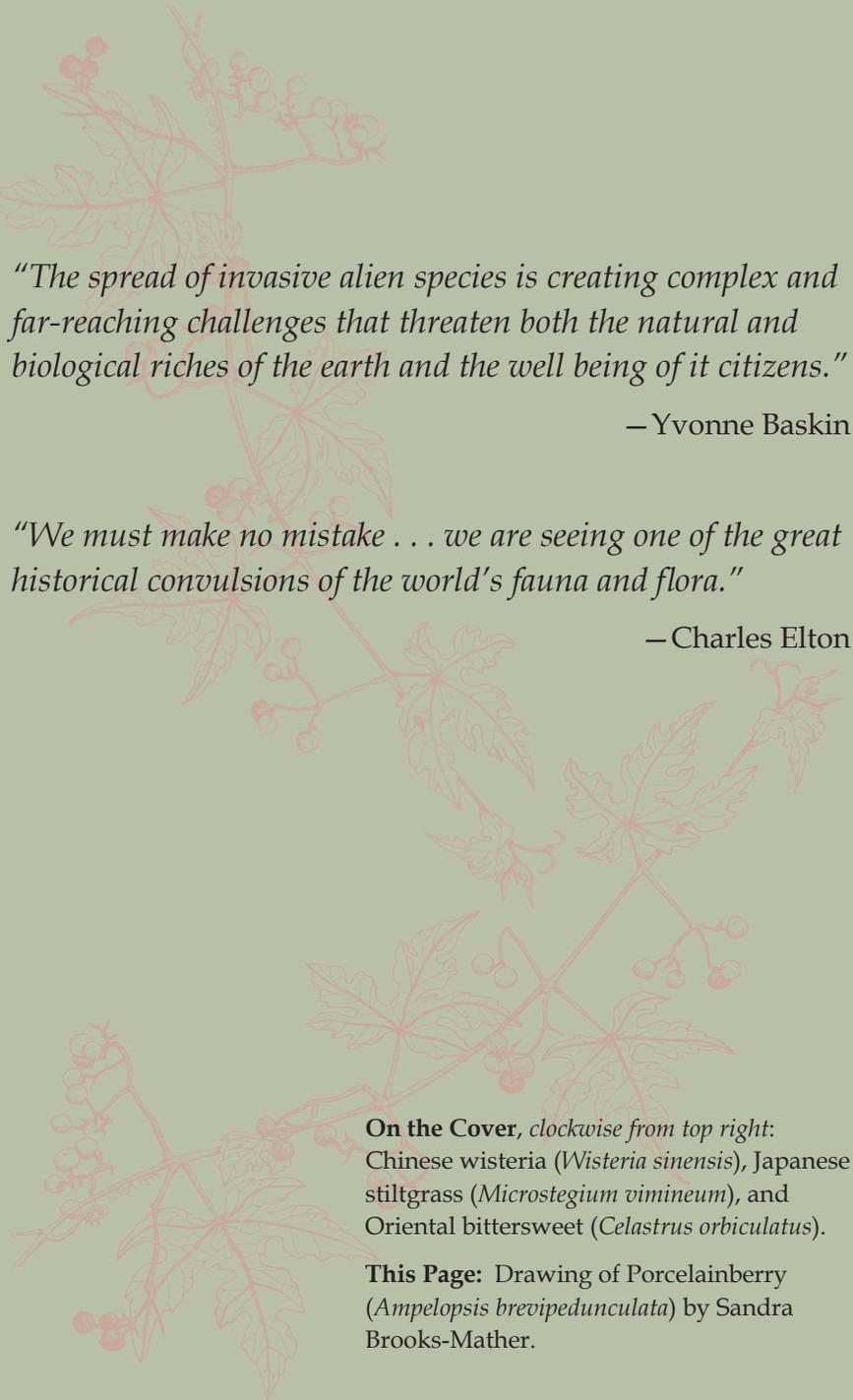


CONTROLLING INVASIVE PLANTS



NORTH CAROLINA BOTANICAL GARDEN
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL



“The spread of invasive alien species is creating complex and far-reaching challenges that threaten both the natural and biological riches of the earth and the well being of its citizens.”

— Yvonne Baskin

“We must make no mistake . . . we are seeing one of the great historical convulsions of the world’s fauna and flora.”

— Charles Elton

On the Cover, clockwise from top right: Chinese wisteria (*Wisteria sinensis*), Japanese stiltgrass (*Microstegium vimineum*), and Oriental bittersweet (*Celastrus orbiculatus*).

This Page: Drawing of Porcelainberry (*Ampelopsis brevipedunculata*) by Sandra Brooks-Mather.

INTRODUCTION

The goal of this booklet, now in its second edition, is to educate residents of the North Carolina Piedmont about the common invasive plant species of their gardens and yards, and those found in surrounding natural areas. A further goal is to provide information on how to control invasive plants in the landscape. You will find here information on the identification and control of these plants, as well as information resources for other invasive species not included in these plant profiles.

The best way to avoid invasive plant problems is prevention. Simply put—*do not purposefully introduce plants known to be invasive into your garden or yard*. The second easiest method for controlling invasive plants is early detection followed by a rapid response. One invasive plant is much easier to control than thousands! By having a copy of this booklet, you are on the right path: knowing what plants to look for as invaders early on is extremely important.

Controlling established invasive plants can be a challenge. Be persistent in your efforts: control of invasives often requires repeated effort, possibly over several seasons. The rewards, however, greatly outweigh the effort. Controlling invasive plants in your garden and yard will beautify your surroundings, increase the diversity of native plants and animals, and promote healthy ecosystems in which humans are deeply intertwined.

Finally, we hope that you will share this information. It is important that we work together to control invasive species and minimize their impact in our natural and landscaped communities.

WHAT IS AN INVASIVE PLANT?

An invasive plant is a species found outside its native range that threatens the survival or reproduction of native plants or animals, or that threatens to reduce biological diversity. Most of our invasive plants have origins in Asia due to that continent's similarity in geographical and environmental conditions to the southeastern United States. These species arrive here as both accidental and intentional introductions.

WHY CONTROL INVASIVE SPECIES?

Invasive species can cause significant damage to ecosystems, communities, habitats, and native species. They also pose problems for people. There are large economic costs associated with the control of invasive species (millions of dollars annually). Once established, invasive plant species decrease the diversity of native plants and decrease the visual and inherent value of our natural areas.

Controlling invasive species in your yard can help reduce the cost of control to your community and can encourage the growth of native species. The native species you promote can help to increase pollinators and the diversity of animals that you will see in your yard. Native plants and animals not only provide a greater variety of beauty; they also provide valuable services, including naturally cleaning our water and air and helping to protect us from floods. By controlling invasive species you can help conserve a better world for all of us and celebrate our region's natural history.

TREATMENT OF INVASIVE PLANTS

The table below serves as a guide to controlling most invasive plants, including species not listed in the invasive plant profiles on the following pages.

Habit	Duration	Spring	Summer	Fall	Winter
Tree	Deciduous	P seedlings	CP, GD, HS, P	CP, GD, HS, P	P
	Evergreen	P seedlings	CP, GD, HS, P	CP, GD, HS, P	CP, GD, HS, P
Shrub	Deciduous	P	CP, P, S	CP, P, S	P
	Evergreen	P	CP, P, S	CP, P, S	CP, P, S
Herb	Annual	C, P, S	C, P, S	C, P, S	N/A
	Perennial	C, P	C, P, S	C, P, S	CM, P
Vine	Deciduous	C, CP, P	C, CP, P, S	C, CP, P, S	P
	Evergreen	C, CP, P	C, CP, P, S	C, CP, P, S	C, CM, P, S

C = Cut, **CM** = Cardboard & mulch, **CP** = Cut & paint, **GD** = Girdle
HS = Hack & squirt, **P** = Pull, **S** = Spray

Please refer to the next two pages – "Guidelines for Treatment of Invasive Plants" – for descriptions of the control methods listed in the above table.

GUIDELINES FOR TREATMENT OF INVASIVE PLANTS

Cut (C): For some plants, continual cutting can exhaust the energy stored in roots. Do not, however, mow or string-trim plants that have gone to seed, as this will spread the seeds. Hand cut plants with seeds and fruits, place them in a bag and put in the trash, not in your yard waste. Cutting can stimulate re-sprouting, so repeat the cutting or treat the re-sprouts with foliar spray to increase the effectiveness of management.

Cardboard and Mulch (CM): This method is an effective treatment on dense ground covers. Cut back all vegetation as far as possible and remove vines from trees. Completely cover the area with cardboard, overlapping edges and securing if necessary. Cover cardboard with organic mulch, wet, and create drainage holes where water pools. The cardboard may be left to compost in place. Pull any sprouts that appear. *This treatment will suppress all vegetation under the cardboard.*

*What is glyphosate?

Glyphosate is a general-use pesticide sold under a variety of trade names, including Roundup®. It will kill most plants. Glyphosate is available at most garden centers in "Ready to Use" solutions, concentrate, or super-concentrate forms. Dilute all concentrate glyphosate with water to create different percent solutions acceptable for use.

What is a percent solution?

Percent solution refers to the amount of herbicide compared to the amount of water in the solution. Read the product label to correctly calculate the amount of glyphosate to mix with water for the desired percent solution. *Clearly label all containers for later identification and safety.*

Cut and Paint (CP): For trees, shrubs, and vines that are too large to pull, make a level cut through the stump close to the ground and clear away debris. Immediately paint or spray the outer two-thirds of the stump with a 15–25% solution of glyphosate herbicide.* This treatment is most effective on deciduous plants in summer or fall and on evergreen plants year round. You can also use this method when drift from foliar spray could harm desirable plants.

Girdle (GD): For larger trees and shrubs, remove the bark and vascular tissue immediately underneath the bark. Using an axe, hatchet, saw, or chainsaw, cut a ring all the way around the trunk of the plant near the base. Immediately applying a 15–25% solution of glyphosate herbicide* to the wound increases effectiveness.

Hack and Squirt (HS): Using an axe or hatchet, make several uniform cuts on the trunk of a tree or shrub. The cuts should be closely spaced and angle downward to create a "cup." Spray a 15–25% solution of glyphosate herbicide* immediately into the wounds to fill the "cups."

Pull (P): Pull or grub the plants, being sure to remove the entire plant including the roots. Leaving roots can allow the plant to re-sprout. This method is most effective on herbaceous plants and seedlings. For larger trees and shrubs, specialized tools may be necessary.

Spray (S): Using a 1–2% or ready-to-use solution of glyphosate herbicide,* thoroughly wet the foliage of the invasive plants (foliar spray). Species with waxy leaves may require a 5% solution of glyphosate. Care must be taken to avoid spraying nearby desirable plants. Do not spray on windy days. Most sprayers create a fine mist that coats the leaves of plants, but mist can drift from the targeted invasive plants. On windy days, drift increases the threat of damage to desirable plants and to people.

Warning!

Herbicides can be hazardous to humans and to the environment: use all herbicides with caution. When using herbicides, be sure to read the label, follow all recommended instructions, and use personal protection equipment. When using herbicides around water, be sure to use the appropriate products, as some herbicide mixtures are toxic to fish and freshwater organisms.

Each herbicide may have specific instructions regarding temperature, precipitation and wind speed for correct application. Read the product label to ensure the best results, maintain applicator safety and minimize damage to non-target plants.

INVASIVE PLANT PROFILES

This section provides descriptions, pictures, and best suggested treatment for the most problematic invasive species.

VINES

Invasive vines shade out native flora and kill (by girdling) and topple trees. Invasive vines can climb and completely cover trees, shrubs, and structures; form extensive ground covers; or exhibit both habits.

Porcelainberry: *Ampelopsis brevipedunculata*

Climbing, woody, deciduous vine in grape family. Leaves are deeply lobed (3–5 times) and alternate. Small green to white flowers occur in June–August and distinctive berries that change color from green to blue and purple (porcelain color) are produced during the fall. Climbs using tendrils found opposite of leaves. The stems have continuous white pith across the nodes (native grapes have a non-continuous brown pith). **Cut and paint larger vines, pull or foliar spray smaller individuals. Bag and dispose fruits if present and accessible.** **Time of treatment: summer and fall.**



Porcelainberry can be confused with our native grapes (*Vitis* species). If you are uncertain, check the pith color by cutting into a vine, as shown (right).



Chinese and Japanese Wisteria:

Wisteria sinensis and *W. floribunda*

Woody vine climbing to 70 feet, or trailing on the ground, or shrub-like. Compound leaves, with each leaflet elliptic (1.5–3 inches long by 1–1.5 inches wide) and pointed at the tip, with wavy margins. Produces purple fragrant flower clusters in spring, March–May, and velvety seed pods July–November (native wisteria produces smooth seed pods). **Cut and paint large vines. Pull all plant parts and remove from area, or foliar spray small individuals.** **Time of treatment: spring to fall.**



Oriental Bittersweet: *Celastrus orbiculatus*

Woody, deciduous, twining, climbing vine. Leaves are dark green becoming yellow toward fall and are round to elliptic in shape, 1–5 inches long. Young leaves may taper to a pointed tip. Small yellowish flowers (May) create green fruits that turn yellow and split open revealing red seeds (August–January). Stems grow to 4 inches thick and vary in color from tan to dark grey. **Cut and paint larger vines, pull or foliar spray smaller ones. Bag and dispose of fruits if present and accessible.** **Time of treatment: spring to fall.**



Watch for native and invasive look-alikes!

Some native vines are very closely related (for instance, from the same genus) to the invasive vines, giving them similar physical characteristics. Sometimes the native and the invasive species can be hard to distinguish from one another.

If you are uncertain as to which species you have, consult other resources such as the North Carolina Botanical Garden, your local Master Gardener program, or the Internet.

English Ivy: *Hedera helix*

Evergreen, climbing, woody vine that also forms dense ground cover. Leaves are thick and waxy, dark green with white veins, and vary in shape (3-5 pointed lobes to entire); 2-4 inches long by 2.5-5 inches wide. Vines root at nodes and produce a glue-like substance to aid in climbing. On climbing vines, small green flowers form during summer and purple fruits are present through the winter. Fruits are toxic and plants may cause dermatitis in some individuals. **Cut and paint large vines, pull smaller vines. Cut vines growing up trees: pull or paint the stumps with herbicide. Time of treatment: year round.**



Japanese Honeysuckle: *Lonicera japonica*

Woody evergreen climbing vine, or forming extensive ground cover. The leaves are opposite and elliptic in shape (sometimes lobed in the spring) with a silvery underside, 1.5-2.5 inches long by 0.5-1.5 inches wide. White to yellow flowers in spring and summer are fragrant and produce a glossy black fruit from June to March. Red-brown stems are slightly hairy, becoming tan with peeling bark, and are up to 2 inches thick. **Pull or foliar spray smaller vines, cut and paint large vines. Cut vines entwining trees and shrubs. Time of treatment: year round.**



Native Alternatives and Replacements

There are many native and non-invasive vines and ground-covers that can be planted as alternatives to invasive species or to replace invasive plants once they are removed. Below are some attractive, beneficial, and readily available native species:

Coral honeysuckle (*Lonicera sempervirens*), trumpet creeper (*Campsis radicans*), American wisteria (*Wisteria frutescens*), Virginia creeper (*Parthenocissus quinquefolia*), passion flower vine (*Passiflora incarnata*), Dutchman's pipe (*Aristolochia tomentosa*), Carolina jasmine (*Gelsemium sempervirens*), climbing aster (*Ampelaster carolinianus*), wild ginger (*Asarum canadense*), creeping blueberry (*Vaccinium crassifolium*).

TREES AND SHRUBS

Invasive trees and shrubs shade out native flora, can change soil chemistry, and prevent native trees from growing. Eventually, few native trees or shrubs will be present, just a near monoculture of the invasive plants.

Autumn Olive and Thorny Olive:

Elaeagnus umbellata, *E. pungens*

Evergreen (Thorny olive) or functionally evergreen (Autumn olive) shrubs to 20 feet. Leaves of both species have silver, scaly undersides, are alternate and elliptic, and are 0.5–4 inches long and 0.5–2 inches wide. The fruits are red with silver or brown scales and form during summer and fall. Trunk and twigs often have thorns and have light brown to gray bark that is rough to slightly fissured. **Cut and paint larger individuals; continually cut or foliar spray resprouts. Pull all or foliar spray smaller individuals and seedlings. Time of treatment: year round.**



Chinese Privet: *Ligustrum sinense*

Evergreen to semi-evergreen shrub to 30 feet. Leaves are opposite, elliptic, and may be minutely indented, sometimes wavy. They are thick and waxy with a pale green underside and hairy midvein, 0.8–1.6 inches long by 0.5–1.2 inches wide. Small white flowers in spring and summer give rise to green fruits that turn dark-purple to black and are persistent over the winter. The bark is slightly rough and gray in color. **Cut and paint large individuals and continually cut or foliar spray resprouts. Pull all or foliar spray smaller individuals and seedlings.**

Time of treatment: year round.



Mimosa, Silktree: *Albizia julibrissin*

Deciduous tree 10–40 feet. Feathery, fernlike leaves (bipinnately compound) are dark green in color. Fragrant, pink, “fireworks” flowers are produced May–September, and tan seed pods form that can persist through winter. Bark is thin, brown to gray, and glossy. **Girdle, hack and squirt, or cut and paint large trees. Foliar spray or continually cut resprouts. Pull seedlings. Time of treatment: summer and fall.**



Multiflora Rose: *Rosa multiflora*

Deciduous shrub and hedgerow to 10 feet. Leaves are compound with serrate edges and hairy bracts at the base. White, fragrant, five-petal flowers are produced April–June, followed by glossy red rose hips that are persistent through the winter. Stems climb, arch, or trail and have large thorns; may stay green through the winter. **Foliar spray all individuals, or cut back to the ground and paint large stumps. Time of treatment: spray spring to fall, cut and paint year round.**



Tree of Heaven: *Ailanthus altissima*

Deciduous tree to 80 feet. Leaves are compound with 11–41 leaflets, each 2–7 inches long by 1–2 inches wide. Each leaflet is dark green with whitish underside and has a distinct “tooth” or lobe near the base. Bark is pale gray on the trunk, light brown on the twigs. Small yellow or green flowers appear in large clusters in late spring and produce papery fruits that may persist. Plant produces a strong nutty odor. **Hack and squirt or cut and paint larger trees and continually spray resprouts as they appear. Foliar spray smaller individuals, or pull seedlings and saplings. Time of treatment: summer and fall.**



Princesstree, Paulownia: *Paulownia tomentosa*

Deciduous tree to 60 feet. Leaves are large (12–20 inches long), heart shaped, and have fuzzy hair on both surfaces. Fragrant pale violet flowers form in April–May and produce green capsules that turn brown and persist through winter. Each capsule will split, releasing many winged seeds. The bark is gray and slightly fissured. **Girdle, hack and squirt, or cut and paint large trees. Foliar spray or continually cut resprouts as they appear. Time of treatment: summer and fall.**



Native Alternatives and Replacements

There are many native and non-invasive trees and shrubs that can be planted as alternatives to invasive species or to replace invasive plants once they are removed. Listed below are some attractive, beneficial, and readily available native species:

Dogwood (*Cornus* sp.), native holly (*Ilex* sp.), redbud (*Cercis canadensis*), azalea (*Rhododendron* spp.), pawpaw (*Asimina triloba*), persimmon (*Diospyros virginiana*), ironwood (*Carpinus caroliniana*), cucumber tree (*Magnolia acuminata*), sassafras (*Sassafras albidum*), American beautyberry (*Callicarpa americana*), strawberry bush (*Euonymus americana*), spicebush (*Lindera benzoin*), sweetspire (*Itea virginica*).

GRASSES AND HERBS

Invasive grasses and herbs take up more water and nutrients and produce more seeds than native plants. They can eventually take over gardens, yards, and natural areas and displace native plants, animals, and native pollinators such as bees and butterflies.

Chinese lespedeza: *Lespedeza cuneata*

Perennial herb with one to several erect stems. Stems may become almost woody and can branch at midstem. Leaves consist of three oblong leaflets: each leaflet is small with a hair-like tip. Plants appear silvery or gray in color with dense hairs on most surfaces. Purple to cream flowers arise along the stem, either singularly or in clusters. **Foliar spray all individuals.**

Time of treatment: summer.



Japanese Stiltgrass: *Microstegium vimineum*

Sprawling annual grass that resembles a diminutive bamboo. Leaves arise from stems and are 2–4 inches long and up to 0.6 inch wide. Stems may be erect to 3 feet or reclining on the ground, with roots at the nodes. Inconspicuous flowers emerge from late August to October. (Also see photo on booklet cover.)

Pull repeatedly or foliar spray individuals. Repeated treatment over several years is usually required. Time of treatment: summer through late August.



Garlic mustard: *Alliaria petiolata*

Biennial herb that produces a garlic smell when broken or crushed. Wavy to toothed, heart-shaped leaves 1–4 inches long and wide. Produces small white flowers April–May of the second year, followed by erect seed pods that can turn glossy black and remain on the plant all summer. First year plant is a basal rosette; second year it produces one to several stems 2–4 feet high. Dead stalks may remain all summer. **Pull all or foliar spray individuals of both years. Time of treatment: winter and spring.**



Native Alternatives and Replacements

There are many native and non-invasive grasses and herbaceous plants that can be planted as alternatives to invasive species or to replace invasive plants once they are removed. Listed below are some attractive, beneficial, and readily available native species:

Switchgrass (*Panicum virgatum*), muhly grass (*Muhlenbergia capillaris*), little bluestem (*Schizachyrium scoparium*), river oats (*Chasmanthium latifolium*), sedges (*Carex* spp.), butterfly weed (*Asclepias tuberosa*), black-eyed susan (*Rudbeckia* spp.), cardinal flower (*Lobelia cardinalis*), lobelia (*Lobelia* spp.), phlox (*Phlox* spp.).

HELPFUL HINTS

Hand pruners, loppers, bow saws, and 14-inch hand saws will cut most invasive plants. Use a chainsaw for larger trees.

There are specialized tools available for controlling invasive plants such as the Weed Wrench®. Reviews of this tool and many more can be found on the Wildland Species Program website: tncweeds.ucdavis.edu/tools.html

Different percent solutions of glyphosate are needed for different control methods. When using different methods, working in large areas, and to save money, buy concentrate herbicide. Concentrate herbicide can be diluted with water (see product labels) to create different percent solutions for a variety of tasks.

Household cleaner bottles (empty and cleaned) or new pump sprayers (available at nurseries and drug stores) are useful tools for spraying herbicides on individual plants. Be sure to label all herbicide bottles for their contents.

To unclog spray bottles and spray nozzles used for spraying herbicide, soak them in warm water after every use.

Screw-top bottles with wide mouths, such as mason jars, and paint brushes are useful for painting herbicides on cuts. Be sure to label all herbicide bottles for their contents.

To safely mark where you have used herbicide, add dyes, such as food coloring, India ink, or commercial dyes to herbicide solutions.

Large quantities of cardboard may be necessary for the cardboard and mulch control method. Extra cardboard is often available at recycling centers and home appliance stores.

A magnifying glass or hand lens may be helpful to see small characteristics, such as hair on stems or leaves, that help identify plant species.

FOR MORE INFORMATION

Visit the North Carolina Botanical Garden website — www.ncbg.unc.edu — for a complete list of invasive plants and information on these species and their control. You will also find information on nurseries that sell native plants, including the “alternatives” listed in this booklet.

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You also may want to consult the following sources/websites:

Southeast Exotic Pest Plant Council
www.se-eppc.org/

Plant Conservation Alliance, Alien Plant Working Group
– Weeds Gone Wild
www.nps.gov/plants/alien

The Nature Conservancy, Wildland Species Program
tncweeds.ucdavis.edu
tncweeds.ucdavis.edu/esadocs.html

United States Fish and Wildlife Service,
Invasive Species Program
invasives.fws.gov

North Carolina Native Plant Society
www.ncwildflower.org

“Non-native Invasive Plants of Southern Forests”
www.invasive.org/eastern/srs

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