

EXOTIC PLANT SPECIES IN CENTRAL APPLACHIA

Exotic plant species are plants that have escaped or been introduced to a habitat that is not within a native range. As plants have coevolved with other species (insects, fungi, herbivores, birds, other plants, etc.) for thousands of years within a native range, species interactions along with climate, soils, topography, and moisture define the challenges plants must face in order to survive as a species. When a plant species migrates beyond the native range into an ecosystem that provides the plant with adequate environmental conditions for survival, often the plant is able to flourish without the influence of insect and fungi species that the emigrant plant coevolve within a native range. For this reason, prolific exotic plants can have a competitive advantage over native plants where they frequently thrive in friendly environments without the pressures of insect herbivory or fungal pathogens found in a native range of an exotic species.

An argument against the introduction of new exotic species may seem contrary to an interest in enhancing overall biodiversity of an area. However, the long term effects of the spread of aggressive exotic plant species, including the replacement of native plant communities with the establishment of monocrops of exotic species, diminishes biodiversity over time (Nash 1999). Native plants and the species that rely on native plants are commonly displaced by the unchecked growth of exotic species. The demise of native plants impoverishes regional ecological richness not only via the reduction of the native plant populations, but by the impacts upon pollinator species which depend on native plants for habitat and survival, and native bird populations which have coevolved with native plants and rely on food sources provided by native plants (Barnes 1999). It is the opportunistic alien plant species with a competitive growth efficiency that causes the most ecological and economic damage. Areas that have been disturbed by human construction, mining, and housing developments, and natural events such as mudslides and wind storms, provide prime opportunity for invasive exotics to root and spread (Davis 1995). Currently human impacts create the majority of disturbances on natural landscapes; exotic plant species invasion of our native forests are largely a result of human activity.

An estimated 5,000 exotic plant species have naturalized in the United States, reproducing and spreading prolifically without dependency upon human aid. The more invasive exotic plants cause significant economic impacts. Purple loosestrife (*Lythrum salicaria*) alone reaches an expense of \$45 million each year (HortIdeas 2000). The exotic plant species highlighted below are considered to pose a significant threat to the ecological health of the southeastern United States according the Southeast Exotic Plant Pest Council.

A few exotic species abundant in the Southeast United States:



Tree of Heaven

Ailanthus altissima (Mill.) Swingle

Tree of Heaven

The Tree of Heaven, a native of Asia, is a fast growing opportunistic species found throughout central Appalachia in sunny, disturbed areas and waste lands. Aptly named, this scrubby tree reaches for the heavens growing at a rate of 2.5 feet per growing season, and quickly reaches 100 feet in prime moisture and sunlight conditions. *Ailanthus* reproduces with highly viable seed stock and also spreads via sprouts from a strong root. The Tree of Heaven can produce viable seeds as early as two years from a root sprout; as the seed is wind-blown it can travel great distances. *Ailanthus altissima* is a member of the primarily tropical Simaroubaceae family, and its migration to Europe has created a weed problem there, as well.

Ailanthus bark is light brown to grayish brown, sometimes appearing with light colored stripes, and is rather

smooth. The twigs are hairy when young with a continuous, yellowish pith and relatively small, solitary, lateral buds. Odd pinnately compound leaves are also hairy with small glands and consist of 11-41 leaflets ranging from 3 to 5 inches long and 1 to 2 inches wide. Leaflets are lanceolate (lance-shaped) with acuminate (pointed) tips and mostly entire margins. A small gland can usually be found on the underside of each leaflet. Many bundle scars can be seen in large, triangular leaf scars. The deciduous leaves have a strong odor when crushed. A single Tree of Heaven can develop several hundred imperfect flowers during a growing season. Both female and male inflorescences are radially symmetrical, about 1/4 of an inch long, and are organized into dangling panicles that can be seen as light green clusters from the last of May to early June in central Appalachia. Usually *Ailanthus* are dioecious, meaning the female and male flowers are not found on the same tree, but rather female flowers are on a separate tree than male flowered trees. The male Tree of Heaven have foul smelling inflorescences. Female flowers develop into a type of fruit capsule called shizocarps, with two hard seeds surrounded by a thin tissue shaped into a wing around each seed. Showy pink clusters of winged shizocarps appear in late summer and can be seen throughout the winter. Tree of Heaven can be cut low to the ground to control its spread. To eradicate the plant and keep sprouts from returning, add salt to the soil near the base of the Tree of Heaven once its cut.

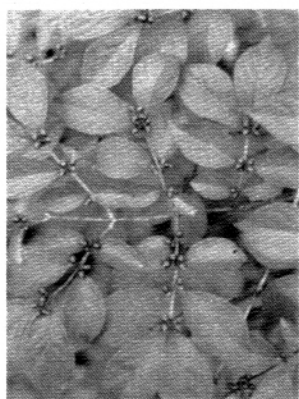
Elaeagnus umbellata (Thunb.)

Autumn Olive

Elaeagnus umbellata, commonly called Autumn Olive, is a member of the Elaeagnaceae family that has been planted throughout central Appalachia in disturbed areas such as strip mine reclamation sites to control erosion, return nitrogen to the soil, and provide food and habitat for wildlife. Birds enjoy the abundant, small (1 cm) red drupes that mature in late September; they spread the seed widely, contributing to the invasive spread of Autumn Olive in Appalachia. *Elaeagnus* is a strong competitor in open areas, thriving in full sun in well-drained open meadows, along roadsides and woodland edges. Luckily, Autumn Olive is not shade tolerant, and though its seed stock undoubtedly has invaded native forests, it has not become a threat beneath the shade of a hardwood canopy. Autumn Olive is a thick shrub which grows to a height of about 20 feet. Twigs have spines and a silver or golden hue. Small, alternate, ovate, glabrous dark green leaves have a distinct silvery, glaucous underside. Tubular, fragrant, yellowish-white flowers are found in May through June. Autumn Olive can be cut and the area mowed repeatedly to control its fruit development and spread. Young plants that sprout from new seed can be pulled from the soil and all roots removed during moist conditions. Grubbing, removing all root parts from the area, is necessary to prevent the return of the Autumn Olive.



Autumn Olive



Amur Bush Honeysuckle

Lonicera maackii (Rupr.) Maxim

Amur Bush Honeysuckle

Lonicera maackii, commonly called Amur bush honeysuckle, was introduced to the United States from Asia and Western Europe in 1855, and has been promoted in the past by government agencies as a popular ornamental and source of wildlife habitat. It is a member of the Caprifoliaceae family, and like the Autumn Olive, is spread largely by birds that enjoy the red berries as a fall food source. Unlike the Autumn Olive, the Amur bush honeysuckle is somewhat shade tolerant and can be found in virtually any habitat, including wetlands, open fields is therefore sometimes found beneath the canopy of Eastern deciduous forests. The early spring leaves of the bush honeysuckle persist into late fall, allowing the plant to compete aggressively with native plants. Seeds can germinate and take root in disturbed areas where vegetation is minimal due to poor soils and exposure to rough wind and water forces and where native plants have a difficult time becoming established. The bush honeysuckle may

exhibit an allelopathic on surrounding vegetation, preventing germination and/or growth of other plants by the release of phytochemicals. The shrubby Amur bush honeysuckle will grow as tall as 20 feet with characteristic opposite, narrowly elliptic leaves and white, fragrant flowers that turn to yellow during May and June. Twigs are smooth and spineless with a hollow pith. Invasive bush honeysuckles such as the Amur honeysuckle can be controlled by cutting and continuously mowing. Eradication may be attained by grubbing, or removing all honeysuckle roots from the soil.

Rosa multiflora (Thunb. Ex Murr)

Multiflora Rose



Multiflora Rose

Rosa multiflora, commonly called multiflora rose, was brought to the United States from Asia in the late 19th century to be used as a root stock for cultivated rose. It belongs to the Rosaceae (Rose) family along with several other native roses which look similar to multiflora rose. Government agencies promoted the planting of multiflora rose during the 1930's as a living fence, for erosion control, windbreaks, and wildlife habitat. Birds enjoy the fall bearing rose hips, and distribute the seed widely. Seeds can then remain viable in the soil for up to twenty years. The multiflora rose also reproduces by sprouting roots and rooting from arching branches that reach the ground. *Rosa multiflora* is adaptable to a wide array of climatic and soil conditions and can be found along pastures, roadsides, floodplains, woodland edges and sunny spots in the forest throughout the United States.

The multiflora rose blooms white to light pink in May and June. Leaves are divided into 7-9 shiny, obovate (oval-shaped) leaflets with finely serrate (toothed) margins that are usually smaller than 1.5 inches each. Thorned stems will grow as tall as 13 feet while arching back to the ground, rerooting and forming dense thickets that choke out preexisting vegetation. Frequent mowing and cutting will suppress but not eradicate the multiflora rose. Biological controls such as the Rose Rosette disease and the Rose Seed Chalcid are making an impact upon the multiflora rose population, but unfortunately affect native roses as well. Before making an effort to control or eradicate an invasive exotic rose thicket, make sure you do not have one of the following less common native roses: swamp rose (*Rosa palustris* Marsh.), Arkansas rose (*Rosa arkansana* Porter), or prairie rose (*Rosa setigera* Michx.).

Allaria petiolata (M. Bieb.) Cavara & Grande Garlic Mustard

Garlic mustard, *Allaria petiolata*, is a member of the Brassicaceae (Mustard) family and threatens both natural wooded areas and partially shaded to sunny cultivated areas. Garlic mustard was introduced to the United States as a medicinal herb from Europe in the mid 19th century, and is currently found in 28 states. The invasive biennial that smells like garlic and looks like a mustard plant is particularly threatening to native shade loving herbs found beneath the forest canopy.

The morphology of *Allaria petiola* is significantly different in the first year compared to its second year of growth. In its first year the garlic mustard will grow to 4 inches high with kidney shaped leaves that persist into the second year. Garlic mustard can grow up to 3.5 feet during the second growing season, with alternated, triangular leaves with toothed margins that are larger towards the base of the stem. Terminal white clusters of four petaled flowers usually bloom in April and May though sometimes they appear in July and August. Fruit capsules typical of the mustard family called siliques mature in late summer, bursting when ripe and hurling small black seeds several meters. A single garlic mustard can produce over 800 seeds which can remain viable for up to five years in the soil.

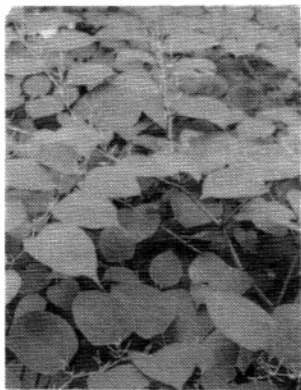


Garlic Mustard

The seeds of the garlic mustard are frequently distributed by humans, animals, and water, and commonly colonize flood plains or disturbed area. Once established, the garlic mustard migrates into vegetated areas where it frequently outcompetes native vegetation. Small populations can be controlled by uprooting the plants with as little disturbance to the soil as possible, and removing any plants that have gone to fruit to prevent further seed dispersal. Large areas of garlic mustard can be controlled by repetitive mowing until the seed bank is exhausted. In the proper environment, fire can be used to promote native vegetation and control garlic mustard.

Polygonum cuspidatum (Sieb. & Zucc.) Japanese Knotweed

Japanese knotweed, *Polygonum cuspidatum*, is a semi-woody perennial belonging to the Polygonaceae (Knotweed) family that may have been introduced to the United States as an ornamental prior to the turn of the 20th



Japanese Knotweed

century. A native to Japan, it is currently found throughout the eastern United States. Previously planted to control erosion, seeds are currently distributed by water, wind, and human activity. Once established, Japanese knotweed is difficult to eradicate, as virulent rhizomes allow the plant to regenerate even when repeatedly mowed or pulled from the ground. *Polygonum cuspidatum* frequently outcompetes existing vegetation when introduced to an area, and can form a monocrop in very little time. Japanese knotweed can survive an array of environmental conditions and can be found in soils with high salinity, in soils inundated with water or in drought conditions, and in full sun or beneath shade. It can quickly displace native vegetation in ecologically sensitive areas such as wetland sites along riparian edges and ponds.

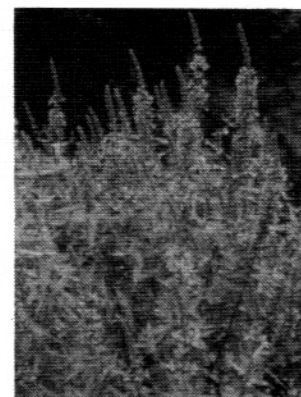
Small white flowers appear in August and September, forming clusters of panicles along the stem. The stem is often covered with a removable white glaucous coat, is swollen at leaf axils, and grows erect anywhere from 3 to 10 feet tall. The fruit is a shining, triangular achene

0.1 to 0.15 inches long. To control Japanese knotweed, plants should be removed from the area and all parts would be burned to prevent further seed dispersal and rerooting.

Lythrum salicaria L.

Purple Loosestrife

Purple loosestrife, *Lythrum salicaria*, of the Lythraceae (Loosestrife) family, is a wetland perennial that was introduced to the United States from Asia and Europe in the early 1800's. Purple loosestrife was accidentally introduced as a hitchhiker on European ships, and European settlers commonly used purple loosestrife as a medicinal herb in the treatment of wounds, ulcers, bleeding, sores, diarrhea, and dysentery. *Lythrum salicaria* was promoted in the early 1900's as a showy ornamental and a valuable bee forage. Purple loosestrife has naturalized and is currently found throughout wetland areas in the United States, withstanding shaded areas though full sun is preferred. Millions of dollars are spent annually, especially in the northeast, to reduce the damage of the invasive aquatic which clogs waterways, displaces native vegetation and diminishes wildlife habitat. Purple loosestrife has more recently migrated to the Appalachian region and is already a threat to communities of native vegetation.



Purple Loosestrife

Leaves are 4 inches long and .5 inches wide without petioles, and usually are opposite though sometimes leaves are found in whorls of three. Leaf bases are cordate and the apex lanceolate. Purple loosestrife can grow to be 10 feet tall though commonly it grows to be 5 feet tall, with hairy, four-sided stems that are sometimes woody at the base. Showy purple flowers form compact spikes 6 to 8 inches tall, blooming from June to September. A single plant can produce up to 3000 flowers in a single growing season. They frequently remain standing throughout the winter. Over 100 tiny orange seeds are found in a single capsule in late autumn; an individual plant can produce over 2.5 million seeds each growing season. The seeds are fairly resilient and can remain viable following almost two years of submergence beneath water, and are commonly dispersed by the mud and water that attaches to aquatic wildlife, humans and domestic animals.

Before eradicating a plant that may suit the description of purple loosestrife, make sure that plant is not one of the following plants that could be mistaken for the invasive exotic by the untrained eye: winged loosestrife (*Lythrum alatum* Pursh), blue vervain (*Verbena hastata* L.), blazing star (*Liatris spicata* L. Willd.), and fireweed (*Epilobium angustifolium* L.). Young *Lythrum salicaria* can be controlled by hand pulling. Older stands should be removed by extracting all root parts from the mud as thoroughly as possible, and replacing the sand with native vegetation to compete with a new seedling generation. Mowing is not advised to control purple loosestrife as the plant produces new sprouts from individual pieces of vegetation. Biological controls that have been approved for release in the United States include three beetles, a root miner and two leaf eaters, though native loosestrifes could suffer with the exotic invasive.

Euonymus fortunei (Turcz.) Hand.-Mazz.

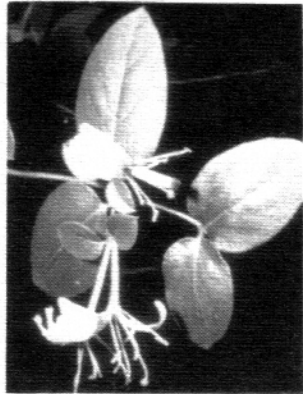
Climbing Euonymus

Climbing euonymous, *Euonymus fortunei*, is an evergreen, perennial vine also known as winter creeper. A member of the Celastraceae (Staff-tree) family, it quickly forms a dense ground cover or rapidly climbs upward. Stems are

warty, climbing with the aid of aerial roots. Dark green, glossy, elliptic, toothed leaves are arranged opposite one another, have distinct venation and are approximately 1 to 2.5 inches long. Blooming in May and June, subtle greenish flowers are found in clusters born on a long stalk. Orange-red berries that look very much like Bittersweet fruits mature in June or July, and provide a source of food for birds which then distribute the seeds widely. Because winter creeper can produce food and grow throughout the year, it has a competitive advantage over many native species whose vegetation dies back with fall frost. Climbing euonymus is still a popular landscaping plant because it can grow in poor soils and will grow fast, helping to control erosion. If winter creeper is correctly identified as replacing native vegetation, all parts should be removed from the area and burned to prevent spreading and further establishment.



Climbing Euonymus



Japanese Honeysuckle

Lonicera japonica (Thunb.)

Japanese Honeysuckle

Japanese Honeysuckle, *Lonicera japonica*, is a woody vine native to Japan and a member of the Caprifoliaceae (Honeysuckle) family. Japanese honeysuckle was brought to the US at the turn of the 19th century for its aromatic fragrance and use in landscaping. It is currently found throughout central Appalachia as it was once planted to prevent erosion and provide habitat for wildlife. The climbing, trailing Japanese honeysuckle can climb up to 40 feet, competing for light in trees as well as with the herbaceous understory. Evergreen leaves are arranged opposite one another and allow the vine to grow earlier in the growing season and out compete native herbs and vines to form a dense thicket of nothing but Japanese honeysuckle. Fragrant white and yellow flowers appear in April and grace central Appalachia with a rich aroma throughout June. Fruits mature in August

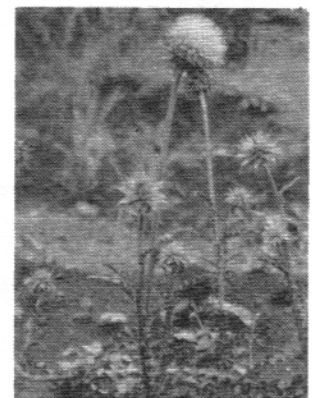
to October and are widely distributed by birds. Japanese honeysuckle is frequently found in disturbed areas but prefers nutrient rich soil and full sun. There are two native honeysuckles that should be protected and propagated wherever possible: *Lonicera sempervirens*, Coral Honeysuckle, and *Lonicera canadensis*, Carolina Honeysuckle. Coral Honeysuckle is distinctly different from Japanese honeysuckle, with coral colored tubular flowers and a low shrubby disposition rather than a climbing one. The Carolina honeysuckle looks very much like Japanese honeysuckle, with deciduous leaves rather than evergreen. Once the honeysuckle is properly identified, grubbing can be used to control the exotic Japanese honeysuckle, removing all plant parts from the soil as any left in the soil are certain to regenerate. Young plants can be hand pulled in moist soil.

Carduus nutans L.

Musk Thistle

Musk thistle, *Carduus nutans*, is a member of the Asteraceae and a native of Europe and Asia that was introduced to the United States almost 100 years ago, and is now considered an invasive weed as many as forty states. Thistles will grow up to 6 feet tall, with spiny stems with multiple branches. Leaves have a waxy surface and are around an inch wide and 2-5 inches long, and a lobed, lanceolate shape. Terminal showy pink flowers, some nearly 4 inches wide, droop from the stem from May to August. Bristles are attached to the up to 1200 seeds produced from each flower in one or two growing seasons. A single musk thistle can produce 120,000 seeds in its lifespan, which can then remain viable for more than 10 years in the soil. Musk, or nodding, thistle is limited to areas with full sun, acidic to neutral pH, and adequate moisture.

Any areas with the above criteria are susceptible to musk thistle invasion under 8000 feet altitude. Once the exotic invasive musk thistle is properly identified, it can be hand pulled and all flowers or seeds can be burned to prevent spreading. Two weevils have been introduced to biologically control the nodding thistle, though they may affect native thistles as well.



Musk Thistle

The Tennessee Exotic Pest Plant Council developed the following list with nomenclature and authorship from Woodford, B.E. and R. Kral. 1993. *Checklist of the vascular plants of Tennessee*. Sida, Botanical Miscellany No. 10; or Kartez, J.T. 1994. *A synonymized checklist of the vascular flora of the United States, Canada, and Greenland*. Second edition. Timber Press.

Rank 1. "Severe threat"

Exotic plant species which possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation; includes species which are or could become widespread in Tennessee.

Ailanthus altissima (Mill.) Swingle -- tree of heaven
Alliaria petiolata (M. Bieb.) Cavara & Grande -- garlic mustard
Carduus nutans L. -- musk thistle, nodding thistle
Eleagnus umbellata Thunb. -- autumn olive
Euonymus fortunei (Turcz.) Hand. Mazz. -- winter creeper, climbing euonymous
Hydrilla verticillata (L. F.) Royle -- hydrilla
Lespedeza cuneata (Dum. Cours.) G. Don -- sericea lespedeza
Ligustrum sinense Lour. -- privet
Ligustrum vulgare L. -- common privet
Lonicera japonica Thunb. -- Japanese honeysuckle
Lonicera maackii (Rupr.) Maxim. -- Amur bush honeysuckle
Lonicera morrowii A. Gray -- Morrow's bush honeysuckle
Lythrum salicaria L. [All vars. and cultivars] -- purple loosestrife
Microstegium vimineum (Trin.) A. Camus -- Nepalgrass, Japanese grass
Myriophyllum spicatum L. -- Eurasian watermilfoil
Paulownia tomentosa (Thunb.) Steud. -- princess tree
Phalaris arundinacea L. -- canary grass
Phragmites australis (Cav.) Trin. Ex Steud. -- common reed
Polygonum cuspidatum Seib. & Zucc. -- Japanese knotweed, Japanese bamboo
Pueraria lobata (Willd.) Ohwi -- kudzu
Rosa multiflora (Thunb. Ex Murray -- multiflora rose
Solanum viarum Dunal -- tropical soda apple
Sorghum halepense (L.) Pers. -- Johnson grass

Sources of native vegetation taken from a more complete list found in Gardening for the Birds, by Thomas G. Barnes.

Nurtured Gardens Nursery
Lower Licking Road
Morehead, KY 40351

Sunlight Gardens, Inc.
174 Golden Lane
Andersonville, TN 37705

Shooting Star Nursery
444 Bates
Frankfort, KY 40601

Works Cited

- Bartlow, Judith, et al. 1997. Tennessee Exotic Plant Pest Council Management Manual. Tennessee Exotic Plant Pest Council & Great Smoky Mountains National Park.
- Davis, Mary Byrd. 1996. Eastern Old Growth Forests. Island Press.
- Nash, Steve. 1999. Blue Ridge 2020: An Owner's Manual. University of North Carolina Press, Chapel Hill, NC.
- Williams, Greg and Pat. 2000. Hort Ideas. Vol. 17. N. 1.

Text – Amanda Allen

Series Editor – Al Fritsch, S.J.

Design – Mark Spencer

Printed on Recycled  Paper

Copyright ©2000 by ASPI Publications