agricultural, environmental, government, industry and other groups. To date, there has been broad consensus and support for these pending regulations. At the end of this session, attendees should have a better understanding of New York's assessment process, provide input to improve how this work advances in the future, assess if this process will work for your state and engage with the broader group on the pros/cons of this approach.