What could be the harm in transplanting an exotic species to your yard? Read on.

Invasive Exotic Plants in Illinois

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Photos By Michael Jeffords, INHS

Humans have moved plants for their food, fiber and aesthetic needs throughout much of history, but the modern era of global trade and commerce has accelerated that rate to unparalleled levels. This presents great opportunities and threats.

On one hand, we have unprecedented access to plants from a vast array of exotic regions of the world; on the other hand, these plants can wreak considerable economic and ecological havoc. Just as any other region of the world, Illinois is not impervious to these opportunities and threats.

Almost every major crop grown in Illinois was introduced from some other region of the world. Given how vital those crops are to our subsistence, it is not surprising that many of these are accepted with little question as a part of our landscape. Seldom do these 'exotic' plants make the insidious transition and become 'invasive,' a term reserved for organisms that escape, cause problems and cost us money. Invasive plants often inflict irreparable harm to native species and ecosystems, and equally to regional and national economies. Recent estimates place the annual cost of the impact and management of invasive plants in excess of $35 billion.

Although probably introduced as an herb in the 19th century, it was only recently that garlic mustard became an aggressive invasive.

(Photo By Joe McFarland.)

Significant invasive plants in Illinois are found in all habitats: woodland, wetland, prairie and roadsides. Invasive plants include kudzu, garlic mustard, musk thistle, Phragmites, reed canary grass, buckthorn, purple loosestrife, teasel and leafy spurge. Waiting at our doorstep are an ever-increasing list of invaders, including giant hogweed, mile-

a-minute weed and apple of Peru. The need to develop solutions to reduce the impacts of the current invaders, and anticipate and prevent impending threats, is obvious and urgent.

Given that not all exotic plants become invasive (see editorial on garlic mustard vs asparagus), an important step in managing exotic invaders is to understand why an introduced plant becomes invasive in the first place. Two significant, and related, reasons are thought to be important—that the invader is a significantly stronger competitor than native plants and that the invader, in being moved from its native range, has escaped from its natural enemies (usually specialist insects and pathogens) that kept its populations under control.

Freed from these natural checks and balances, the introduced plant can become a more-effective competitor, thereby gaining a foothold. The use of biological control, to reunite the weed with its natural herbivores, can be an effective and safe solution in managing the invader.

Biological control is the first step in reducing the population of the weed. The second step is to restore the habitat by replanting or managing native plants to keep the invader from coming back. Often, the sensitive nature of habitats invaded by exotic plants dictates that biological control may be the only safe management option. The purple loosestrife biological control program at the Illinois Natural History Survey (INHS) is an excellent example of the success of this method (see sidebar).

Significant research is being undertaken at INHS to understand why introduced plants become invasive and how to manage them. We highlight some of this research below.

Garlic Mustard

Possibly introduced as an herb from Europe in the 19th century, this forest invader is regarded among the most significant ecological threats in the eastern United States. Almost every wooded area in Illinois has been invaded by garlic mustard (*Alliaria petiolata*).

Mechanical control is futile, and chemical control is risky because of the sensitive nature of other plants in the forest understory. There is some promise on the biological control front. Several species of weevils are being evaluated in quarantine in Minnesota for their specificity, a step critical to the safety of this method to ensure that they will not feed on native or crop mustards. While this research in being done, INHS researchers are engaged in collaborative research on the population dynamics of this plant, its interaction with other forest herbs and shrubs, and the value of different management methods.

Leafy Spurge

Leafy spurge (*Euphorbia esula*) has been regarded as a problem since the early 20th century, but it is a relatively recent invader into Illinois. At least 20 populations have been discovered in the greater Chicago region. The success of this toxic Eurasian perennial is thought to be linked to its ability to produce chemicals that inhibit the growth of other plants.

Although predominantly a weed of agricultural lands, leafy spurge has been found in several natural areas (restored and natural prairie) in northern Illinois. As in the case of garlic mustard, the feasibility of chemical and mechanical control methods is limited in such sensitive habitats, thereby creating the need for development of biological control methods.

Several species of specialist flea-beetles have been successfully used in managing leafy spurge in other regions of the country. Research is ongoing at INHS to determine the most suitable and effective control agents, and to understand the vulnerability of different prairie species to the chemicals of leafy spurge. This research will help land managers select suitable species for restoration plantings.

(Photo By Susan Post.)

(Photo By Lori Schwab.)

Scientists attribute the success of leafy spurge—a native of Eurasia—to a chemical it produces that inhibits growth of other plants.

Teasel

Cut-leafed (*Dipsacus laciniatus*) and common (*D. fullonum*) teasels have been in North America for nearly two centuries, and were originally brought in from Europe to tease/comb wool. Their spread may be linked to increased use in dried flower arrangements, as a homeopathic medicinal item and as a component of bird seed mixes.

The use of teasel in bird seed mixes and dried flower arrangements may have helped spread this European plant.

These biennials have emerged as significant invaders of roadside and other open habitats in the last two decades, with cut-leaf teasel being the major species of concern in Illinois. Teasel differs from garlic mustard and leafy spurge in that it tends to invade marginal habitats (e.g. roadside right-of-ways, old fields), and therefore its economic and ecological impacts are less obvious. It may pose a risk to traffic safety, as the weed is known to lead to drifting snow along roadside edges.

Ongoing collaborative research between INHS and USDA scientists in teasel's native range (Europe) is focused on identifying suitable biological control agents. So far a moth whose larvae tunnel in the seed head and a flea-beetle that feeds on the leaves offer hope. Detailed ecological investigations also are under way to identify the teasel life-stage where management intervention would have the biggest impact.

Buckthorn

Buckthorn (*Rhamnus spp.*), a European species brought in as an ornamental hedge, is a major invader of almost every wooded natural area in northern

Are you managing garlic mustard?

The Illinois Natural History Survey is interested in learning from your experiences in managing garlic mustard. If you are interested in participating in a survey to share your experiences on garlic mustard management, email your complete contact details (address, phone number, email address) to Susan Post (INHS, 1816 S. Oak St., Champaign, IL 61820; spost@inhs.uiuc.edu).

Citizens to the rescue

The Illinois Natural History Survey's (INHS) Purple Loosestrife Biological Control project has flourished as a result of a strong partnership with land managers, students, educators—and homeowners such as Jack Mommsen and the late Beverly Mommsen of Crystal Lake. After learning about the school-based Galerucella beetle project, the Mommsens wondered why homeowner associations couldn't rear the beetles as well. Following a training workshop held in 2001, the Mommsens reared approximately 25,000 beetles (nearly 1,000 beetles per cage) for release in their subdivision.

During 2002 and 2003, the Mommsens recruited members of their homeowner association and provided invaluable assistance during workshops, sharing techniques for caging and potting plants. By 2003 their group had 68 cages in production, releasing tens of thousands of loosestrife-munching beetles into their wetlands.

The INHS Loosestrife team visited their site during 2004. Purple loosestrife—when it could be found at all—was stunted and showed evidence of beetle feeding. Native vegetation was coming back and the focus of the homeowner group then shifted to native plantings. For their efforts, the Mommsens were recognized as one of the 2004 Department of Natural Resources Volunteers of the Year.

Illinois. This woody perennial outcompetes other plants for nutrients, light and moisture. The dispersal of seeds by birds feeding on its fruit, combined with the sensitive natural areas buckthorn invades, makes it a particularly hard species to control.

Recent discovery of buckthorn serving as a winter host for the invasive soybean aphid, has raised its profile as a major threat for economic and ecological reasons. This association of an invasive insect with an invasive weed has renewed interests in developing biological control options.

Used as an ornamental hedge, buckthorn has invaded northern Illinois woodlands to the detriment of native plants.

(Photo By David Voegtlin.)

Future Invaders

Although significant strides are being made in the management of the current cohort of invasive plants, the increasing pace of global trade will require continuous monitoring and a proactive approach to anticipate the risks of species introductions. One step in this process was the establishment, in 2005, of the Illinois Invasive Species Council, an advisory group made up of INHS scientists and other experts working on various aspects of ecology and management of exotic species. The role of this group will range from helping coordinating early detection and management of new invaders, to reviewing exotic species introductions into Illinois in light of the Illinois Exotic Species Act.

Clearly, new economic opportunities in the nursery trade and agriculture will continue. However, equally clear is the need that these pursuits are made in a way that recognizes the economic and ecological risks that exotic invasive species pose to the diminishing Illinois wilds.

(Photo By Bev Mommsen.)

Jack Mommsen and his late wife, Beverly, led their homeowner's association in a biological assault on purple loosestrife.

Dr. S. Raghu heads the new Illinois Natural History Survey (INHS) Ecology and Biological Control of Invasive Plants laboratory. Susan Post is an INHS research biologist. Dr. Robert Wiedenmann served as the director of the Center for Ecological Entomology at INHS until March 2005 and is presently the head of the Department of Entomology at the University of Arkansas.