A joint educational publication of

Georgia Forestry Commission
University of Georgia
U. S. Forest Service

Invasive Plants of Georgia's Forests

Identification and Control

An invasive species is any species (including its seeds, eggs, spores, or other biological material capable of propagation) that is not native to a given ecosystem; and whose presence causes economic or environmental harm or harm to human health.

Photo by Jil Swearingen, USDA NRCS

Since invasive species are in a new environment, free from the natural predators, parasites, or competitors of their native habitats, they often develop very high populations. These large populations can out-compete and displace native species, or can reduce wildlife food and habitat. Some invasive species can reduce forest productivity by reducing tree growth rates, restricting tree seedling establishment, increasing fire hazard, and increasing site preparation costs.

You can help fight invasives by not planting or transporting invasive species. Check to see if a plant is invasive before buying or planting it. Be sure to clean your shoes and brush off your clothes after being in an area with invasive species. Eradicate or control populations of invasive species on your own land. Don't hesitate! Begin control efforts as soon as you find invasives on your land. Controlling small infestations is more effective and economical than trying to control a well-established, rapidly spreading infestation. Spread the word; tell your neighbors if you see invasive species on their land.

Contaminated equipment, soil, pine straw, mulch, and other materials are major avenues of invasive species spread. Inspect and clean any equipment used at or near infested sites and monitor for new infestations any areas where off-site materials were introduced. Also, monitor sites that were recently disturbed or border disturbed areas such as rights-of-way, roads, ditches, and stream sides.

Herbicides can be used to effectively control both large and small infestations. Use herbicides carefully. Many herbicides are not selective and will kill all surrounding vegetation or may harm aquatic systems. Before buying, mixing, and use of herbicides, read and follow label information and wear the appropriate safety gear. Contact your county extension agent for specific recommendations on herbicide use. Detailed information about chemical control options can be found at www.invasive.org.

Autumn olive - *Elaeagnus umbellata*

Photo by Dave Moorhead, UGA

Photo by Chris Evans, UGA

Photo by Jim Miller, USFS

Autumn olive is a deciduous shrub reaching from 3 to 20 feet in height. Bark is gray-brown and smooth with small white dots (lenticels). Scattered thorns occur on many plants but may be absent. Leaves are alternate, elliptical and 2-3 inches in length. Autumn olive is easily recognized by the silvery, dotted underside of the leaves. Red, juicy fruits are abundant and occur on clusters near the stems.

Autumn olive is native to China and Japan and was introduced into America in 1830. Since then it has been widely planted for wildlife habitat, mine reclamation, and windbreaks. It is found throughout the eastern United States. In Georgia, autumn olive is a problem primarily in the northern half of the state.

Autumn olive invades old fields, open woods, woodland edges, and other disturbed areas. However, it cannot tolerate wet conditions. Because the fruits are readily eaten by birds and small mammals, this plant has the ability to spread rapidly. Autumn olive can form a dense shrub layer which displaces native species and closes open areas.

Control

Thoroughly wet all leaves with Arsenal AC, Vanquish or Garlon 4 as a 1-percent solution in water (4 ounces per 3-gallon mix) with a surfactant (April to October).

For stems too tall for foliar sprays, apply Garlon 4 as a 20-percent solution in commercially available basal oil (2.5 quarts per 3-gallon mix) with a penetrant (check with herbicide distributor) to young bark as a basal spray (January to February or May to October). Or, cut large stems and immediately treat the stumps with one of the following herbicides in water with a surfactant: Arsenal AC as a 10-percent solution (1 quart per 3-gallon mix) or a glyphosate herbicide as a 20-percent solution (2.5 quarts per 3-gallon mix).

Chinese privet - *Ligustrum sinense*

Photo by Ted Bodner, Southern Weed Science Society

Photo by Jil Miller, USFS

Photo by Jim Miller, USFS

Privet is a thick, semi-evergreen shrub that grows up to 30 feet in height. Trunks usually occur as multiple stems with many long, leafy branches attached at nearly right angles. Leaves are opposite, oval and 1/2 to 1 1/2 inches long. Bark is light gray to tan in color and very smooth. White flowers are very abundant and occur in clusters at the ends of the branches. Fruit ripen to a dark purple to black color and persist into winter. Although there are several species of privet, they are hard to distinguish and have similar invasive impacts.

Privet was introduced into the United States in the early 1800s. It is commonly used as an ornamental shrub and for hedgerows. Privet quickly escaped cultivation and currently is found throughout the southeast and scattered elsewhere in the U.S. It is widespread and common throughout all of Georgia.

Privet can invade a wide variety of habitats. It prefers moist open lands but can be found in highly shaded or dry areas. It commonly forms dense thickets in fields or in the forest understory. Privet reproduces both by sprouts and by seeds, which are dispersed by birds and mammals. It shades and-out competes many native species and, once established, is very difficult to remove.

Chinese privet Control

The Georgia Forestry Commission has conducted informal field trials using different herbicides, methods and timing to determine cost effective options to eradicate Chinese Privet from forested areas. Sites ranged from Coastal Plain to Piedmont and to Mountains and performance of these treatments remained consistent.

Based upon our field trials, each of these treatments has eliminated the target plant with one application, but suckering, incomplete coverage and new seedlings make additional treatments necessary. For most stands of Privet, two treatments can eradicate the plant. Here are the four most cost effective treatments:

1. **Escort XP®** (1 oz per acre + 0.25% non-ionic surfactant) broadcast in 100+ gallons of water per acre during the growing season. (Less water volume could be used provided that all layers of privet foliage are treated.) This ground application provides a foliar treatment and residual soil activity and *was the most cost effective treatment option tested.* This would be used in an understory situation but could be used over the top in Loblolly stands. It should not be used where the spray will come into contact with the foliage of non-target hardwood plants. Some species of hardwood are more sensitive to the soil activity of this herbicide and may be damaged or killed. These include Black Cherry, Ash spp., Dogwood, and Elm spp. Avoid waterways with broadcast treatments.

2. **Glyphosate** (3-5% solution with water) applied as a directed spray to completely wet the foliage of the privet DURING THE DORMANT SEASON (November through February). Use a glyphosate product that contains 41% or more active ingredient. If the formulation doesn't have a surfactant included in the product, add 0.5% of a non-ionic surfactant. With a lack of soil activity and low impact on dormant (leafless) plants this is a good option when desirable non-target plants, growing in close proximity to privet, may receive some of the herbicide spray.

3. **Garlon 4®** (20% plus crop oil) applied as a basal bark treatment – timing can be throughout the year but the chemical is easiest to apply during the dormant season when leaves are off other understory plants. This application is a good choice on older stands of privet that have large stems with a canopy and few sucker sprouts underneath. It is also a good first step at knocking back the biggest privet stems so that a foliar treatment can penetrate to ground level plants. Can be used to treat individual stems next to waterways. Small plants underneath the larger privet stems will remain unaffected and follow up treatments for these will be necessary.

4. **Krenite®** (mixed 50-50 with water) as a cut surface or injected into the cambium. This can be done at anytime during the year and would be a good choice where the plants must be cut and removed. Stumps should be treated to prevent resprouting. Small plants underneath the larger privet stems will remain unaffected and follow up treatments for these will be necessary.

Since many Chinese Privet stands occur in wet areas, landowners should follow guidelines for chemical applications in Georgia's Best Management Practices for Forestry (Page 36). Options 2-4 could be used to treat individual plants/stems and could certainly be done in close proximity to streams provided care is taken not to spray directly into the water. The broadcast treatment (1) shouldn't occur within the Streamside Management Zone (SMZ).

Kudzu - *Pueraria montana*

Photo by Dave Moorhead, UGA

Photo by Jim Miller, USFS

Photo by Chris Evans, UGA

Kudzu is a climbing deciduous vine capable of reaching lengths of over 100 feet. The stems can grow to 4 inches in diameter and the large semi-woody roots can reach depths of 3 to 16 feet. Kudzu is easily identified by its usual growth form, a large dense mat of vines, often totally covering other vegetation, structures, or land. Kudzu has three-parted leaves with large broad leaflets, up to 4 inches wide. Purple flowers with yellow centers occur is small clusters. Flowering occurs in June and July.

Kudzu is native to Asia and was first introduced into America in 1876 at the Philadelphia Centennial Exposition. It was widely planted throughout the eastern United States in an attempt to control erosion. Currently it is found throughout most of the southeastern states and is widespread throughout Georgia.

Kudzu's preferred habitat is open, disturbed areas such as roads, rights-of-way, forest edges, and old fields. It is an aggressive invader capable of growing over 1 foot a day in prime conditions. Kudzu often grows over, smothers, and kills all other vegetation including trees.

Control

Thoroughly wet all leaves (until runoff) with one of the following herbicides in water with a surfactant: July to October for successive years when regrowth appears—Tordon 101* as a 3-percent solution (12 ounces per 3-gallon mix) or Tordon K* as a 2-percent solution (8 ounces per 3-gallon mix), either by broadcast or spot spray—spraying climbing vines as high as possible. July to September for successive years—Escort at 3 to 4 ounces per acre in water (0.8 to 1.2 dry ounces per 3-gallon mix)—or when safety to surrounding vegetation is desired, Transline as a 0.5-percent solution in water (2 ounces per 3-gallon mix); spray climbing vines as high as possible or cut vines that are not controlled after herbicide treatment.

For partial control, repeatedly apply Garlon 4 or a glyphosate herbicide as a 2-percent solution in water (8 ounces per 3-gallon mix) with a surfactant during the growing season. Cut large vines and immediately apply these herbicides to the cut surfaces. Or, apply Garlon 4 as a 20-percent solution in basal oil (2.5 quarts per 3-gallon mix) with a penetrant (check with herbicide distributor) to large vines as a basal spray (January to April), which controls vines less than 2 inches in diameter.

* Nontarget plants may be killed or injured by root uptake.

Tallow tree - *Triadica sebifera*

Photo by Chuck Bargeron, UGA

Photo by Jim Miller, USFS

Photo by Chris Evans, UGA

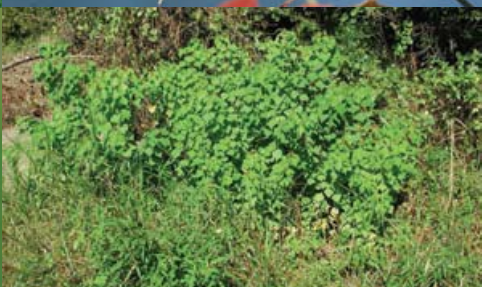

Photo by Dave Moorhead, UGA

Tallow tree, also called popcorn tree, is a deciduous tree reaching 60 feet in height and 3 feet in diameter. Leaves are heart-shaped with a long pointed tip. The noticeable male flowers are yellowish and occur on long, dangling spikes. the three-lobed fruits are found in clusters at the end of branches. The fruits turn from green to black and split to reveal three waxy popcorn-like seeds.

Tallow tree is native to China and was first introduced into America in South Carolina during the 1700s. The USDA recommended planting this tree for seed oil from 1920 to 1940. It is currently still being sold as an ornamental. It occurs throughout the southeastern United States and is common in South Georgia.

Tallow tree commonly invades wet areas such as stream banks and ditches but is now invading drier upland sites. It can tolerate salty soils, flooding, and shady environments. Tallow tree is a serious threat because of its ability to invade high quality, undisturbed forests. Seed is dispersed both by birds and by water. Tallow tree can displace native vegetation as well as alter soil conditions due to the high amount of tannins present in the leaf litter.

Control

Large trees. Make stem injections using Arsenal AC, Garlon 3A, or Pathfinder II in dilutions and cut spacings specified on the herbicide label (anytime except March and April). For felled trees, apply the herbicides to stem and stump tops immediately after cutting (at least a 10-percent solution for Garlon 3A). For treatment of extensive infestations in forest situations, apply Velpar L to the soil surface within 3 feet of the stem (one milliliter squirt of spot gun per 1-inch stem diameter) or in a grid pattern at spacings specified on the herbicide label.

Saplings. Apply Garlon 4 as a 20-percent solution in basal oil (2.5 quarts per 3-gallon mix) with a penetrant (check with herbicide distributor) to young bark as a basal spray.

Seedlings and saplings. Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (July to October): Arsenal AC as a 1-percent solution (4 ounces per 3-gallon mix), Krenite S as a 30-percent solution (3 quarts per 3-gallon mix), or Garlon 4 as a 2-percent solution (8 ounces per 3-gallon mix).

Cogongrass - *Imperata cylindrica*

Photo by Mark Atwater

Photo by Chris Evans, UGA

Photo by Chris Evans, UGA

Cogongrass is a perennial colony-forming grass that grows up to 6 feet tall. Leaves have an off-center and whitish midrib and rough edges. Sharp, branched, white rhizomes help identify this plant. Cogongrass is best identified by the large fuzzy panicle of flowers and seeds, giving the plant a cottony or silky look. Flowering occurs from late March to mid-June.

Cogongrass is native to Southeast Asia and was first introduced into the southeast United States in the early 1900s. It was initially planted for forage and erosion control; however it is unpalatable for livestock and not well suited for erosion control due to its aggressive behavior. Currently cogongrass is found in the southeastern United States and in portions of South Georgia.

Cogongrass is an extremely aggressive invader with the capability to invade a range of sites. It forms dense mats that exclude all other vegetation, leading to its inclusion on the federal noxious weed list. It spreads both by rhizomes and wind-dispersed seeds. Infestations often occur in circular patterns. Cogongrass is very flammable and creates fire hazards, especially in winter.

Cogongrass is a federal noxious weed; any occurrence should be promptly reported to your local Georgia Forestry Commission office.

Control

Thoroughly wet all leaves with one of the following herbicides in water with a surfactant (September or October with multiple applications to regrowth): Arsenal AC as a 2-percent solution (8 ounces per 3-gallon mix), a glyphosate herbicide as a 4-percent solution (8 ounces per 3-gallon mix), or combination of the two herbicides.

Repeat before flowering in spring to suppress seed production and again in successive years for eradication.

multiflora rose - *Rosa multiflora*

Photo by Jim Miller, USFS

Photo by Jim Miller, USFS

Photo by Chris Evans, UGA

Multiflora rose is thorny shrub that can grow up to 15 feet tall. The stems are round, arcing canes. Anyone who has tried to walk through a thicket of multiflora rose will be familiar with the sharp, curved thorns that cover the canes. Small white flowers and later rose hips (fruit) grow abundantly in clusters. This rose is easily distinguished from other wild roses by the feathery fringe at the base of each leaf, where the leaf joins the branch.

Multiflora rose is native to Asia and, during the mid-1900s, was widely planted as a "living fence" for livestock control. It has also been planted for wildlife habitat and food. Multiflora rose is found throughout the Eastern United States and is widespread and throughout Georgia, but a most problematic in the Piedmont.

Multiflora rose can form impenetrable thickets in pastures, open forests, and forest edges. It is spread both by vegetative means and by seeds, which are dispersed by birds and mammals. It grows so thick that it can restrict human, livestock and wildlife movement and displace native vegetation. Multiflora rose does not grow well in closed canopy forests, but invades quickly after any disturbance and is difficult to eradicate once well established.

Control

Thoroughly wet all leaves with one of the following herbicides in water with a surfactant: April to June (at or near the time of flowering)—Escort at 1 ounce per acre in water (0.2 dry ounces per 3-gallon mix); August to October—Arsenal AC as a 1-percent solution (4 ounces per 3-gallon mix) or Escort at 1 ounce per acre in water (0.2 dry ounces per 3-gallon mix); May to October—repeated applications of a glyphosate herbicide as a 2-percent solution in water (8 ounces per 3-gallon mix), a less effective treatment that has no soil activity to damage surrounding plants.

For stems too tall for foliar sprays, apply Garlon 4 as a 20-percent solution in basal oil (2.5 quarts per 3-gallon mix) with a penetrant (check with herbicide distributor) to young bark as a basal spray (January to February or May to October). Or, cut large stems and immediately treat the stumps with one of the following herbicides in water with a surfactant: Arsenal AC as a 10-percent solution (1 quart per 3-gallon mix) or a glyphosate herbicide as a 20-percent solution (2.5 quarts per 3-gallon mix).

Other Invasive Trees of Concern

tree of heaven - *Ailanthus altissima*

chinaberry tree - *Melia azedarach*

princess tree - *Paulownia tomentosa*

mimosa - *Albizia julibrissin*

Other Invasive Vines of Concern

English ivy - *Hedera helix*

Japanese climbing fern - *Lygodium japonicum*

Chinese wisteria - *Wisteria sinensis*

oriental bittersweet - *Celastrus orbiculatus*

Other Invasive Plants of Concern

Photo by Chris Evans, UGA

garlic mustard - *Alliaria petiolata*

Photo by Tom Heutte, USFS

Japanese knotweed - *Polygonum cuspidatum*

Photo by Jim Miller, USFS

shrubby lespedeza
Lespedeza bicolor

Photo by Chuck Bargeron, UGA

Japanese honeysuckle
Lonicera japonica

Photo by Chris Evans, UGA

Nepalese browntop
Microstegium vimineum

Invasive Plants of Concern in Converted Ag Fields


Photo by Ted Webster, USDA ARS

tropical spiderwort
Commelina benghalensis

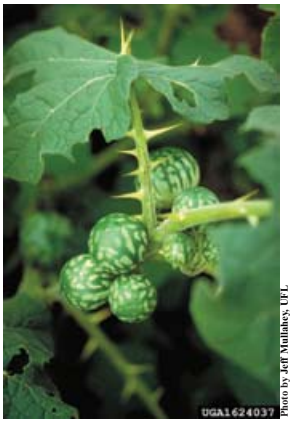

Photo by Jeff Mullahey, UFL

tropical soda apple
Solanum viarum

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References

Nonnative Invasive Plants of Southern Forests: A Field Guide for Identification and Control. James H. Miller, 2003. USDA Forest Service, Southern Research Station.

Plant Invaders of Mid-Atlantic Natural Areas. Swearingen, J., K. Reshetiloff, B. Slattery, and S. Zwicker, 2002. National Park Service and U.S. Fish & Wildlife Service.

Southeast Exotic Pest Plant Council Invasive Plant Manual
www.invasive.org/eastern/eppc/index.html.

Invasive Plants of the Eastern United States: Identification and Control
www.invasive.org/eastern.

Images and more information available online at: www.invasive.org.

Follow all label instructions with any herbicide application.
Mention of any specific herbicide does not represent endorsement by the Georgia Invasive Species Task Force.
www.georgiainvasives.org.