

LESSON 11. INVASIVE EXOTIC PLANTS AND ANIMALS OF ILLINOIS FORESTS

Many organisms, both plants and animals, are pests of Illinois forests. Most are exotic species that man has transported from various parts of the world while some are native species that became invasive due to changes resulting from human activities. These invasive species can alter the composition and structure of a forest community, create new habitats, destroy or reduce the viability or reproductive potential of a particular species, or just take up space that would be occupied by native species. Commonly these invasive organisms alter the habitat making it unsuitable for species that presently occupy a site.

Exotic organisms have a measurable affect on the environment. As a result the scientific study of introduced exotics is driven largely by economic concerns. Many of these exotic species affect our everyday life and are responsible for millions of dollars of loss in Illinois alone. Most of this loss has to do with exotic insects and pathogens associated with agricultural crops, but some also affect forests, and the integrity of our natural areas.

Introduced Diseases and Their Effects on Illinois Forests

Fungal pathogens have had a major effect on Midwestern forests. The introduced Dutch elm disease fungus and the virus disease, phloem necrosis, eliminated the American elm as a common ornamental throughout most of North America and greatly reduced its importance in most forest stands. The smaller European bark beetle, which is the vector of the fungus that causes Dutch elm disease, was first discovered in the United States in 1909. Discovered in Illinois in 1950, this disease has had a major impact on the composition and structure of forest communities. Many mesic forests, particularly forests associated with terraces of streams and small rivers, contained both *Ulmus americana* (American elm) and *Ulmus rubra* (slippery elm) as major overstory components. By the mid-1960s the large, stately American elms were mostly dead in central Illinois.

Vegetation studies of some Illinois forests in the 1960s show that major composition changes had occurred since the introduction of Dutch elm disease and phloem necrosis. In a small central Illinois woodlot the larger elms were dead when the overstory was surveyed in 1964. When the living and dead values for elms were added together it indicated that this site was predominately an elm forest before these diseases were introduced into Illinois. When the same woodlot was surveyed in 1983 the elms, as a group, were third in importance in the woods, very common in the seedling and sapling categories as well as the smaller diameter classes. At that time dead elms accounted for 14 percent of all standing elms, indicating that mortality from Dutch elm disease and phloem necrosis was limiting the importance of elms.

Brownfield Woods is a 24 hectare remnant of a streamside prairie grove that once occupied about 2600 hectares along the Salt Fork River northeast of Urbana, Champaign County, Illinois. Elms (American and slippery) were common overstory species in the woodlot in the early 1900s. In this woods, elms had the second highest density, exceeded only by *Acer saccharum* (sugar maple). By 1991 American elm was virtually eliminated

from the woods, its basal area decreased by 95 percent, stems/ha decreased by 80 percent, and all individuals present were in small diameter classes. In this woodlot slippery elm also had a relatively rapid decline in importance. In 1960 slippery elm averaged 15.1 stems/ha in Brownfield Woods, increased to 45.2 stems/ha in 1975, and decreased to 11.3 by 1986. The third most abundant species in the woods in 1975 was slippery elm. Though affected to some extent by phloem necrosis and Dutch elm disease, slippery elm and sugar maple rapidly filled the openings created by the death of American elms. The increased shade from canopy closure in the dead-tree gaps, however, favored the more shade tolerant *Aesculus glabra* (Ohio buckeye) and sugar maple over slippery elm, reducing its high densities recorded in 1975. Although still an important forest component, slippery elm has diminished since 1975 and will probably continue to decline in importance.

The decrease of American elm has caused dramatic changes in all Illinois forests where it was originally important. Though still present, and in many places common in the seedling, sapling, and small diameter class, this species is no longer an important tree of Illinois forests. Few large individuals are now encountered. Its continued existence is assured, however, as many individuals survive long enough to reproduce. This creates a seed source for its continued existence as an understory component.

Introduced Insects and Their Effect on Illinois Forests

Introduced insects also have the potential of altering the structure and composition of forest communities. One insect species that has the potential of devastating the oak-hickory forests of Illinois is the gypsy moth. This species was imported from Europe to Massachusetts in 1869 and has slowly spread westward. Presently it is a serious defoliator of urban and forest trees in most of the northeastern United States. Gypsy moths are capable of causing enormous devastation over large areas. The larvae of this species feed on the leaves of most native forest trees and shrubs, completely defoliating and eventually killing hardwood forests. Trees that are under stress from other diseases or drought conditions are particularly susceptible to disease and death after gypsy moth defoliation.

Since 1981 male gypsy moths have been caught in pheromone traps placed at various locations in Illinois. The number of male moths caught has continued to increase since 1986 with most individuals being trapped in the five-county area surrounding Chicago. Most of the trapped individuals represent male moths that have flown far away from areas infested by flightless females. This long distance migration is probably occurring because of our modern transportation systems which aid in the dispersal of gypsy moth egg masses from infested to non-infested areas. At the present time, no major outbreak of this species has occurred in Illinois. However, this species is presently in Illinois and it's just a matter of time until a major outbreak occurs.

More recently two species of beetles have been introduced into the Great Lakes region that have had a major impact on Illinois forests. The Emerald ash borer, a native to Asia, entered the United States in untreated wooden shipping crates. The larvae of these beetles feed on the wood of ash trees, a common forest tree of mesic sites throughout

Illinois. These beetles are now common in Illinois. Larvae hidden in firewood can easily travel undetected in a camping trailer, and the adults can hitch a ride on a car or truck.

Another beetle that has entered the Great Lakes region, again probably by untreated shipping crates, is the Asian long-horned beetle. This beetle has an appetite for maple trees.

There are numerous examples of fungal, viral, and bacterial pathogens that affect our crops as well as our native and even exotic plants and plant communities. Also, many introduced insects, as well as other animal species have caused similar dramatic changes. This chapter, however, is mostly concerned with the introduced vascular plant and mammal species that have the potential of effecting the composition and structure of Illinois forests.

Exotic, Non-native, Invasive Plants

Presently few plants new to Illinois are brought in accidentally. They are already here, brought in legally for horticultural, agricultural, or forestry purposes. Gardens, farms, and plant introduction facilities operated by the federal government are the main source of our new weeds. These garden, landscaping, and new agricultural species already being cultivated, are the future exotic plant invaders.

It is estimated that nearly one-third of the vascular flora of most Midwestern states is not native to the region, being introduced from many parts of the world. Presently there are 3,134 species of vascular plants found growing wild in Illinois. Of that number 969 (31 percent) are non-native species. Most of these are Eurasian weeds that have followed man throughout the world, some are ornamental species that man uses in his gardens and for landscaping, others are crop plants that are occasionally spontaneous, while others are Midwestern species that randomly appear as waifs, occasionally appearing spontaneously and rarely persisting. Also, each year a few new exotic species enter Illinois, mostly ornamental shrubs from the landscaping trade.

The majority of the exotic introduced species are agricultural and roadside weeds that are rarely problems in natural communities. Agricultural weeds, though a major economic problem in Illinois, usually do not enter our natural communities in great numbers unless anthropomorphic or natural causes have created major disturbances or have drastically fragmented these communities. Once entering the forests, however, these invasive species have a significant impact on the fauna and flora, commonly spreading throughout the entire forest fragment.

Most exotic species that enter forests have many of the same characteristics of agricultural weeds that give them a competitive advantage in disturbed habitats (Table

11.1). These weedy species commonly have short life cycles, rapid growth rates, high levels of energy allocation for reproduction, efficient dispersal mechanisms, rapid population growth rates, wide distributions, seeds that remain viable for extended periods of time, and the ability to rapidly use available environmental resources.

Table 11.1. Characteristics of an ideal weed.

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1. Short life cycle
 2. Seeds germinate under many different environmental conditions
 3. Internal control allows for seed germination throughout year
 4. Seeds that remain viable for many years in the seed bank
 5. Rapid growth through the vegetative phase to flowering
 6. Continuous seed production throughout most of the growing season
 7. Self-compatible, but not completely autogamous or apomictic
 8. Cross-pollinated using unspecialized visitors or wind borne pollen
 9. Very high seed output in favorable environmental circumstances
 10. Production of some seed in a wide range of environmental conditions
 11. Adaptations for short- and long-range dispersal
 12. Vigorous vegetative propagation or regeneration from fragments if a perennial
 13. Ability to compete interspecifically by special means (rosette, choking growth, allelopathy)
 14. Ability to rapidly use available environmental resources
 15. High degree of flexibility that can generate appropriate phenotypes in different environments
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Though many plant species have the potential for creating major disturbances in our forests, relatively few are major invaders, particularly where disturbances have been minimal. The exotic species that seem to appear most commonly in Illinois forests are listed in Table 11.2. In this list the species are grouped according to growth habit, and arranged alphabetically by scientific name followed by the species common name.

Presently some of the species are major problems in forest communities while others are relatively uncommon. Some species have been in Illinois since early settlement time, others are recent introductions. Many of these species will be discussed in detail below.

Introduced Exotic Trees

Very few exotic tree species are commonly encountered in Illinois forests (Table 11.2). Most individuals are found at the forest edge or in tree-fall gaps. Of the tree species listed in table 11.2, most are “old-timers” having been naturalized by the early 1900s or sometimes earlier in Illinois. Only *Acer ginnala* (Amur maple) is relatively new to the Illinois flora, and was first reported as escaped about 30 years ago. Native to central and northern Manchuria, northern China, and Japan, this species is commonly planted throughout the northeastern United States. Occasionally reported as escaping in eastern North America, other authors suggested that Amur maple was a relatively trouble-free shrub to small tree that requires little maintenance except that “weed seedlings may rarely be a problem.”

Amur maple is commonly planted throughout much of Illinois although it is best adapted to areas with cool summers. Naturalized individuals are found where this species is used in plantings along interstates and other roadways. Also, when used in landscape planting around homes, naturalized individuals are usually encountered. Mostly associated with old fields and open weedy areas, occasional individuals are found associated with open forests and at the forest edge. The only extensive population of Amur maple studied where forest and forest edge individuals are common is near Lake Shelbyville, Moultrie County, Illinois. The population is near an abandoned home site where an abandoned pasture and the forest edge are overgrown with Amur maple and other exotic and native weedy species. In the abandoned pasture Amur maple seedlings averaged 11,667 stems/ha, while saplings averaged 4,167 stems/ha. Many individuals were small trees 7-9 cm dbh and were up to 20 years old when the area was studied in 1990.

The ornamental *Pyrus calleryana* (Callery pear, Bradford pear) is a recent introduction that may become a problem in our forests. Presently little is known about how invasive this species will be in Illinois, so it was not included in table 11.2. Preliminary findings, however, suggest that it will become a major problem of the future. This species, that may reach a height of 15 meters, is native to Korea and Japan and is widely planted as an ornamental throughout the eastern United States. First introduced into the New World in the early 1900s, its attractive white flowers and excellent growth form make it an ideal ornamental along streets and in yards. Within the past 20 years this species has become the most commonly planted tree throughout most of Illinois even though its branches are susceptible to wind and ice damage.

Until recently Callery pear was not considered a serious invasive plant pest in Illinois. Studies at the Lake of the Woods Forest Preserve near Mahomet in central Illinois, however, found thousands of adventive individuals of Callery pear. Individuals ranged from small seedlings to mature trees 9 meters tall and 20 cm dbh. This species formed impenetrable thickets whose individuals produced many thorn-like, very sharp spur branches, while trees 2 meters or more in height were laden with fruit. Most individuals

were found in old fields, but some were in a restored prairie, other in fencerows and at forest edges. This species will, at a minimum, be a forest edge species and a tree of successional fields. It will probably not become a forest interior species but presently it is naturalized in at least 67 Illinois counties.

Most of the remaining tree species listed in Table 11.2 have been used as ornamentals in Illinois for more than 100 years. Two of these species *Koelreuteria paniculata* (golden-rain tree) and *Ailanthus altissima* (tree-of-heaven) are rarely encountered in our forests. Only on the steep talus slopes below the bluffs of the Illinois and Mississippi rivers is the tree-of-heaven especially abundant. These talus slope forests are heavily disturbed and have been subjected to extensive cutting and other disturbances since steamboats were traveling our Midwestern rivers in the 1840s. Golden-rain tree is uncommon but has become naturalized on the steep slopes below the river bluffs north of Alton, Illinois.

Morus alba (white mulberry) was introduced along the Atlantic seaboard during colonial times when an attempt was made to establish a silkworm industry in this country. Transported west by early settlers, mulberries are now common throughout the eastern United States, including Illinois. Rare in good quality forest, white mulberry is common and widespread throughout Illinois, being found at forest edges, in heavily disturbed forests, abandoned fields in the early stages of tree regeneration, fencerows, and most other weedy habitats. Another species, *Maclura pomifera* (Osage orange), also common throughout the state, is frequently found growing in hedgerows or pastures, but also occurs in disturbed forests, floodplain forests, and on riverbanks. During the early- and mid-1800s Illinois was open range. It was not until 1854, when the railroads were well established, that fencing laws were enacted. Many a debate arose on whether the farmer who grew the crop or the livestock owner should erect the fence. For either party it was an expensive venture. Upon buying his land a farmer would have to pay 16 to 24 times the original purchase price per acre to erect a wooden fence.

Table 11.2. The most common introduced exotic species that pose the greatest threat to Illinois forests.

Scientific Name	Common Name	Origin
Herbs		
<i>Alliaria petiolata</i>	Garlic mustard	Europe
<i>Glechoma hederacea</i>	Ground ivy	Europe
<i>Lespedeza cuneata</i>	Sericea lespedeza	Eastern Asia
<i>Lysimachia nummularia</i>	Moneywort	Europe
<i>Microstegium vimineum</i>	Natal grass	Eastern Asia
<i>Ornithogalum umbellatum</i>	Star-of-Bethlehem	Europe
<i>Perilla frutescens</i>	Beefsteak plant	Eastern Asia
<i>Persicaria cespitosa</i>	Creeping smartweed	Asia
<i>Prunella vulgaris</i>	Self-heal	Europe
<i>Stellaria media</i>	Common chickweed	Europe
<i>Vinca minor</i>	Common Periwinkle	Europe
Shrubs		
<i>Berberis thunbergii</i>	Japanese barberry	Eastern Asia
<i>Elaeagnus umbellata</i>	Autumn olive	Eastern Asia
<i>Euonymus alatus</i>	Winged euonymus	Eastern Asia
<i>Frangula alnus</i>	Glossy buckthorn	Europe
<i>Ligustrum obtusifolium</i>	Blunt-leaved privet	Japan
<i>Lonicera maackii</i>	Amur honeysuckle	Eastern Asia
<i>Lonicera tatarica</i>	Tatarian honeysuckle	Europe
<i>Rhamnus cathartica</i>	Common buckthorn	Europe
<i>Rhodotypos scandens</i>	Jetbead	Japan
<i>Rosa multiflora</i>	Multiflora rose	Eastern Asia
Trees		
<i>Acer ginnala</i>	Amur maple	Eastern Asia
<i>Acer platanoides</i>	Norway maple	Europe
<i>Ailanthus altissima</i>	Tree-of-heaven	Eastern Asia
<i>Koelreuteria paniculata</i>	Golden-rain tree	Eastern Asia
<i>Maclura pomifera</i>	Osage orange	Arkansas to Texas
<i>Morus alba</i>	White mulberry	Eastern Asia
<i>Morus tatarica</i>	Russian mulberry	Europe and Asia
<i>Robinia pseudoacacia</i>	Black locust	SE United States
Vines		
<i>Celastrus orbiculatus</i>	Round-leaved bittersweet	Eastern Asia
<i>Dioscorea oppositifolia</i>	Chinese yam	Eastern Asia
<i>Euonymus fortunei</i>	Climbing euonymus	Eastern Asia
<i>Lonicera japonica</i>	Japanese honeysuckle	Eastern Asia
<i>Pueraria lobata</i>	Kudzu-vine	Eastern Asia

In 1847, Professor Johnathan Turner introduced Osage orange into Illinois to use as a living fence. This thorny tree, which is native to southern Arkansas, Oklahoma, and adjacent Texas, made an excellent fence. By the late 1800s a survey in Iowa indicated that 39 percent of all fences were of Osage orange; in Kansas this figure was close to 60 percent; while in Kankakee County, Illinois, Osage orange accounted for nearly 75 percent of all fencing. Osage orange fit all the requirements of the settlers for fencing. It was cheap, grew fast, was easily started, could survive the climate of the prairie, was armed with stout thorns, was not attacked by most animals and insects, and produced a tight hedge. It was advertised as being “horse-high, bull-strong, and pig-tight”. The coming of barbed wire meant the gradual grubbing out of the many miles of Osage orange hedge, a progress that is still continuing today.

Another species that deserves mentioning is *Robinia pseudoacacia* (black locust). Native to the extreme southeastern part of Illinois, and south through the eastern United States from Oklahoma to Georgia, black locust is commonly planted and has escaped from cultivation as far north as southern Canada. It was commonly planted throughout most of Illinois during the late 1800s and early 1900s as its hard, durable wood made excellent fence posts. Sometimes encountered in disturbed forests, black locust is a major problem in the sand deposits of Illinois. Spreading by root-sprouts after initially being planted, black locust has destroyed many of our high quality sand prairie and sand savanna communities.

Introduced Exotic Shrubs

Many shrubs species were originally introduced to provide food and cover for wildlife, being recommended by various government agencies for these purposes. Commonly grown in state-owned nurseries, they were sold each year at relatively low prices along with many exotic tree species. It was not uncommon for farmers and interested city dwellers to obtain wildlife packets that contained a variety of shrub species considered wildlife friendly. Some species were also advertised for erosion control and to provide living fences for livestock. With the development of the extensive interstate highway system many of these introduced exotics were used for landscaping, as crash barriers, and to reduce headlight glare in the median of these highways. Many of these introduced shrubs are currently the most serious threat to Illinois forest communities.

Of the species listed (Table 11.2) some are encountered nearly throughout the state, and in many forests are found in large numbers. These shrubs have generally been considered the major exotic species problems of Illinois forests. An “old-timer” of this group is *Rosa multiflora* (multiflora rose). Originally introduced from eastern Asia for wildlife cover and food, and as a “living fence,” this species has become a serious invader of pastures, old fields, and occasionally some of our better quality natural areas. It commonly invades prairies, savannas, open woodlands, and forest edge, and has been found in mature forest communities particularly near tree-fall gaps. Once entering a disturbed community this thorny, bushy shrub can form impenetrable thickets.

Elaeagnus umbellata (autumn olive), a native to Japan, China, and Korea, is now commonly planted throughout much of the northeastern United States. The USDA Soil Conservation Service started studying this species in 1940, and the strain “Cardinal” was released in 1963 for commercial production. By 1982 the Illinois Department of Conservation was distributing more than 1 million autumn olive seedlings a year which represented about 20 percent of the entire state’s nursery production. Though not originally considered to spread extensively from cultivation, it was soon found as seedlings and small individuals around original plantings. This species is now common throughout most of Illinois, going from an unknown in 1963 to our most abundant exotic shrub in disturbed habitats in about 40 years. The state nurseries of Illinois are no longer growing this species, but it can still be found in commercial nurseries, and is still used for landscaping.

Euonymus alatus (winged wahoo or burning bush) is another naturalized shrub that is becoming a problem in some natural areas. Native to eastern Asia, winged wahoo is a commonly planted ornamental that in recent years has been used extensively in landscaping along interstate highways. Its form and bright crimson autumn foliage make it a desirable and commonly planted shrub. Unlike autumn olive, which is usually limited to tree-fall gaps in mature forests, winged wahoo does well in dense shade of closed canopy forests.

Winged wahoo was first reported as naturalized in Illinois in 1973 based on a naturalized population found in Coles County. This population dominates the understory in the more shaded parts of a north-facing hillside and valley floor forest, being particularly abundant in small ravines. The entire population extends over an area of about 3 hectares with some of the plants 5 meters tall, 5 cm dbh, and in excess of 30 years old. *Quercus alba* (white oak), *Quercus rubra* (red oak) and sugar maple dominate the overstory of this mature second growth forest with most of the individuals between 30 and 50 cm dbh. Throughout this forest the number of winged wahoo plants is about ten times greater than that reported for all other woods species combined. On two glacial drift hill prairies on the south-facing slopes of this same valley winged wahoo averaged 2,518 to 13,100 stems/ha.

One of the most pernicious introduced shrubs is *Lonicera maackii* (Amur honeysuckle). Native to eastern Asia, it has been an important ornamental shrub for more than 100

years being introduced into North America in 1898. From the 1960s to 1984 the USDA Soil Conservation Service sponsored a program to develop improved cultivars of Amur honeysuckle that provided cover and food for wildlife, stabilized and reclaimed soil, and improved ornamental quality. The tendency of Amur honeysuckle to spread beyond the original plantings was first recognized in the mid-1920s, and naturalized individuals were being reported in the 1950s. Since that time this species has spread into most habitats in Illinois, including closed canopy forests. In the fall it is easily observed in forest communities since it is one of the few species that holds its yellowing leaves much later than its community associates.

Besides the species listed above many other exotic shrubs are invading Illinois forests. Some are, or will become, major problems of the future. *Rhamnus cathartica* (common buckthorn) is presently a problem in forest and savanna communities in the northern half of Illinois. A close relative *Frangula alnus* (= *Rhamnus frangula*) (glossy buckthorn) has become a severe pest primarily in wetland habitats, being particularly problematic in alkaline bogs, tamarack and cedar swamps, shrub thickets, and low woods. It is capable, over time, of forming near monocultures even in relatively undisturbed wetland. Other species, such as *Berberis thunbergii* (Japanese barberry), *Ligustrum obtusifolium* (blunt-leaved privet), and *Rhodotypos scandens* (jetbead) are only occasionally encountered and rarely in large numbers in most forests. Other shrubby species have been reported once or twice in Illinois forests but it is doubtful that they will develop into future problems. Some of these include *Calycanthus floridus* (strawberry shrub), *Forsythia suspense* (weeping forsythia), *Sorbaria sorbifolia* (false spiraea), and *Cornus mas* (Cornelian cherry).

Introduced Exotic Vines

Vines are common in most forest communities, particularly along forest edge and in canopy openings. Commonly “growing up” with the forest community, many vine species enter the forest canopy after major disturbance such as fires, wind-throws, and anthropomorphic changes such as timber harvests. These vines grow into the large canopy gaps created by these disturbances and enter the forest canopy where sufficient light is available. Many native woody vines occur in Illinois forests. These species rarely dominate the forest canopy or forest understory and rarely completely eliminate other native components of the forest. Exotic vines, in contrast, overwhelm the forest community. The excessive growth of these exotics completely cover the canopy, shading the trees that eventually die, or completely cover the ground layer flora, eliminating the light necessary for the growth of most other species.

Exotic vines are a major problem in forest communities in the southern half of Illinois. *Lonicera japonica* (Japanese honeysuckle), the most troublesome exotic vine in southern Illinois was introduced into the United States from eastern Asia as an ornamental. Since the early 1920s it has been widely planted as a source of food and cover for wildlife. This species has become a major threat to forest communities and the organisms that occur in this habitat. An aggressive colonizer of successional fields, this vine also invades mature forests and open woodlands. This aggressive species seriously alters or destroys the woody understory and herbaceous layer of the communities that it invades. Japanese

honeysuckle climbs and drapes over native vegetation, and completely covers understory plants and ultimately enters the forest canopy. This vine grows rapidly, and its semi-evergreen habit allows for growth throughout much of the year.

Another exotic vine of mostly southern Illinois and farther south is the often-maligned *Pueraria lobata* (kudzu). Kudzu is not a common species in Illinois but was planted widely throughout the southeastern United States in the late 1930s and early 1940s where it now covers an estimated 3 million hectares. First collected in Illinois in 1941, a total of 78 populations of kudzu, from 28 Illinois counties, were recorded by 1997. Native to eastern Asia, kudzu vines have extraordinary growth rates with a growth of 18 meters in a single growing season being common. These vines originate from large tuberous roots that can grow to a depth of 3.5 meters and sometimes weigh 90-140 kg. Kudzu forms dense mats of vines that cover underlying vegetation, preventing the growth of other plant species, decreasing species diversity, and decreasing the amount and variety of food available for wildlife. Though not as troublesome as in the southeastern United States, this species does reproduce in Illinois and unless eradicated will continue to be a problem in southern Illinois forests.

The other exotic vines listed are also more common in the southern part of the state (Table 11.2). The two woody species, *Celastrus orbiculatus* (round-leaved bittersweet) and *Euonymus fortunei* (climbing euonymus), are also occasionally encountered in disturbed woods in central Illinois. Both are spread by birds, which commonly regurgitate the seeds after eating the bright-colored orange-to-red fleshy pulp that surrounds the seed. Originally associated with old home sites, these species escaped from cultivation into surrounding natural communities. Now both are found in a variety of forest type, including mesic to dry-mesic closed canopy forests. They do best, however, in disturbed habitats and at the forest edge.

Dioscorea oppositifolia (Chinese yam), also mostly restricted to southern Illinois, is an herbaceous exotic vine that has the potential to become a major plant pest through nearly all of the eastern half of the United States. Already many populations have been discovered along riparian corridors throughout the Shawnee National Forest. Vines begin to grow in April and by the end of the growing season commonly exceed 4 meters in length, blanketing nearby vegetation. Though seeds are sometimes produced, reproduction is mostly asexual by small potato-like bulbils that are 1-2 cm in diameter and are produced in the leaf axils. Bulbils can remain dormant throughout the winter and will root and establish a new plant the following spring. Chinese yam will soon be a major plant pest in the southern half of Illinois and may become common throughout most of Illinois.

Introduced Exotic Herbs

Many herbaceous, exotic species enter the forests and savannas of Illinois. Included in this list are many of our common lawn weeds, some of our important agricultural weed and just about any other exotic herbaceous species on an occasional basis. The massive seed set, continuous seed production during the growing season, and seed adaptations to both short- and long-range dispersal of many of these species makes it probable that they will occasionally be encountered. Like all well-adapted weed species they can be expected in nearly any habitat, particularly if the habitat has been disturbed (Table 11.1). Common lawn weeds like *Taraxacum officinale* (common dandelion), *Plantago rugellii* (broad-leaved plantain), *Plantago lanceolata* (buckhorn plantain), and *Poa pratensis* (Kentucky blue grass) are occasionally encountered, particularly at the forest edge, along paths, and in tree-fall gaps.

Many of the species listed in table 11.2 are similar to the lawn weeds discussed above, mostly being restricted to disturbance, rarely occurring in high numbers in forest communities. Included in this group are *Glechoma hederacea* (ground ivy), *Perilla frutescens* (beefsteak plants), *Persicaria cespitosa* (creeping smartweed), *Prunella vulgaris* (self-heal), and *Stellaria media* (common chickweed). Others listed in table 11.2 persist around old homesteads and enter adjacent forests. *Ornithogalum umbellatum* (star-of-Bethlehem), and *Vinca minor* (common periwinkle), will persist and spread after being planted. Both commonly reproduce asexually, but also occasionally produce fruits. Both are problems in some of our nature preserves where they are difficult to control.

Presently, the greatest threat to the understory vegetation of Illinois forests is the biennial herb *Alliaria petiolata* (garlic mustard). This species is now common throughout most of the north central and northeastern United States and adjacent Canada. Imported from Europe as a food and medicinal herb this species was first collected in Illinois in 1918 north of Chicago, and by 1991 had spread to 42 counties in northern and central Illinois and two counties in southern Illinois. A prodigious seed producer, garlic mustard is becoming a major threat to the herbaceous woodland flora of northeastern North America and to wildlife that depend on the species for food and cover. Seed dispersal is by natural and anthropomorphic means. Floodwaters disperse seeds along river corridors, and vehicles distribute seeds along road corridors. Natural area visitors carry seeds within and between forest sites, and this appears to be the primary seed vector to isolated areas. By 1993 garlic mustard was reported from 58 dedicated nature preserves and 18 state parks in Illinois.

Another problem exotic, *Microstegium vimineum* (natal grass) will soon rival garlic mustard as a major pest of Illinois forests. Natal grass has not had a chance to spread as far because of its late arrival into the state. Presently mostly restricted to southern Illinois, this annual grass is well adapted to the low light intensities of closed canopy forests. A colonial species that spreads by rooting at stem nodes that touch the ground, natal grass forms extensive patches that displace native flora and decrease the food available to many animals. Where white-tailed deer are abundant, they may facilitate natal grass invasion by feeding on native vegetation and avoiding natal grass.

Introduced Exotic Animals

As discussed previously, many exotic insects create problems in Illinois forests. Besides the species already discussed many others are local or occasionally a major problem. Introduced species of other animal groups also create ecological problems, many of which have profound effects on the organisms of our forest communities. Exotic birds, many intentionally transported from Europe by man, are sometimes nest parasites, and predators of our native forest birds, and using space once occupied by native species. Among the mammals, all of the grazing species that man has introduced have had a profound effect on the forests of Illinois. Since settlement and into the 1950s most of Illinois forests were subjected to grazing by cattle, sheep, horses, and pigs. Grazing essentially destroys the undergrowth of a forest, eliminating most of the herbaceous layer and the seedlings and saplings of the next generation of forest trees. In the past it was not uncommon to hear the phrase “hogged and logged” when discussing Illinois forests. Presently grazing is uncommon in most Illinois forests as the practice is generally not very economical.

One mammal species that is a local problem in the Shawnee National Forest is hogs. Wild hogs were common in Illinois during settlement times, but with the invention of barbed wire they were easy to confine. Wildlife biologists reported free-roaming or feral hogs in Union County in 1993, and they have since been reported in eight additional counties in the rugged, sparsely populated hill country of southern Illinois. Though their origin in southern Illinois remains uncertain, it is likely they are domesticated swine that have escaped to the wild. In these forests, the rooting and wallowing of feral hogs damages vegetation and causes erosion and stream sedimentation. Presently, the populations of hogs in southern Illinois are small and isolated, but they are definitely a liability to the forests due to the environmental damage they cause and their potential to spread disease to domestic individuals.