

*Text of an article written for Wellesley College by Christopher Matrick, Senior Conservation Program Manager for the New England Wild Flower Society*

Oriental bittersweet. Japanese barberry. Burning bush. Norway maple. Tree of heaven. Garlic mustard. Glossy buckthorn. Water chestnut. Recognize any of these names? Perhaps you have one or more of them growing in your yard or neighborhood? It is nothing to be ashamed of...or maybe it is? All of these species have something in common – they are increasingly common in our area and throughout the region, and all are considered invasive species. These species, in particular plant species, have been receiving a great deal of attention from conservationists and even the media. Numerous articles have appeared in local and national magazines and newspapers in the last year and a half. The sudden flurry of attention given these species has left many wondering “What is all the hub-bub about?”

The “hub-bub” surrounding these species concerns their potential impact on local habitats, native plant and wildlife species, and the biodiversity of our region. However, before we can begin to understand the impact of these species we must define who the culprits are. They are all, with few exceptions, non-native, or exotic, or introduced. Whichever term is used they did not grow in North America at the time of the first European colonization. This should not be interpreted to mean that all non-native plants are bad – in fact only approximately 15% introduced species become a problem.

There are many native plants that exhibit invasive tendencies including poison ivy, staghorn sumac, and Virginia creeper. These species should be termed explosive species. When ecological conditions are right, these species may undergo an explosion in their population numbers and density, but when conditions change and become more shady, or sunny, or moist their numbers drop off. This is not true of invasive species, many of which appear to actually stop natural ecological processes, such as succession of a field to forest.

### **Defining the Problem**

A definition widely used in New England adds to our understanding of what species should be classified as invasive. The definition reads as follows “plants that have, or are likely to spread into native or minimally managed plant systems, and cause economic or environmental harm by developing self-sustaining populations and becoming dominant or disruptive to those systems”.

This may seem a mouthful at first glance, but if taken a little at the time, is quite simple. First we have “plants that have or are likely to spread into native or minimally managed plants systems”, this is simply species that have escaped from cultivation or were unintentionally introduced. The terms “native or minimally managed” are in place to eliminate locations that are managed in a fashion that perpetuates the presence of these species – roadsides and formal town parks or greens is a good example. Next in the definition are plants that cause economic or environmental harm. For a plant to be considered invasive it must cause some measurable damage. This damage may be monetary (economic), as in the case of crop losses or rangeland degradation; or it may be ecological (environmental), as in the case of declines in endangered species or biodiversity. For a plant to be considered invasive it must also be able to develop self-sustaining populations, typically away from the site of original introduction. In essence, the species must be able to spread at the location of introduction, and also serve as a source of new populations. This clause in the definition eliminates several very prolific non-native plant species because of their inability to disperse themselves away from the point of original introduction – Periwinkle and Daylily. The final phrase in the definition is what concerns biologists the most, “becoming dominant or disruptive to those systems”. The plant must be able to out compete other species or alter the normal ecological processes that keep habitats and ecosystems healthy. By applying the standards set forth in this definition a list of species which may be invasive can be developed.

## **The Roots of the Problem**

The origin of invasive species is sometimes a murky subject. Typically they originate from far away. We have few species considered to be invasive from Central or South America. In the northeast, most of our invasive species are native to Asia, Eurasia, and Europe. Further south in North America, several African and Australian species are problematic. How they arrived here, or their vector of transmission, can be placed in one of three categories: horticulture, conservation, or accidental. The burden of guilt is shared by all three sources; each one introduced equally pernicious species.

In some cases invasive species were simultaneously introduced for multiple purposes. Japanese barberry, oriental bittersweet, and multiflora rose were all introduced for horticultural reasons and for conservation purposes, as good wildlife food and cover. Multiflora rose was also touted as a wonderful living fence! However, when we look at the percentages of introductions, horticulture is the clear leader. Sixty percent of all invasive species were introduced and spread for horticultural reasons. Burning bush, yellow flag iris, Japanese honeysuckle, and the multiple species of upright shrub honeysuckles, Morrow's, Tatarian, Mack's and Pretty, were all brought to this continent for horticultural reasons. Even the smelly, somewhat unattractive garlic mustard was introduced to Long Island in the mid 1800's as a component of herb gardens.

Conservation organizations are not free of blame either. In the name of erosion control, wind breaks, and wildlife food and cover, conservation groups brought us autumn olive, Japanese knotweed, glossy and common buckthorn, Norway maple, and kudzu. Accidental introductions make up a small, but important sector of introductions. Most aquatic species such as water chestnut, Eurasian watermilfoil, fanwort, and hydrilla were the result of accidental escapes from water gardens or aquarium tanks. Two other species just beginning to have an impact on New England, Japanese stiltgrass and mile-a-minute vine came into this country as seed, free loading in packing material or seed mixes. One of our worst invaders, purple loosestrife, was an accidental introduction long before it was sold in garden centers. Seeds of purple loosestrife were carried here from Europe in the ballast of ships. When the water used as ballast was pumped out

of the ship, so were the seeds of purple loosestrife. Some of our invasive species had less than glamorous beginnings!

There is also a category of native plants that are considered invasive. These species are native in one habitat or region of the country, but in another are a significant pest. Phragmites, or the common reed, is the most well known example. Wetland soil core samples reveal that Phragmites was present over three thousand years ago in some coastal marshes in Connecticut. It is a native species, so why is it so problematic today. Core samples indicate it occupied only a small portion of the upper reaches of coastal marshes. Nutrient loading, wetland disturbance, salt marsh degradation, and road salting have all been implicated as a reason for its prolific spread— in reality it is probably a combination of factors. Black locust is another species that falls into this category. Native to the southern Appalachian Mountains it was naturally expanding its range northward, ever since the retreat of the last glacier about 10,000 years ago. Its use as a street tree and in horticulture advanced its spread by hundreds, if not thousands of years. It is now a significant invasive species in disturbed areas and on Cape Cod.

## **Over Achievers**

Now that we know how to define an invasive plant species and where they originate from, it is important to discover what makes them so successful. Why are they such good competitors? What gives them the edge over many of our native plants? Most of these species are quite well behaved in their native land. Why do they become such thugs upon arrival in a foreign location? All of our invasive species share certain characteristics. First and foremost, they are almost always introduced without the predators, those pathogens and pests that keep them in check in their native habitats. Most are also habitat generalists – they do not occupy a specific, narrow niche. For example, I have observed multiflora rose growing equally well, flowering and fruiting, in a sunny, dry field and as in standing water on a shady streamside. This is almost unheard of in native species.

Most produce prolific amounts of fruit or seed. A single large purple loosestrife plant can produce as many as two million seeds each year. Some use their root systems or branches to spread, or

a combination of seed and vegetative reproduction. If you have a burning bush in your yard or neighborhood that you do not annually maintain, look around underneath the shrub. Even lawn grasses can not compete with the dense carpet of seedlings you will find growing there. The root system of Japanese knotweed has been documented to spread 65 feet from the main stem of the plant, and if cut, it will send up new shoots along the entire length of that root. This is no shrinking violet – it has also been rumored to push its way up through 3 inches of asphalt in a shopping center parking lot!

Invasive species also use very effective seed dispersal mechanisms that allow them to spread quickly over a large area. These mechanisms – wind, water, and birds, give them an advantage over many native species which employ ants, mammals or gravity to disperse their seeds. Many invasive plant species are also the first plants to leaf out in the spring, and the last to drop their leaves in the autumn. We all anxiously await the arrival of spring and the greening of the forest, but that first green haze of leaves which appears in the forest in April is not viburnum or blueberry. It is barberry, shrub honeysuckle and buckthorn. The same is true in the fall, where its bright yellow color, and its leaves that hang on after every other tree can easily identify Norway maple has long shed its leaves. This “first and last” strategy gives invasives an advantage – they are photosynthesizing and storing up energy for reproduction and growth longer than most of our native plant species.

The list of shared characteristics that make invasive plant species so successful goes on and on, but one more needs to be mentioned – disturbance. Whether the disturbance is natural or human induced, invasive species thrive on it. All of our habitats and natural communities are at some risk to invasion by this green horde, but any habitat receiving some type of disturbance is extremely vulnerable. Roadsides, powerline and gasline right of ways, rivershores, lakeshores, wildlife clearings, walking trails – these are the places where the impact of invasion is the greatest. These are the locations where invasives get their start. Many invasive species need some sort of disturbance to establish them at a new location, but once in place they often require no disturbance to maintain themselves or to spread. Today with rapid growth, development, and suburban and

urban sprawl seemingly endless, there is no shortage of disturbance.

### **Negative Impacts**

Getting back to the “What’s all the hub-bub about?” question posed earlier. Why do we care if invasive species are invading our landscape? Won’t the addition of new species to our region actually increase biodiversity? “What’s all the hub-bub” about? Negative impacts – on our economy, on our natural heritage, and on the biodiversity that keeps our ecosystems and ourselves healthy. Invasive species, both plants and animals, cost the United States economy over 138 billion, yes billion, dollars each year in environmental damage, crop failures, control efforts, and public health problems. These species are having a dramatic effect on our natural communities. Following habitat loss, invasive species are the number one threat to the integrity of our nations natural areas. Today over 100 million acres of land are infested with invasive species, and 3 million acres are added to that total each year. This is an area three times the size of the State of Delaware!

The lands we have set aside as a public treasure, our national and state parks and forests, are being lost at a rate of 4600 acres per day to invasive species. Invasive species do not recognize legal protections either. They are implicated in the decline of 42% of species listed under the Endangered Species Act of 1973 and for 18% of those species, invasives are the primary reason they are on the federal list. These figures do not take into account the threat posed by invasives to species protected by each states endangered species legislation.

A recent study by the Illinois Natural History Survey revealed that songbirds nesting in invasive plant species are at a higher risk of nest predation than those using native species. Further, it is my personal opinion that the fruits produced by many invasive species are junk food for birds, producing nothing but a quick sugar high. The fruits of native species such as holly, viburnum, and blueberry are high in fats and lipids, sources of longer-term energy. The sugar energy provided by invasive species fruits does not last long, therefore would require frequent feeding. This frequent feeding may not be a problem while these migrants are in residence in the northeast, but what happens when they undertake their annual winter migration? Do they have to stop more often to

refuel? What happens if they run out of energy far from land? Do invasive plant species share some of the responsibility for the recent documented decline in songbirds? These answers are unknown, but are worthy of thought and study.

### **Invasives Are Everywhere**

Invasive plants species are found throughout our region. I travel frequently throughout New England, and in most places I visit I can find an invasive plant growing outside cultivation. However the problem varies in degree from place to place. In New England, the hardest hit areas are coastal regions, the Connecticut River Valley, the Housatonic River Valley, the Berkshire/Taconic region of Massachusetts and Connecticut, the major urban areas, the Lake Champlain basin, and large portions of Connecticut and Rhode Island. However, problems associated with invasives are not solely restricted to New England or the northeast. Invasive plant species are having a negative impact on habitats and ecosystems throughout North America. Black knapweed and yellow star-thistle are a plague of rangeland and prairies habitats, *Melaleuca* or paperbark, a tree introduced from Australia is a plague on the Everglades, and Kudzu, originally touted to prevent soil erosion on agricultural land in the south, is now commonly known as the “plant that ate the south.”

Throughout our region and the nation, ad hoc and legislated groups are undertaking efforts to establish lists of species considered invasive and develop legislation preventing their further introduction. Any laws or legislation passed preventing the distribution or sale of invasive plant species could potentially impact the nursery industry. Japanese barberry, burning bush, and Norway maple are in many locations the bread and butter of this industry. So in an attempt to promote cooperation and the development of a mutually acceptable list, most of these groups in New England are comprised of representatives of the nursery industry and the conservation field. A look at each New England state and their progress in this area reveals the following. Vermont, Maine, Rhode Island, and Connecticut have lists of invasive species. Vermont and Maine have some legal restrictions on the transport and sale of some species. New Hampshire has a law, and is currently writing the regulations of that law and working on a list. Massachusetts working on the

development of a list. Each of these states is actively collecting data on invasive species in natural communities of each state.

### **What Can You Do?**

All of this information is interesting and informative, but it still may leave you wanting. Simply knowing there is a problem with certain plant species is not enough. Many of you may want to get out there and do something about it. What can YOU do to help? Well I'm glad you asked. The first step is to learn what species are invasive and how to identify them. The New England Wild Flower Society and other organizations offer courses each year on the identification and ecology of invasive plant species. Once you learn how to identify them, look at your own landscape or yard. Are you growing any of these species? Are your plants serving a seed source for infestations elsewhere? If you find you are growing an invasive plant species remove it as soon as possible. There are wonderful non-invasive, native and non-native plants you can put in as a substitute. Take a walk through your local nursery or garden center, if you find invasive plant species, explain the problems surrounding invasive species to the owner and encourage them to stop selling them.

Volunteer for invasive species control projects in your area. Take a look at your local town forest or nature preserve. Are there invasives growing there? Contact your local conservation commission or land trust and inquire about organizing a project yourself. Start small; don't try to tackle 20 acres of Japanese barberry until you have tried to control one acre. Always obtain the appropriate permissions and permits first. Landowner permission is always required, and when wetlands are involved other permits are needed as well.

Finally get the word out – tell your friends and neighbors about the problem and how to identify these species. You can read it in a book or magazine, but the personal touch engenders much more success. Please feel free to contact me with any questions you might have, or if you would like to be added to a list of people who volunteer for invasive species projects. We are actively surveying and controlling invasive species in each state in New England. You can reach me at [cmattrick@newfs.org](mailto:cmattrick@newfs.org). Get out there and lend a helping hand!