Control of Invasive Non-Native Plants

A Guide for Gardeners and Homeowners in the Mid-Atlantic Region

In the next century, the greatest threat to our native plants and the wildlife species that depend upon them may well come from other plants. Thousands of plant species have been brought to North America in the past three centuries. Most are well-behaved, rarely penetrating natural areas. Several hundred, however, have no natural controls here, and are able to out-compete and gradually displace our native plants, even deep in forests and undisturbed ecosystems. Variously called alien, introduced, or exotic, these non-natives are highly invasive.

Some of these plants were brought here intentionally, for their medicinal, ornamental, or food value. Others hid in soil, clothing, boots, crop seed, or ballast. Most came from other continents, but a few have spread from other parts of the US. In each region, different species are better adapted and therefore pose a greater threat. This guide is for the mountain, piedmont and inner coastal plain regions of Maryland, northern Virginia, the District of Columbia, Delaware, and southeastern Pennsylvania.

Many of the plants in this guide are popular, even beloved, landscape plants, but it is now clear that they pose a threat to our environment. If you cannot effectively contain these plants within your property, by clipping seeds, fruits, or runners, PLEASE CONSIDER REMOVING THEM. It is a difficult decision, but each of us has a responsibility not to damage the local ecosystem that cleans our air and water, stabilizes the soil, buffers floods, and provides food and shelter for innumerable species besides our own. EACH OF THE NON-NATIVE PLANTS IN THIS GUIDE SIGNIFICANTLY REDUCES THE NUMBER OF PLANT AND ANIMAL SPECIES ON ANY SITE IT INVADES.

When evaluating exotic plants for your garden, ask these questions:

- Does it naturalize or self-sow? How far does it spread? Are the seeds spread by wind or water? If so, don't plant it unless you are prepared to remove all seeds, every year.

- Is it a wildlife food plant? If the answer is yes, wildlife will spread it to woods and wetlands. In other words, these are plants to **avoid**. Plant natives instead.

- Is it a rapidly spreading ground cover? If so, don't plant it adjacent to open space.

- Is it low maintenance - hardy, tolerant of drought or flooding, shade-tolerant, pest-free? If so, it has no natural controls here. Do not plant it if it can spread out of the garden.

- Does it have the ability to kill or suppress growth of surrounding plants by shading them out, chemically poisoning them, or out-competing them for food and water? (Norway maple, a common landscape tree, is a prime example.) If so, you don't want it in your garden anyway!

This guide lists garden plants and weeds which are already causing significant changes to natural areas in the Mid-Atlantic. **Measures for controlling each species are indicated by number, e.g., (3), in the text with a full explanation at the end of this article.** Following each section, suggested

alternative plants are given. These alternatives are native plants, well adapted and needing little care, attractive to birds and butterflies, and an important part of the food web for our indigenous species.

MEDIUM TO TALL INVASIVE, NON-NATIVE TREES

NORWAY MAPLE (*Acer platanoides*) has large leaves similar to sugar maple. Break a leaf or stalk - a drop of white sap will show if it is Norway maple. Fall foliage is yellow. (Exception: cultivars such as 'Crimson King,' which have red leaves in spring or summer, may have red autumn leaves.) The leaves turn color late, usually in November. This tree suppresses growth of grass, garden plants, and forest understory beneath it, at least as far as the drip-line. Its wind-borne seeds can germinate and grow in deep shade. The presence of young Norway maples in our woodlands is increasing. Our mixed deciduous forests will give way to pure stands of Norway maple in the next century unless we control its spread now. *Control*: (1); (7), (8), (9), or (10); (11) in mid-October to early November, before the leaves turn color.

TREE OF HEAVEN (*Ailanthus altissima*), known from *A Tree Grows in Brooklyn*, is incredibly tough and can grow in the poorest conditions. It produces huge quantities of wind-borne seeds, grows rapidly, and secretes a toxin that kills other plants. Its long compound leaves, with 11-25 lance-shaped leaflets, smell like peanut butter or burnt coffee when crushed. Once established, this tree cannot be removed by mechanical means alone. *Control*: (1) - seedlings only. Herbicide - use Garlon 3a or 15% Roundup Pro (9) with no more than a 1" gap between cuts, or (10); plus (11) on re-growth. Or paint, basal bark treatment, bottom 12" of bark with Garlon 4 (in February or March to protect surrounding plants). USE MAXIMUM STRENGTH SPECIFIED ON LABEL for all herbicide applications on Ailanthus.

SAWTOOTH OAK (*Quercus acutissima*) has oval leaves with sawtooth edges and huge acorns. Often recommended for wildlife, this Asian tree has spread into our region from forestry plantings, displacing indigenous forest trees. *Control*: (1); (7), (8), (9), or (10); (11) on small trees and re-growth.

RECOMMENDED NATIVE SHADE TREES

White oak (*Quercus alba*), northern or southern red oak (*Q. rubra, Q. falcata*), and mockernut hickory (*Carya tomentosa*) are widely adapted shade trees. Other oaks and hickories are suited to very dry, wet, or steep sites. Tupelo, also called black or sour gum (*Nyssa sylvatica*) has brilliant red fall foliage and small fruits eaten by birds.

SMALL TO MEDIUM INVASIVE, NON-NATIVE TREES

EMPRESS TREE, PRINCESS TREE (*Paulownia tomentosa*): Large panicles of lavender flowers, like upside-down wisteria, identify this tree in spring; the large brown seed capsules remain all year. The leaves are very large and heart-shaped. Winged seeds allow it to spread deep into undeveloped areas, though it needs some sunlight and is most common along trails and waterways. It grows very rapidly and sprouts readily from roots and cut stumps. *Control*: (1) - seedlings and small saplings only; (7), (8), (9), or (10) - use 50% solution, anytime the ground is not frozen; (11) on re-growth and small trees.

MIMOSA (*Albizia julibrissin*) has rather garish pink flowers in summer and feathery compound leaves. It spreads slowly by wind-borne seedpods, or in water or fill-dirt. It re-sprouts when cut or burned. Needs some sunlight. *Control*: (1); (7), (8), (9), or (10).

SIBERIAN ELM (*Ulmus pumila*), a fast-growing medium-height tree also sold for hedges, displaces our native elms, which are already under pressure from Dutch elm disease. It forms dense thickets under which nothing else grows. Its small oval leaves have a single tooth. *Control*: (1); (7), (8), (9), or (10).

RUSSIAN OLIVE, AUTUMN OLIVE (*Eleagnus angustifolium, E. umbellata*): Formerly recommended for erosion control and wildlife value, these have proved highly invasive and diminish the overall quality of wildlife habitat. *Control*: (1) - up to 4" diameter trunks; (7) or (10) or bury stump. Do not mow or burn.

FLOWERING FRUIT TREES: These displace our native fruit trees.

- CHERRY, edible and ornamental (*Prunus avium, P. cerasus,* Japanese species and hybrids).
- PEAR, BRADFORD and other ORNAMENTAL PEARS (*Pyrus calleryana*) - self-sterile but can pollinate other cultivars, now spreading rapidly from street plantings.
- WHITE MULBERRY (*Morus alba*) - the fruits may be white, purple, or black; leaves are lobed. Our delicious native red mulberry, which has very large, usually unlobed leaves, is dying out from a root disease carried by white mulberry.

Control of flowering/fruit trees: (1); (7), (9) or (10); (8) if very large; or if grown for harvest, protect fruit from birds with netting or hardware cloth.

RECOMMENDED SMALL NATIVE ORNAMENTAL TREES

Serviceberry (*Amelanchier spp.*), fringetree (*Chionanthus virginicus*), black haw (*Viburnum prunifolium*), and red chokeberry (*Aronia arbutifolia*) are beautiful flowering trees that also produce fruit for birds. Plant red mulberry (*Morus rubra*) if there are no white mulberries nearby that could transmit disease to them.

RECOMMENDED NATIVE TREES FOR HEDGES

American hazelnut (*Corylus americana*) makes an excellent hedge. In damp soils, slippery elm (*Ulmus rubra*) is a good substitute for Siberian elm. On sunny, dry sites, staghorn sumac or shining sumac (*Rhus typhina, R. copallina*) form thickets; keep suckers in check by mowing.

INVASIVE, NON-NATIVE SHRUBS

MULTIFLORA ROSE (*Rosa multiflora*), formerly recommended for erosion control, hedges, and wildlife habitat, becomes a huge shrub that chokes out all other vegetation and is too dense for many species of birds to nest in, though a few favor it. In shade, it grows up trees like a vine. It is covered with white flowers in June. (Our native roses have fewer flowers, mostly pink.) Distinguish multiflora by its size, and by the presence of very hard, curved thorns, and a fringed edge to the leaf stalk. *Control*: (1) - pull seedlings, dig out larger plants at least 6" from the crown and 6" down; (4) on extensive infestations; (10) or (11). Foliar application is most effective when in flower. It may remain green in winter, so herbicide may *applied when other plants are dormant. For foliar application, mix Rodeo with extra sticker-spreader use Roundup Pro, or use Roundup Sure Shot Foam on small plants.*

BUSH HONEYSUCKLES (*Lonicera spp.*), including Belle, Amur, Morrow's, and Tatarian honeysuckle. (In our region, assume that any honeysuckle is exotic unless it is a scarlet-flowered vine). Bush honeysuckles create denser shade than native shrubs, reducing plant diversity and eliminating nest sites for many forest interior species. University of Missouri research found that Asiatic Bush Honeysuckle increases the risk of tick borne disease by a factor of ten. *Control*: (2) on ornamentals; (1); on shady sites only, brush cut in early spring and again in early fall (3); (4) during the growing season where fire is appropriate with the native ecosystem; (7); or (10) late in the growing season.

OTHER ORNAMENTAL SHRUBS:

- **JAPANESE SPIRAEA** (*Spiraea japonica*). *Control*: (1); (2); (3), (7), (10), or (11).

- **PRIVET** (all *Ligustrum* species). *Control*: (1); (7), (9) including in the Winter when the temperature is above 50 degrees, or (10); or trim off all flowers. Do not cut back or mow.

- **BURNING BUSH, WINGED EUONYMUS, WINGED WAHOO** (*Euonymus alatus*), identified by wide, corky wings on the branches. [There is another species called burning bush, *E. atropurpureus*, which is indigenous to the Appalachians, and a piedmont euonymus called strawberry bush (*E. americanus*).] *Control*: (1); (7) or (10); or trim off all flowers.

- **JAPANESE BARBERRY** (*Berberis thunbergii*), red and green varieties. *Control*: (1); (7) or (10); or trim off all flowers.

RECOMMENDED NATIVE SHRUBS

Spicebush (*Lindera benzoin*), which is covered with tiny yellow flowers in March, is our most common native shrub. It needs rich soil, as does strawberry bush (*Euonymus americanus*). Maple-leaf viburnum (*Viburnum acerifolium*) is suited to dry shade and thinner soil, while the arrowwoods (*Viburnum dentatum, V. recognitum*, *V. nudum*) grow in moist soil. Wild hydrangea (*Hydrangea arborescens*), parent of some cultivated varieties, is a somewhat vining shrub. Highbush blueberry (*Vaccinium corymbosum*, the parent of cultivated blueberries) and lowbush blueberry (*V. vacillans*) need very acidic soil. They tolerate shade but fruit best in sun. Both turn red in fall.

INVASIVE, NON-NATIVE VINES

All of these vines shade out the shrubs and young trees of the forest understory, eventually killing them, and changing the open structure of the forest into a dense tangle. DO NOT PLANT NEXT TO OPEN SPACE.

KUDZU (*Pueraria lobata*), the vine that smothered the South, is now spreading through the Northeast and Midwest. It has large lobed leaves in groups of three, thick stems, flowers that resemble wisteria, and hairy, bean-like seedpods in fall. It grows extremely rapidly both above and below ground, and can pull down trees. *Control*: Small patches may be eliminated by repeated weeding (1), mowing (2), or grazing; established infestations can only be controlled with herbicide (10) or (11) - expect re-growth, but wait a full year and re-treat in the third *year. Herbicide is most effective in early fall. Controlled burning (4) of the dead plants the following spring allows native vegetation to return.*

JAPANESE HONEYSUCKLE (*Lonicera japonica*), including Hall's honeysuckle, has gold-and-white flowers with a heavenly scent and sweet nectar in June. This is probably the familiar honeysuckle of your childhood. It is a rampant grower that spirals around trees, often strangling them. *Control*: (1); (3); (10); (11) in fall or early spring when native vegetation is dormant. Plan to re-treat repeatedly.

WISTERIA, CHINESE AND JAPANESE (*Wisteria sinensis, W. floribunda*) both become heavy, woody vines that can pull down a large tree. *Control*: (1); cut back and deadhead ornamental plants (2); (10).

ORIENTAL BITTERSWEET (*Celastrus orbiculatus*) has almost completely displaced American bittersweet (*C. scandens*). The Asian plant has its flowers and bright orange seed capsules in clusters all along the stem, while the native species bears them only at the branch tips. *Control*: (1); keep ornamental plants cut back, remove all fruits as soon as they open, and bag or burn fruits; to eradicate use Garlon 3a (10).

PORCELAIN BERRY (*Ampelopsis brevipedunculata*) has small, hard fruits in a loose, flat cluster that turn from white to yellow, lilac, green, and finally a beautiful turquoise blue. *Control*: (1) before fruits appear; keep ornamental plants cut back, and bag or burn fruits before they ripen; to eradicate use Garlon 3a (10).

ENGLISH IVY (*Hedera helix*) grows up trees and can eventually pull them down. It spreads along the ground and occasionally by fruits. *Control*: Clip off flowers or fruits if any are seen (2), and (1) pull any seedlings. To eradicate ivy climbing trees, cut stems as high above ground as you can reach, then pull down and paint lower portion of stems and foliage with Garlon 3a or 25% Roundup Pro cut stump (10), taking care not to wet the tree bark. Ground cover: pull up as much as you can, dig out the roots as well as you can, and repeat until it no longer re-sprouts; or treat re-growth with Garlon 3a.

WINTERCREEPER (*Euonymus fortunei*). *Control:* Same as for English Ivy, but Garlon is not effective; glyphosate mixed with extra sticker-spreader may be.

VINCA, PERIWINKLE (*Vinca minor*). *Control*: With persistence, you can dig out vinca, especially when the ground is wet after rain (1); plan to remove re-growth. If digging is not feasible, cut to the ground and treat re-growth with glyphosate (11).

RECOMMENDED NATIVE ORNAMENTAL VINES

American bittersweet (*Celastrus scandens*), which bears flowers and seed capsules only at the branch tips, has been almost completely displaced by the Asian species. To preserve it, give it preference, except where its exotic counterpart is present, because the two hybridize. Trumpet honeysuckle (*Lonicera sempervirens*), a semi-evergreen twining shrub with tubular red flowers attractive to hummingbirds, is uncommon but indigenous to the piedmont. Native wisteria (*Wisteria frutescens*), much less aggressive than the introduced ones, can be grown from Maryland south. Trumpet vine (*Campsis radicans*) has dramatic flowers attractive to hummingbirds, and Virginia creeper (*Parthenocissus quinquefolia*) has spectacular red fall foliage, but be aware that both are aggressive growers. Native grapes (*Vitis spp.*) provide an enormous amount of food for birds but are aggressive and not ornamental. For non-vining ground covers, see below.

INVASIVE NON-VINING GROUND COVERS

CROWN VETCH (*Coronilla varia*) has striking pink flowers. Its bare woody stems are unattractive in winter. Often planted along highways, its seeds spread invasively. *Control*: (1); (10) or (11).

CREEPING BUGLEWEED (*Ajuga reptans*), **MINTS**, including **SPEARMINT** (*Mentha spicata*), **GROUND IVY, GILL-OVER-THE-GROUND, CREEPING CHARLIE** (*Glechoma hederacea*), **HENBIT** (*Lamium amplexicaule*), and **PURPLE DEAD NETTLE** (*L. purpureum*), spread by wind-borne seed as well as by runners. They grow in sun and shade and are common lawn weeds which have spread to woods and wetlands. Recognize mints by square stems and a minty smell when crushed. PLANT CULINARY AND ORNAMENTAL MINTS IN CONTAINERS; PREVENT FROM SPREADING OUT DRAINAGE HOLES OR OVER THE TOP. *Control*: (1) (difficult); (2); (6); (11).

INDIAN STRAWBERRY (*Duchesnea indica)*. From India, this shade-tolerant ground cover spreads by fruit and runners. *Control*: (1), taking care to remove each crown; (6).

RECOMMENDED NATIVE GROUND COVERS

Evergreen: Golden ragwort (*Senecio aureus*) and green-and-gold (*Chrysogonum virginianum*) have showy yellow flowers in spring and grow in moist shade. Wild stonecrop (*Sedum ternatum*) has lacy white flowers; it grows in thin, rocky soil in light shade. Moss phlox (*Phlox subulata*), the familiar landscape plant, has a looser form in the wild, and usually has white flowers; it tolerates very poor soil but needs good drainage.

Semi-evergreen: Allegheny spurge (*Pachysandra procumbens*) is indigenous to the mountains but will grow here. It looks much like its Japanese cousin. Deciduous: Wild ginger (*Asarum canadense*) has kidney-shaped leaves that seem to sparkle in spring. Not a culinary plant, its roots do have a gingery scent. It needs moist shade.

INVASIVE BAMBOOS

RUNNING BAMBOOS (many species and genera; *Phyllostachys, Bambusa,* and *Pseudosasa* are the most destructive). Many bamboos send runners great distances, under pavement and edging. Once established, they form impenetrable thickets that are almost impossible to eradicate. PLANT BAMBOOS ONLY IN CONTAINERS, NEVER IN OPEN SOIL. PREVENT FROM SPREADING OUT DRAINAGE HOLES. *Control*: (1) - an enormous job; (10) or (11). For Bamboo, a herbicidal treatment we have used with no impact on non-target plants is to cut stump, generally with a loppers, at the base to form a slight cup. We squirt in 5% glyphosate with a non-ionic surfactant. The half life of glyphosate is 25 days and it does not migrate thru the soil to other plants. At Lowe's we obtain Roundup Pro EPA Reg. No. 524-475. The surfactant is harmless to herptiles unlike the surfactant with regular Roundup according to guidance from the National Park Service.

RECOMMENDED ALTERNATIVES TO BAMBOO

Giant cane (*Arundinaria gigantea*), a well-behaved native bamboo, is indigenous to damp woods and swamps on the coastal plain. Elsewhere, use native grasses (see below) or shrubs (see above).

INVASIVE WETLAND PLANTS

A number of ornamental plants once recommended for water gardens or moist garden soil have spread to our riverbanks, floodplains, and wetlands. They are extremely difficult to eradicate once established - up to 10 years of repeated treatment may be needed to remove purple loosestrife or *Phragmites*. These plants propagate by seed and by fleshy root parts that break off easily. Both are spread by water, feet (human, animal, bird), and tires, including those of mowers. They are also found in dredge spoil, fill dirt, and compost. It is not clear whether seeds may be transported by wind. Do not plant exotic water garden plants unless they are not hardy, and never dump plants from fish tanks or water gardens into toilets, storm drains, lakes, or streams.

COMMON REED (*Phragmites australis*, formerly *P. communis*) looks like a tall ornamental grass with lovely plumes, usually white or tan. Although the species is indigenous, a particularly aggressive strain, probably introduced or a hybrid, has escaped from natural controls and taken over many formerly diverse wetlands. It is also seen in roadside ditches. *Control*: (10) or (11), using Rodeo when the plant is flowering. If possible, follow up with a controlled burn of the dead plants, to allow native plants to return. DO NOT DIG PHRAGMITES - THE ROOTS WILL BREAK, RE-SPROUT, AND SPREAD. If herbicide cannot be used, cut annually in late July to reduce spread.

GIANT REED (*Arundo donax*) chokes waterways from Virginia south. It can grow 20' tall. *Control*: Same as for Phragmites or mow several times a season.

JAPANESE KNOTWEED, MEXICAN BAMBOO (*Polygonum cuspidatum*) can grow in shade. The stems have knotty joints, reminiscent of bamboo. It grows 6-10' tall and has large pointed oval or triangular leaves. *Control*: Cut at least 3 times each growing season and/or treat with Rodeo or Roundup Pro (9), (10) or (11), Spray on leaves on both sides (spray to wet). In gardens, heavy mulch or dense shade may kill it.

PURPLE LOOSESTRIFE (*Lythrum salicaria, L. virgatum*), a handsome garden plant, has tall spikes of magenta flowers over a long bloom season. Often marketed as sterile, it is at best self-sterile, i.e., it can be pollinated by plants you may not be aware of that are growing nearby. A single plant can produce up to a million seeds. Like *Phragmites*, it chokes out all competitors and has taken over millions of acres of wetland in the US. *Control*: Initial infestations may be hand-pulled (1) before flowering (DO NOT DIG). Bag and burn or send to the landfill. Otherwise, use Rodeo (10) or (11) when plants begin to bloom (they continue to flower while setting seed). Expect to re-treat for several years until the seed bank is exhausted. A useful bio-control is now available. Consult with the Maryland Department of Agriculture (MDA) for sources.

LESSER CELANDINE, CELANDINE BUTTERCUP (*Ranunculus ficaria*) has spread from gardens to carpet our floodplains with small yellow flowers in spring. It comes up in winter, giving it a head start over most native spring wildflowers. *Control*: It is not yet known whether digging is effective - the small reproductive corms break off very easily. Try digging (1) before the plants flower. Otherwise, use Rodeo or Roundup Pro (10 or 11), preferably in February to protect native plants, frogs, and salamanders that become active in March.

RECOMMENDED NATIVE WETLAND PLANTS FOR WATER GARDENS

Turtlehead (*Chelone glabra*), lizard's tail (*Saururus cernuus*), cardinal flower (*Lobelia cardinalis*), New York ironweed (*Vernonia noveboracencis*), blue flag (*Iris versicolor*), Virginia bluebells (*Mertensia virginica*), wild blue phlox (*Phlox divaricata*), arrowhead (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*). Also use native reeds, rushes, and sedges.

INVASIVE ORNAMENTAL GRASSES

Often promoted as native plants, most ornamental grasses come from outside our region. Once established, they are extremely tenacious. They are now spreading into our meadows. So far, **PAMPAS GRASS** (*Cortaderia selloana* and *C. jubata*), **JAPANESE SILVER GRASS** (*Miscanthus sinensis*), and **REED CANARY GRASS** (*Phalaris arundinacea*) have been the most invasive. Those with heavy seeds are less likely to spread. *Control*: (1); (2); or (11), using additional sticker-spreader.

RECOMMENDED NATIVE GRASSES

Native grasses usually grow in small clumps, in a mix of several species. Tall ones include Indian grass (*Sorghastrum nutans*), big bluestem (*Andropogon gerardii*), purple top (*Triodia flava*), and, on the coastal plain, switch grass (*Panicum virgatum*). Small to medium grasses include little bluestem (*Schizachyrium scoparium*), bottlebrush (*Hystrix patula*), and wild oats (*Uniola latifolia*). Native

grasses provide nest sites for meadow birds, as well as food, cover, and shelter for a wide variety of animals. In the garden, they offer textural contrast, and fall and winter interest.

THE MOST INVASIVE NON-NATIVE WEEDS

GARLIC MUSTARD (*Alliaria petiolata*, *A. officinalis*), a white-flowered biennial with rough, scalloped leaves (kidney-, heart- or arrow-shaped), recognizable by the smell of garlic and taste of mustard when its leaves are crushed. (The odor fades by fall.) *Control*: Pull before it flowers in spring (1), removing crown and roots. Tamp down soil afterwards. Once it has flowered, cut (2), being careful not to scatter seed, then bag and burn or send to the landfill. (11) may be appropriate in some settings.

JAPANESE or VIETNAMESE STILT GRASS, EULALIA (*Microstegium vimineum*) can be identified by its lime-green color and a line of silvery hairs down the middle of the 2-3" long blade. It tolerates sun or dense shade and quickly invades areas left bare or disturbed by tilling or flooding. An annual grass, it builds up a large seed bank in the soil. *Control*: Easily pulled in early to mid-summer (1) - be sure to pull before it goes to seed. Follow up for late emergents. If seeds have formed, bag and burn or send to landfill. Mowing weekly or when it has just begun to flower may prevent it from setting seed (3). Use glyphosate (11) or herbicidal soap (less effective) on large infestations. Follow up with (5) in spring.

MILE-A-MINUTE VINE, DEVIL'S TAIL TEARTHUMB (*Polygonum perfoliatum*), a rapidly growing annual vine with triangular leaves, barbed stems, and turquoise berries in August that are spread by birds. It quickly covers and shades out herbaceous plants. *Control*: same as for stilt grass. An excellent and safe bio-control weevil is now available. Consult the Maryland Department of Agriculture (MDA) for sources.

JAPANESE PERILLA, BEEFSTEAK PLANT (*Perilla frutescens*). Sold as a salad plant, this member of the mint family is extremely invasive by wind-borne seeds. Recognize it by the odd odor, supposedly like raw beef, when you rub it. *Control*: (1); (2); (10) or (11).

SPOTTED KNAPWEED (*Centaurea maculosa*), a biennial with thistle-like flowers.

CANADA THISTLE, BULL THISTLE (*Cirsium arvense, C. Vulgare*). Exotic thistles are far more common than native ones. If you cannot identify the species, it is probably better to remove it. *Control*: Do NOT pull (1) unless the plant is young and the ground is very soft - the tap root will break off and produce several new plants. Wear sturdy gloves. (2); (6); (10) or (11).

CONTROL MEASURES

• **(1)** PULL seedlings and small or shallow-rooted plants when soil is moist. DIG out larger plants, including the root systems. Use a spading fork or weed wrench for trees or shrubs.

• **(2)** To prevent spread of seeds of desirable ornamental plants, CUT OFF SPENT FLOWERS ("DEADHEAD") or cut off seeds or fruits before they ripen. Bag, and burn or send to the landfill.

• **(3)** MOW or CUT BACK at least 3 times a season to deplete plants' store of nutrients, reduce seed formation, and kill or minimize spread of plants. If necessary, repeat each year.

• **(4)** CONTROLLED BURNING during the spring, repeated over several years, allows native vegetation to compete more effectively with the exotic. This may require a permit. Spot treatment with glyphosate in late fall can be used to make this method more effective.

• **(5)** Use a CORN-BASED PRE-EMERGENCE HERBICIDE on annual weeds. This product is also an organic fertilizer, i.e., it can stimulate growth of existing plants, including weeds, so it is appropriate for lawns and gardens but may not be appropriate in woodlands.

• **(6)** In lawns, SPOT TREAT with BROAD-LEAF WEEDKILLER. Good lawn-care practices (test soil; use lime and fertilizer only when soil test shows a need; mow high and frequently; leave clippings on lawn) reduce weed infestations.

• **(7)** CUT DOWN the tree. Grind out the stump, or clip off re-growth.

• **(8)** GIRDLE tree: cut through the bark and growing layer (cambium) all around the trunk, about 6" above the ground. Girdling is most effective in spring when the sap is rising, and from middle to late summer when the tree is sending down food to the roots. Clip off re-growth.

• **(9)** HACK & SQUIRT: Hack a hole (several holes in larger trees) downward into the growing layer, and squirt in glyphosate (or triclopyr if recommended in text above). Follow label directions for Injection and Frill Applications. This is most effective from middle to late summer. Clip off any re-growth or paint with glyphosate.

• **(10)** CUT DOWN, and PAINT THE CUT STEM OR STUMP WITH GLYPHOSATE (or triclopyr if specified above). Follow label directions for Cut Stump Application. Clip off re-growth or paint with glyphosate. See Note on Herbicides.

• **(11)** PAINT foliage with GLYPHOSATE herbicide (see Note on Herbicides). Use an envelope dauber (small sponge-topped bottle), following label directions for "wiper" method. Add a drop of food color for visibility. Or use a foam spray. Avoid dripping on non-target plants, because glyphosate kills most plants except moss. If it rolls off waxy or grass-like foliage, use additional sticker-spreader. Deciduous trees, shrubs, and perennials move nutrients down to the roots in late summer. Glyphosate is particularly effective at this time and when flowering plants are in bloom. Several invasive exotics retain their foliage after native plants have lost theirs, and resume growth earlier in spring than most natives. This allows you to

treat them without harming the natives. However, the plant must be growing for the herbicide to work, and more may be needed in cold weather because growth is slower.

NOTE ON HERBICIDES: MNPS strongly recommends non-chemical methods of control wherever feasible. However, for large infestations, and for a few plants specified above, non-chemical methods are inadequate. Applied carefully to avoid non-target plants, glyphosate is the least environmentally damaging herbicide in most cases. Roundup contains a stronger concentration of glyphosate than Kleen-Up. Both contain a petroleum-based sticker-spreader. Rodeo, the glyphosate formulation for wetlands, does not contain any sticker-spreader and thus is safer for the environment. With Roundup Pro the surfactant is harmless to herptiles according to guidance from the National Park Service. The smallest size of Rodeo available is one quart of concentrate, obtainable from farm supply stores for about $60 in 1999. Add food coloring for visibility, and a soap-based sticker such as Cide-Kick. For small applications, another choice is Roundup Sure Shot Foam, easier to see and control than liquid Roundup. Glyphosate is ineffective on some plants; for these, triclopyr (Garlon), a stump and brush killer, may be indicated. When using herbicides, read the entire label and observe all precautions listed, including proper disposal. If in doubt, call your state Extension Service.

Originally compiled by Louisa Thompson, Master Gardener Consultant, Maryland Cooperative Extension, March, 1999. Sources include "Exotic Plants," by Gene Cooley, MD Natural Heritage Program; "Invasive Alien Plant Species of Virginia," by the Virginia Native Plant Society (P.O. Box 844, Annandale, VA 22003) and the VA Division of Natural Heritage (www.state.va.us/~vaher.html); "Plant Invaders of Parks and Natural Areas," by the NPCI Alien Plant Working Group (www.nps.gov/plants/alien/); "Invasive Exotic Pest Plants in Tennessee," by the Tennessee Exotic Pest Plant Council (www.webriver.com/tn-eppc/exlist); "Element Stewardship Abstracts" of The Nature Conservancy (www.tnc.weeds.ucdavis.edu/); *Invasive Plants: Weeds of the Global Garden*, by John M. Randall and Janet Marinelli, 1996, Brooklyn Botanic Gardens Bookclub, (718) 622-4433 ext. 274, and the Monsanto web-page (www.monsanto.com). The author would like to thank Rod Simmons, Jil Swearingen, Susan Rudy, Susan Salmons, Philip Pannill, Marc Imlay, Marion deGroff, Jane Baldwin, Graham Egerton, and Ray Bosmans for their comments. CONTROL OF INVASIVE EXOTIC PLANTS IS A NEW ENDEAVOR; THE RECOMMENDATIONS GIVEN HERE MAY NOT HAVE BEEN FULLY TESTED.

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