Exotic Shrubs
A Potential Problem in Natural Area Management in Illinois

John E. Ebinger
Eastern Illinois University, Charleston, Illinois 61920

Within the past few decades there has been increased concern over the introduction of non-native plant species into the Illinois flora. These exotic species compete with and in some cases completely displace native species, increase or decrease the total biomass or productivity of a site, influence geochemical and geophysical conditions and processes, change the nutrient balance of the soil, occasionally produce allelopathic chemicals, modify disturbance regimes, and influence the native fauna by changing the plant community structure (Bratton, 1982).

Recently Henry and Scott (1980) reported that since 1846 there has been a dramatic increase in the number of alien species in the Illinois vascular flora and that these taxa now constitute about 29% of the plant species known to occur in the state. Most of this concern involves herbaceous species, but woody taxa presently make up about 13% of our alien flora. Many of these exotic woody species are not weedy and rarely are encountered in natural areas. If present, they are restricted to roadsides, old fields, or other recent disturbances and disappear as a result of successional processes. A few, however, are major plant pests, and we are at the present time suffering the consequences of the introduction and widespread planting of several species which initially appeared to be without weedy tendencies. Two of these, *Rosa multiflora* Thunb. and *Lonicera japonica* Thunb., have become major problems in Illinois natural areas, and increasing amounts of time, energy, and money are being spent to eradicate them. Other woody species, which commonly have been planted during the last few decades, may have the potential of also developing into pests. One of these, *Elaeagnus umbellata* Thunb., was introduced for wildlife management, while both *Euonymus alatus* Sieb. and *Ligustrum obtusifolium* Sieb. and Zucc. are ornamentals commonly used in landscaping. Some of the problems associated with these species are discussed below.

Elaeagnus umbellata (autumn olive), which is native to Japan, China, and Korea, is now commonly planted throughout much of the northeastern United States to provide cover and supplementary food for birds and other wildlife. It has been studied since 1940 by the United States Soil Conservation Service, and the strain 'Cardinal' was released in 1963 for commercial production (Foose, 1974). This species was first planted in Illinois during the 1960's. Though not usually considered to spread extensively from cultivation (Allan and Steiner, 1972), it has recently been found to occupy a number of sites near the original plantings. It was first listed as adventive in Illinois by Myers (1972), while Mohlenbrock (1975) reported that it rarely escapes from cultivation.

Recently Ebinger and Lehnen (1981) reported that autumn olive has become naturalized at many localities in east-central Illinois. They found it in many habitats, generally seeding into these areas from nearby established plantings. They reported concentrations of 5,225 autumn olive plants per hectare in a pine plantation, 33,975 plants per hectare in an old field with

a thick stand of grasses and forbs, and 27,500 plants per hectare in a grazed upland woods. Similar results have also been obtained by Nestleroad (1982 - personnal communication), who studied the extent of autumn olive reproduction in three state parks in east-central Illinois. He found concentrations as high as 143 stems per square meter near established plantings and an average of 2.5 autumn olive plants per square meter in an old field farther from the plantings. It appears that this taxon will probably become naturalized throughout the southern two-thirds of Illinois. Furthermore, it is quite possible that it will become a detriment to agriculture in some parts of Illinois, as in West Virginia where its planting and sale have been prohibited in 22 counties (Douglass, 1976).

Most of the naturalized autumn olive populations observed are in disturbed or weedy areas. At these sites, which vary from old fields to roadsides and pastures, the plants grow best where there have been recent disturbances which reduce competition from other species. Also, naturalized individuals have not been observed in forested areas with a dense overstory. Recently, however, it has been found in a railroad prairie where there are only minor disturbances as well as in an experimental prairie that was started about 10 years ago. Present information indicates that these plants were introduced into these areas from nearby established plantings by birds who regurgitated the seeds soon after ingesting the fruits. Also, some autumn olive seeds remain viable after passing through the digestive tract of birds and other animals, giving another possible source of introduction.

Euonymus alatus (winged wahoo or burning bush) is another naturalized shrub that is becoming a problem in some natural areas. This species, native to eastern Asia, is a commonly planted ornamental that in recent years has been used in landscaping interstate highways. Gleason (1952) reported that it rarely escapes from cultivation in eastern United States, but in 1973 Ebinger and Phillippe reported it as naturalized in Illinois. By 1979 this species was known from 8 counties in the state (Mohlenbrock and Ladd, 1978; Ebinger, 1979).

Winged wahoo has been found in a few natural areas in northern and western Illinois. A small population of about 10 individuals over 2 m tall, with numerous seedlings, occurs in a mature white oak upland forest in Black Hawk State Park (Rock Island County). Another population, consisting of a few large shrubs and numerous seedlings, occurs in an open, second growth lowland forest at Mississippi River Sand Hills Nature Preserve (Hancock County).

In Coles County, Illinois, an extensive population of winged wahoo has been studied by the author for the past 10 years. This species 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 m tall, 5 cm dbh., and in excess of 30 years in age. Numerous smaller shrubs and seedlings are also common. The overstory of this relatively mature second growth forest is dominated by white and red oak and sugar maple, with most of the individuals in the 3-5 dm diameter class. On the valley floor the average number of winged wahoo seedlings (less than 2.5 cm dbh.) exceeds 150,000 per hectare, while saplings (2.5-10 cm dbh.) average 1,700 individuals per hectare. On the north-facing hillside the seedlings average 138,500 per hectare, while saplings average 1,100 plants per hectare. Throughout this forest the number of winged wahoo plants is about ten times greater

than that recorded for all the other woody species combined. During the past 10 years the wahoo population has nearly doubled in number, and some individuals have recently been found at the forest edge as well as in an adjacent upland old field.

Though presently not a major problem in natural areas, winged wahoo does have the potential to spread into good quality forests since it can grow and reproduce in dense shade. Most of the reproduction observed is from seeds falling from established plants. However, birds do regurgitate the seeds soon after ingesting them, and some seeds have been found to be viable after passing through the digestive tract.

Ligustrum obtusifolium Sieb. and Zucc. (blunt-leaved privet) is another exotic shrub with the potential to spread into natural areas. This native of Japan was first reported as naturalized in Illinois by Mohlenbrock (1975) who mentioned that it is rarely found in waste ground. Later, Mohlenbrock and Ladd (1978) reported it from two counties in the state, while the present author has observed it at 7 sites during the past summer. Most of these populations are in disturbed sites such as old fields, roadsides, disturbed forests, and waste areas. One population, in an upland old field in the pioneer tree stage of succession, has an average of more than 6,082 privet plants per hectare. Most of these are seedlings and small plants less than 5 dm tall, but privet plants to 2 m tall are commonly encountered. This area, located in Coles County, Illinois, is surrounded by relatively mature second growth forest in which privet is occasionally found. Privet was probably introduced into this forested area by birds regurgitating the seeds, but very little is known about the reproductive biology of this taxon.

The above observations indicate that many exotic shrubs have the potential of becoming major plant pests. Though these species are most common in disturbed sites, they do have the ability to spread into natural areas, and in some cases, in extremely high population densities. More and more it is becoming obvious that a great deal of caution should be used in the introduction and planting of exotics. The indiscriminate planting of these non-native taxa into, and near areas that are essentially "wild" and usually unmanaged is biologically unsound.

LITERATURE CITED

Allan, P. F. and W. W. Steiner. 1972. Autumn olive for wildlife and other conservation uses. U.S. Dept. Agric. Leaflet No. 458:1-8.

Bratton, S. P. 1982. The effects of exotic plant and animal species on nature preserves. Natural Areas Jour. 2(3):3-13.

Douglass, G. R. 1976. West Virginia noxious weed act of 1976: Regulations. West Virginia Department of Agriculture.

Ebinger, J. E. 1979. Notes on some Illinois plants. Trans. Ill. St. Acad. Sci. 72:86-87.

Ebinger, J. E. and L. Lehnen. 1981. Naturalized autumn olive in Illinois. Trans. Ill. St. Acad. Sci. 74(3 & 4):83-85.

Ebinger, J. E. and L. R. Phillippe. 1973. New plant records for Illinois. Trans. Ill. St. Acad. Sci. 66(3 & 4):115.

Foose, D. R. 1974. Center focuses on conservation plants. Soil Conservation 40(2):4-5.

Gleason, H. A. 1952. The new Britton and Brown illustrated flora of the northeastern United States and adjacent Canada. Lancaster, Lancaster Press, Inc. 3 vols.

Henry, R. D. and A. R. Scott. 1980. Some aspects of the alien component of the spontaneous Illinois vascular flora. Trans. Ill. St. Acad. Sci. 73(4):35-40.

Mohlenbrock, R. H. 1975. Guide to the vascular flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville.

Mohlenbrock, R. H. and D. M. Ladd. 1978. Distribution of Illinois vascular plants. Southern Illinois University Press, Carbondale and Edwardsville.

Myers, R. M. 1972. Annotated catalog and index for the Illinois flora. Western Illinois University Ser. Biol. Sci. 10:1-64.