



NEW JERSEY
AUDUBON
SOCIETY

www.njaudubon.org

GUIDE TO CONTROLLING NON-NATIVE INVASIVE PLANT SPECIES ON NEW JERSEY'S NATURAL LANDS

Non-native invasive species represent a significant threat to native plants and animals. With the right planning and management, invasive plants can be managed to enable the return of native species.



New Jersey Audubon Society
Department of Conservation
11 Hardscrabble Road
Bernardsville, New Jersey 07924

www.njaudubon.org/Conservation/

Phone: (908) 837-9571

Fax: (908) 837-9569

Email: conservation@njaudubon.org

***Fostering environmental awareness and a conservation ethic
while preserving wildlife and natural systems since 1897.***

***NJAS is a non-profit membership organization that relies on your support.
To join online visit www.njaudubon.org or call (908) 204-8998.***

For more information about NJAS, visit our Web site: www.njaudubon.org

New Jersey Audubon Society would like to acknowledge
the Township of Franklin, Somerset County
and the Johanneette Wallerstein Institute for providing funding for this project.

Copyright © 2007 by New Jersey Audubon Society

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical including photocopying and recording, or by any information storage or retrieval system, except as may be expressly permitted by the 1976 Copyright Act or in writing by the publisher.

Printed in the United States of America.

Photo Credits:

Background photos: page 5: Japanese Stilt Grass, photo by Ted Bodner; page 6 Garlic Mustard, photo by Chris Evans; pages 8 and 9, Purple Loosestrife, photo by Linda Haugen; page 10 Canada Thistle, photo by Mary Ellen Harte; page 13, Chinese Bush Clover, photo by Chris Evans; page 15 Winter Creeper, photo by James H. Miller; page 16 Japanese Honeysuckle, photo by Chris Evans; page 17 Mile-a-Minute, photo by Britt Slattery; page 20 Tree of Heaven, photo by Chris Evans; page 21 Japanese Barberry, photo by Gylla MacGregor; page 23 Bush Honeysuckle, photo by Chris Evans.

Photos taken by L. Wilson, U of ID; Chris Evans, U of GA, Ted Bodner, Southern Weed Science Society; Leslie J. Mehrhoff, U of Conn; Eric Coombs, OR Dept. of Agriculture; Jill M. Swearingen, USDI National Park Serv.; Carol Bell Randall, USDA; Steve Dewey, UT State; Dan Tenaglia, MO Plants; Charles Barger, U of GA; Yun Wu, USDA Forest Serv.; Jerry Gibson; Barbara Tukarska-Guzik, U of Selesia; Britt Slattery, USFWS; are all courtesy of www.invasive.org. Photos by John M. Randall and Barry A. Rice are courtesy of The Nature Conservancy, www.tncweeds.ucdavis.edu. Photos by Gylla MacGregor are courtesy of NJ Audubon Society, www.njaudubon.org.



Front cover photo: Purple loosestrife Photo by Linda Wilson, U of ID

CONTROLLING NON-NATIVE INVASIVE SPECIES ON NEW JERSEY'S NATURAL LANDS

Non-native invasive species represent a significant threat to native plants and animals. With the right planning and management, invasive plants can be managed to enable the return of native species.

Why Manage Invasive Plant Species?

Non-native invasive plants pose a significant threat to native plant and animal communities. The physiology of these plants enables them to thrive under a wide variety of conditions and habitats. Non-native invasive plants out-compete native species, rapidly overtaking a habitat, causing a complete change in the local ecosystem. One problem is that there are few, if any, natural controls for non-native invasives. Many plants are equally successful in nutrient poor soils, acid or neutral habitats and moist or dry environments. Non-native invasives alter the soils and groundcover of ecosystems, reducing species diversity and completely altering the native plant and animal diversity. In addition, human activity, such as ATV's, ORV's, surveying or forestry equipment, as well as domesticated animals, such as dogs and horses, all help to spread unwanted plants seed. Both the plant biology and the potentially broad means of seed dispersal, make the control of undesirable plants both a challenge and a necessity.

The explicit purpose of this guide is to offer best management techniques for some of the more common non-native invasive plants. It is designed to help landowners and managers recognize invasives when they first arrive and are more easily controlled. Continued surveillance of properties to discover and fight new or surviving invasives is required. This is not a one-, two-, or three-year project. For any particular property it will never be finished. Each species account contains a brief background on the biology of the plant, dispersal mechanisms, management techniques, and replacement options where applicable. **Landowners are urged to use caution when applying herbicides. Read labels carefully and follow all mixing procedures. Wear appropriate protective clothing. Follow any restrictions outlined by New Jersey Department of Environmental Protection (<http://www.nj.gov/dep/enforcement/pcp/>). For convenience a list of trade names is provided at the end of this document.**

This guide also provides a list of alternative plants where available. In most cases, alternative plants offer the opportunity to fill the gap created by removal of the non-native invasive plant. Sometimes, replacement with a native plant can be a viable method of controlling the non-native plant, as in the case of purple loosestrife.

Finally, be patient, be persistent. It is first important to accurately identify the plant to ensure the best treatment options. The Nature Conservancy reports that it may take at least two growing seasons to determine if a particular control method is effective. Management is also reflective of weather conditions. Drought-stress reduces the effectiveness of most herbicides but enhances the effectiveness of mowing or burning.

LIST OF INVASIVE SPECIES IN THIS MANUAL

Herbaceous Plants



5

JAPANESE STILT GRASS (*Microstegium vimineum*) page 5



6

GARLIC MUSTARD (*Alliaria petiolata*) page 6



7

JAPANESE KNOTWEED (*Polygonum cuspidatum*) page 7



8

PURPLE LOOSESTRIFE (*Lythrum salicaria*) pages 8 & 9

CANADA THISTLE (*Cirsium arvense*) page 10

MUGWORT (*Artemisia vulgaris*) page 11

SPOTTED KNAPWEED (*Centaurea biebersteinii*) page 12

CHINESE BUSH CLOVER (*Lespedeza cuneata*) page 13

LESSER CELANDINE (*Ranunculus ficaria*) page 14



10



11

Woody Vines

WINTER CREEPER (*Euonymus fortunei*) page 15

JAPANESE HONEYSUCKLE (*Lonicera japonica*) page 16

MILE-A-MINUTE (*Polygonum perfoliatum*) page 17



12



13

Shrubs/Trees

AUTUMN OLIVE (*Elaeagnus umbellata*) page 18

MULTIFLORA ROSE (*Rosa multiflora*) page 19

TREE OF HEAVEN (*Ailantus altissima*) page 20

JAPANESE BARBERRY (*Berberis thunbergii*) page 21

WINEBERRY (*Rubus phoenicolasius*) page 22

BUSH HONEYSUCKLE (*Lonicera* species) page 23

BLACK JETBEAD (*Rhodotypos scandens*) page 24



14



15



16



17



18



19



20



21



22



23



24

JAPANESE STILT GRASS

(*Microstegium vimineum*)

BIOLOGY: This plant is associated with both moist and acidic-to-neutral soils that are high in nitrogen, and successional fields and forested uplands. It is an annual plant reaching 2 to 3 feet in height. Leaves are pale green, lance-shaped and about 3 inches in length with a distinctive silvery stripe of reflective hairs down the middle of the upper leaf surface. Delicate flower spikes appear in the late summer and early fall. Fruits are produced shortly after flowering. The plant dies in the fall.



Spring appearance

Photo by Ted Bodner

DISPERSAL: Dispersal is both by seed and by rooting at the joints along the stem. A single plant can produce 100 to 1,000 seeds that remain viable in the soil for at least 3 years. Germination occurs readily following soil disturbance. Seeds are dispersed by surface runoff, streams, floodwaters, hay, soil, animals and people.

CONTROL:

- Due to shallow roots, stilt grass may be pulled by hand at any time.
- Flowering plants may be cut back prior to seed production.
- Herbicides:
 - Glyphosate: Although multiple applications are necessary, glyphosate is effective in removing stilt grass. Follow application directions on bottle.
 - Imazameth. This is a preferred herbicide for controlling stilt grass. It does not appear to kill desirable native sedges, ragweeds and legumes. Application: 6 ounces/acre
 - Fluazifop-p: When applied at a rate of 1 pint/acre also controls Japanese stilt grass but may leave a less desirable plant community. Application: 1 pint/acre.
 - Sethoxydim: This herbicide has provided excellent control. Application: 1 pint/acre.

ALTERNATIVE PLANT OPTIONS:

There are no known alternatives.



Japanese stilt grass in autumn

Photo by Chris Evans

*Summer foliage
Japanese stilt grass*

Photo by Gylla MacGregor



GARLIC MUSTARD

(*Alliaria petiolata*)

BIOLOGY: In addition to displacing native understory vegetation, research has shown that Garlic mustard, a biennial herb ranging from 1 to 4 feet, is harmful to native maples, ashes and other hardwood trees. This non-native plant kills a type of fungi important in extending the root system of many hardwood trees. Garlic mustard can be found in both moist and dry habitats including roadsides, floodplains and forests. When crushed, the leaves and stems have a garlic-like odor. First year plants appear as a rosette of kidney-shaped leaves that remain green during the winter. A shoot forms in the second year producing clusters of small white flowers in the early spring. The fruits are slender, erect capsules that contain shiny black seeds when mature. Seeds can survive for 5 or more years in the soil.



Flowering Photo by Leslie J. Mehrhoff

DISPERSAL: Garlic mustard spreads by seed. Seeds may be carried on the feet of humans or animals, by roadside mowing, automobiles and trains.

CONTROL:

- Hand removal of entire plants, including roots, is effective for light, scattered infestations. Caution: may disturb existing seed bed.
- Cutting flowering plants can prevent flowering and subsequent seed production. Minimizes seed bed disturbance — put cut flowers in garbage bag for disposal.
- Herbicides:
 - Glyphosate: Seedlings that germinate after treatment are not affected; however, when applied after germination, glyphosate can significantly reduce seedling populations. It may be more suitable in areas (forest communities) that have few semi-evergreen herbaceous or grass-like species. Application: 1%, 2% and 3% concentrations to dormant rosettes in late fall or early spring.
 - Triclopyr Amine: Although not thoroughly tested, a spring application of triclopyr amine is reported to kill 92% of garlic mustard rosettes. Application: 7 ounces/5 gallons of water.
 - Bentazon: When applied during the growing season, it has been reported to reduce garlic mustard rosette cover by 90 to 95%. This herbicide did not appear to influence species richness, herb cover or grass cover. Application: 0.50 to 1.0 pounds/acre.



Long seed stalks

Photo by Chris Evans



Garlic mustard root

Photo by Chris Evans

ALTERNATIVE PLANT OPTIONS:

Wild ginger (*Asarum canadense*); lady fern (*Athyrium filix-femina*); evergreen wood fern (*Dryopteris marginalis* or *intermedia*); New York fern (*Thelypteris noveboracensis*); creeping phlox (*Phlox stolonifera*); foam flower (*Tiarella cordifolia*).

JAPANESE KNOTWEED

(*Polygonum cuspidatum*)



Spring shrubs

Photo by Gylla MacGregor

BIOLOGY: This non-native plant can be found along streams, rivers, low-lying areas and waste places. It tolerates deep shade, high temperatures, high salinity, severe floods and drought. It is a shrubby, herbaceous perennial that can exceed 10 feet in height. The stems are smooth except where the leaf meets the stem. Leaves are variable but are normally 6 inches long and 3 to 4 inches wide, broadly oval to triangular and pointed at the tip. Greenish-white flowers appear in the summer followed by small winged fruits. The seeds are triangular, shiny and small.



Seeds

Photo by Barry A. Rice

DISPERSAL: Dispersal by seed and long rhizomes (up to 65 feet). It can be transported by wind, water, as a contaminant in fill-dirt or on the soles of shoes.

CONTROL: No matter what the control method, if rhizomes remain present in the soil, the plant will return when management is relaxed. It is strongly suggested that management be combined with introduction of native, effective competition.

- Hand removal of young plants is possible, however all roots and runners must be removed to prevent re-sprouting. Caution: digging up rhizomes creates soil disturbance and may spread rhizome fragments.
- Herbicides:
 - Glyphosate: This nonselective herbicide is most effective in the fall. Application: 4.4 pounds/2.5 acres in August with a prior cut in late spring or early summer. Alternatively, apply a 2% water-based solution. Repeated applications over several years may be necessary.
 - Picloram: Do not use this herbicide near water Application: 5.7 pounds/2.5 acres in the spring.



Flowering Japanese knotweed

Photo by Gylla MacGregor



ALTERNATIVE PLANT OPTIONS:

Sweet pepperbush (*Clethra alnifolia*);
Virginia sweetspire (*Itea virginica*);
maleberry (*Lyonia ligustrina*); silky dogwood
(*Cornus amomum*); fragrant or shining
sumac (*Rus aromatica* or *copallina*).

Japanese knotweed leaves and seeds close-up. Photo by Jack Ranney

PURPLE LOOSESTRIFE

(*Lythrum salicaria*)

BIOLOGY: This is an erect perennial herb that readily adapts to natural and disturbed wetlands. The woody stem is square and covered with downy hair. Plant growth is 4 to 10 feet depending on local conditions. The leaves are lance-shaped, stalk-less and rounded to heart-shaped at the base and arranged in pairs or whorls around the stem. Purple flower spikes appear throughout most of the summer. A single mature plant can have 30 to 50 stems arising from a single rootstock and can produce 2 to 3 million seeds/year. Flowers are pollinated by insects.

DISPERSAL: Seeds are dispersed by wind and water. This plant can also reproduce through underground stems at a rate of about 1 foot/year.



Purple loosestrife

Photo by Gylla MacGregor



Flowers close-up Photo by Linda Wilson

CONTROL:

Control methods have produced variable results. Small populations can be hand-pulled; larger populations (over 3 acres) are nearly impossible to destroy, focus should be on containment. If pulling by hand, plants should be pulled before they seed, and the entire root system should be removed.

- **Biological:** **Before embarking in any biological control program please determine if there are specific State guidelines you must follow.** Biological control has proven quite successful in controlling purple loosestrife. The New Jersey Division of Fish, Game and Wildlife has used the following biological control insects in Somerset (Franklin Township last year) as well as Hunterdon, Sussex and Warren counties: beetles (*Galerucella calmariensis* and *G. pusilla*) specializing on consuming leaves; weevils (*Nanophyes marmoratus* and *N. breves*) specializing on flowers; and the weevil (*Hylobius transversovittatus*) specializing on roots. Avoid exposing these insects to pesticides. Visit <http://www.invasivespeciesinfo.gov/laws/nj.shtml#admin> (for New Jersey Laws/Statutes), and <http://www.bio-control.com/> or <http://www.invasive.org/weeds/loosestrife/ch3obtain.html> for more information on the purchasing and care of biological control beetles.

continued on next page

Biological control using beetles



Photo by Eric Coombs



Foliage showing biological control

Photo by Jill M. Swearingen

PURPLE LOOSESTRIFE

(Lythrum salicaria)

continued

- Herbicides:
 - Glyphosate: Only Rodeo® is approved for use over water. Because broadcast spraying kills all vegetation, spot application of Rodeo® directly onto plants is highly recommended. The safest method is to cut plant stems and apply herbicide directly to stem. Application: 20 to 30% solution. NOTE: If spraying is desired, it should occur in late August; 1 to 2% solutions are sufficient. It is recommended that no more than 25 to 50% of the plant's foliage be sprayed.
 - Broadleaf herbicides (2,4-D based): May be applied where spot application is not possible; however one should be able to properly identify the plant in the absence of flowers as this application should occur in late May/early June.



Spring growth Photo by Carol Bell Randall



Purple loosestrife summer flowers

Photo by Steve Dewey



ALTERNATIVE PLANT OPTIONS:

Planting native plants around loosestrife may contain it. The native plant pale smartweed (*Polygonum lapathifolium*) will out-compete purple loosestrife if seeded together although loosestrife may appear first if there is remaining rootstock in the soil. Other plant options include: Joe Pye weed (*Eupatorium fistulosum*); cardinal flower (*Lobelia cardinalis*); New York ironweed (*Vernonia noveboracensis*); blazing star (*Liatris spicata*); obedient plant (*Physostegia virginiana*); blue vervain (*Verbena hastata*).

Purple loosestrife seeds and pod

Photo by Linda Wilson

CANADA THISTLE

(*Cirsium arvense*)



Flowers close-up

Photo by John M. Randall

BIOLOGY: Canada thistle grows 1½ to 3 feet tall, has horizontal lateral roots, thick and wavy leaves with marginal spines. Stems are grooved and become hairy with age (but are not spiny unlike bull thistle). Small male and female flower heads are lavender to pink or white and are distinguished by yellow pollen (male plants) and a vanilla fragrance (female flowers). Flowers appear from June to August. It occupies a wide variety of habitats from streams and wet meadows to fields and pastures.

DISPERSAL: Reproduction is primarily by vegetative means, with seed production as a secondary source of reproduction. Seeds may be dispersed by contaminated hay, water, or by human and animal activity. The root system is quite extensive and spreads at roughly 1 to 2 meters/year. Horizontal roots give rise to new shoots as the plant spreads out, making Canada thistle a clonal plant.

CONTROL: Multiple control methods are generally necessary. If populations are extensive, female plants should be targeted first to reduce seed production.

- **Herbicides.** Unfortunately different ecosystems are reported to respond differently to the same herbicide treatment. Regardless, the entire clone (plant colony derived from a single plant) needs to be treated. Herbicide treatment is most effective in early spring or in the fall.
 - **Glyphosate:** Although most effective on fall regrowth, early spring burning followed by spot treatment of glyphosate when in late bud or early bloom is also successful. Glyphosate is non-selective and may kill all green vegetation at the time of application and may result in the complete inhibition of root buds. Application: Variable depending on infestation, however, Glyphosate is reported to be most effective at low concentrations. Two or more years consecutive treatment is best.
 - **Clopyralid plus 2,4-D:** In agricultural areas, this is reported to provide the best and most consistent control of Canada thistle. It does not harm grasses but is inhibitory to members of the sunflower, buckwheat and pea families.

Application: 70 to 280 gallons/acre.

ALTERNATIVE PLANT OPTIONS:

Grasses and alfalfa effectively compete with Canada thistle.



Spring emergence

Photo courtesy of US Forest Service



Canada thistle seed pods

Photo by Eric Coombs

MUGWORT

(*Artemisia vulgaris*)

BIOLOGY: Found in sunny areas of well-drained soil such as uncultivated areas and wastelands. Growth may reach 3+ feet. Small greenish-yellow flowers appear from July to October. Leaves are smooth and dark green above, and cottony beneath. Leaves are deeply lobed with pointed ends.

DISPERSAL: Dispersal is vegetative.

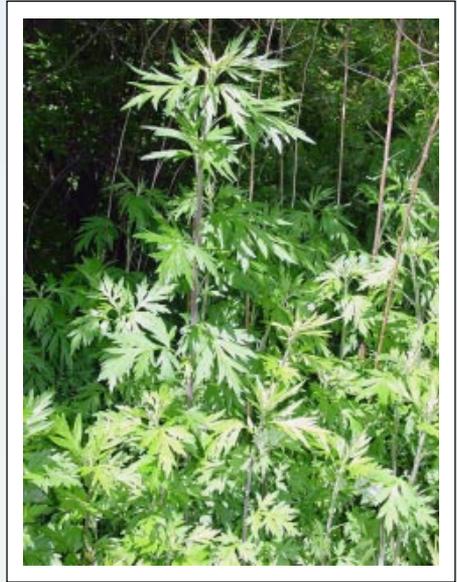
CONTROL: Based on a study by Jordan *et. al.* (2002), mugwort can be virtually eliminated by repeated mowing (2 to 3 times/year) or herbicide application.

• **Herbicides:**

- **Glyphosate:** This treatment should occur for two years in a row.
Application: 6 ounces/gallon (0.10 ounces/square meter).

ALTERNATIVE PLANT OPTIONS:

No known alternative plants.



Mugwort foliage Photo by Gylla MacGregor



Fall colors of mugwort

Panikon Files



Mugwort in spring

Photo courtesy USCS



Mugwort flowering

Photo courtesy of Wise UVA

SPOTTED KNAPWEED

(*Centaurea biebersteini*)

BIOLOGY: Spotted knapweed is a composite plant with 1 to 20 slender, upright stems. Seedling leaves form a rosette. Heads are solitary, terminal, egg-shaped (to oblong). Flowers are slender and tubular, and are whitish to pink or purplish. The marginal florets are somewhat enlarged. Reproduction is by seed. Seeds are oval and brown to black in color with pale, lengthwise lines. Seeds may be viable for up to eight years. This plant is found in a variety of habitats including disturbed areas, well-drained or moist soils.



Spring emergence Photo by Steve Dewey

DISPERSAL: Seeds may be carried by wind or via animal or human activity. Several reports indicate seeds can be carried in contaminated hay.

CONTROL: Small infestations may be removed by hand. Mowing is a possible method of control if done in the early flowering state. In both cases, if a seedbank is already present, benefits are minimal. If mowing is the method of choice, one should be aware that plants mowed in early spring will regenerate, and that mowing when florets appear is not sufficient to inhibit the production of seed (although production is reduced). The planting of grasses and forbs has been successful in reducing the number of diffuse knapweeds. Cattle/sheep grazing is another alternative.



Flowers and buds

Photo by Gylla MacGregor

• **Herbicides:**

- Picloram and 2,4-D: Current research suggests that herbicide treatment is short-lived. Both picloram and 2,4-D are used, with picloram only somewhat better than 2,4-D. Neither prevent germination by seeds in the soil although picloram seems to hold things off slightly longer than 2,4-D. Application of 2,4-D needs to be yearly. Application: Picloram - 0.25 pounds/acre; 2, 4-D - 1 pound/acre.

ALTERNATIVE PLANT OPTIONS:

Goldenrod (*Solidago* sp); native asters, e.g. New England aster (*Aster novi-angliae*), blue wood aster (*Aster cordifolius*).



Infestation of spotted knapweed

Photo by Steve Dewey

CHINESE BUSH CLOVER

(*Lespedeza cuneata*)



Early growth

Photo by Chris Evans

BIOLOGY: This herbaceous plant favors a wide variety of habitats including fields, pond borders, swamps, open woodlands, disturbed ground and meadows. It produces flowers that are creamy-white with purple throats. It blooms July through October.

DISPERSAL: Chinese bush clover reproduces both vegetatively and by seed.

CONTROL: Unfortunately, this plant cannot be effectively removed by hand. Late summer burns, or 2 to 3 years of consecutive mowing of plants while in the flower-bud stage can

reduce plant vigor. Mowing followed by herbicide treatment appears to offer good control.

• **Herbicides:**

- Triclopyr: Use a 2% solution during vegetative stage prior to branching or during flowering.
- Glyphosate (Rodeo®): Use this in wet sites with a 2% solution distributed late June to when seeds set.
- Clopyralid: Use a 0.5% solution during vegetative stage prior to branching or during flowering.



Chinese bush clover

Photo by Chris Evans

ALTERNATIVE PLANT OPTIONS:

Blue or yellow wild indigo (*Baptisia australis* or *tinctoria*), partridge pea (*Cassia fasciculata*), Virginia wild rye (*Elymus virginicus*), little bluestem (*Schizachyrium scoparium*), wild senna (*Senna hebecarpa* or *marilandica*).

Flowers of Chinese bush clover

Photos by Dan Tenaglia



LESSER CELANDINE

(also known as FIG BUTTERCUP)

(*Ranunculus ficaria*)

BIOLOGY: This perennial herbaceous plant is a strong competitor of native flowers. It tolerates moist, forested floodplains but may also be found in dry upland areas. Leaves are lustrous, dark green and appear as heart-shaped rosettes. Leaves may be smooth or toothed. Yellow flowers with 8-12 oblong petals appear in March/April on a delicate stalk above the leaves. Once established, this forest flower spreads rapidly forming a thick ground cover which native species are unable to penetrate.



Emerging growth on forest floor

Photo by Jill M. Swearingen

DISPERSAL: This plant reproduces through bulblets that appear along the stem as well as underground tubers. Bulblets produce the seed by which the plant, along with the tubers may spread. Tubers and bulblets may be carried by seasonal water.

CONTROL: Management should be early in the season as above ground portions of this plant die back by early June. Be sure to correctly identify plant prior to treatment, while it does appear well in advance of other flowering species, similar native plants include marsh marigold (*Caltha palustris*). Marsh marigold may be distinguished from lesser celandine in that it does not produce tubers or bulblets and its yellow flowers consist of 5 to 9 petals on roughly 8" stalks. Once plant is correctly identified, it can be pulled by hand if infestation is small but this could cause soil disturbance which might prompt hidden seed growth. Entire plants must be removed to prevent resprouting.

- Herbicides: Should be applied between March and May, when plant is in leaf, to avoid potential damage to native wildflowers.
 - Glyphosate: Apply a 5% mixture with water and a non-ionic surfactant to foliage, avoiding application to anything but the celandine. The full effect on the plant may take 1 to 2 weeks. Applications can be made during the winter season as long as the temperature is above about 40 degrees F, and no rain is anticipated within 12 hours.



NATIVE ALTERNATIVES:

Wild ginger (*Asarum canadense*), wild geranium (*Geranium maculatum*), foam flower (*Tiarella cordifolia*), Dutchman's breeches (*Dicentra cucullaria*), squirrel-corn (*Dicentra canadensis*), cutleaf toothwort (*Cardamine concatenata*), twinleaf (*Jeffersonia diphylla*), or bloodroot (*Sanguinaria canadensis*).

Lesser celandine flowers close-up

Photo by Leslie J. Mehrhoff

WINTER CREEPER

(*Euonymus fortunei*)



Winter creeper leaves

Photo by James H. Miller

BIOLOGY: This evergreen plant can tolerate a wide variety of environmental conditions. It may be found in full sun or deep shade. Leaves opposite and thick, dark in color and are oval shaped. Leaves can be from 1 to 3 inches long and approximately 1 to 1½ inches wide. Flowers are greenish-white to yellow and appear in the spring. Fruit and seeds appear in the fall. Fruit can be pale pink in color; the seed appears orange to red.

DISPERSAL: Winter creeper spreads both vegetatively and by seed dispersed by water and animals.

CONTROL: This plant may be pulled by hand. The entire plant, including all root shoots, must be removed as any remaining root portions may resprout.

- Herbicides: Thoroughly wet all leaves (until runoff) with one of the following herbicides in water with a surfactant (July to October for successive years):
 - Tordon 101®: A 3% solution (12 ounces per 3-gallon mix). Water (e.g. rainfall) within 6 days of treatment is necessary for soil activation. May damage non-target plants.
 - Tordon K®: Use a 2% solution (8 ounces per 3-gallon mix). Water (e.g. rainfall) within 6 days of treatment is necessary for soil activation. May damage non-target plants.
 - Garlon 4®/glyphosate: A 2% solution (8 ounces per 3-gallon mix) in water with a surfactant. This is a less effective treatment that has no soil activity to damage surrounding plants.



Winter creeper berries

Photo courtesy of
The Nature Conservancy

ALTERNATIVE PLANT OPTIONS:

Virginia creeper (*Parthenocissus quinquefolia*), trumpet honeysuckle (*Lonicera sempervirens*), virgin's bower (*Clematis virginiana*), heartleaf ampelopsis (*Ampelopsis cordata*).



Dense winter creeper foliage

Photo by James H. Miller

JAPANESE HONEYSUCKLE

(*Lonicera japonica*)

BIOLOGY: Japanese honeysuckle grows best in full sun and primarily occurs in disturbed habitats. It may be identified by the upper leaves which are distinctly separate (native honeysuckle vines have fused leaves through which the stem grows). Fragrant white/yellow flowers appear in late April through July. Fruits are produced September to November.

DISPERSAL: Dispersal is by seed, underground rhizomes or surface runners. Birds help facilitate dispersal by seed.

CONTROL: Prescribed burns may help to control seedlings and young plants. Soil disturbance in infested areas should be avoided to reduce possibility of germination of seed bank.

Applying a herbicide to cut stumps is also effective

• **Herbicides:**

- Glyphosate: Treat in October, within 2 days of first frost, follow bottle directions. Defoliation may not be apparent but stems will die.
- Dichlorprop plus 2,4-D: Again within 2 days of first frost, treat with 3.6 grams active ingredient/liter for high mortality.
- Tebuthiuron: Spike 80W® and Spike 20p® (variations of the brand product Spike) provide very effective control at an application rate of 4 to 5 pounds active ingredient/acre.

ALTERNATIVE PLANT OPTIONS:

Crossvine (*Bignonia capreolata*), trumpet creeper (*Campsis radicans*), trumpet or coral honeysuckle (*Lonicera sempervirens*), sweet pepperbush (*Clethra alnifolia*), sweetbay magnolia (*Magnolia virginiana*).



Flowers and buds

Photo by Charles Bargeron



Twisted vines

Photo by Jill M. Swearingen



Honeysuckle vine trailing up tree trunk

Photo by Chris Evans



Honeysuckle flowers close-up

Photo courtesy of Wise UVA

MILE-A-MINUTE

(*Polygonum perfoliatum*)

BIOLOGY: This herbaceous, trailing vine has reddish delicate stems with downward pointing barbs. Leaves are triangular with barbs on the undersurface. White flowers are very small. The plant may be found in open, disturbed areas such as fields, forest edges, wetlands and stream banks.

DISPERSAL: Self pollination is the primary means of dispersal, however seeds can be produced without pollination. Birds and water help facilitate dispersal by seed.

CONTROL: This plant can be pulled by hand as long as activity occurs prior to appearance of mature fruit (to reduce potential

spread by seed). Japanese beetles eat the leaves of this plant.

- Biological: Japanese beetles (*Popillia japonica*) cause significant defoliation.
- Herbicides: Herbicide must be mixed with surfactant due to waxy covering on leaves. Herbicidal soaps can be helpful in controlling this plant but treatment will need to continue throughout the season.
- Glyphosate: Application at a low rate. **Use of Glyphosate on mile-a-minute must be pre-approved by the State Department of Agriculture (FIFRA 1997, Section 2(z)(ee)).**



Foliage Courtesy of The Nature Conservancy



Mile-a-minute flowers

Photo by Jill M. Swearingen

ALTERNATIVE PLANT OPTIONS:

There are no known alternative plants.

Mile-a-minute after biological control

Photo by Yun Wu



Infestation of mile-a-minute Photo by Jill M. Swearingen



AUTUMN OLIVE or RUSSIAN OLIVE

(*Elaeagnus umbellata*)



Leaves Photo by James H. Miller

BIOLOGY: This deciduous shrub is drought tolerant and may be found in a variety of soil types. It can rapidly out-compete native species and at up to 20 feet in height creates dense shade. This plant flowers after three years. Flowers appear in June and July, followed by reddish fruit. The underside of the small simple leaves is covered with silvery white scales.

DISPERSAL: Birds and mammals help facilitate dispersal of seed by eating the fruit.

CONTROL: A combination of cutting and herbicide treatment is the best method of control for this plant.

• **Herbicides:**

- Glyphosate: Applied to cut stumps at a 10 to 20% dilution. Application: 10 to 20% dilution. Foliar applications of 1 to 2% dilution for small shrubs.
- Triclopyr: Either alone or in combination with 2,4-D, has been shown to successfully control Autumn olive. Application: very low concentration; down to 1% triclopyr in diesel fuel.

ALTERNATIVE PLANT OPTIONS:

Spicebush (*Lindera benzoin*); northern bayberry (*Myrica pennsylvanica*); arrowwood (*Viburnum dentatum*); black haw (*Viburnum prunifolium*); gray dogwood (*Cornus racemosa*); winterberry (*Ilex verticillata*).

Autumn olive tree in summer

Photo by Chris Evans



Berries of autumn olive

Photo by Jerry Gibson



Autumn olive flowering

Photo by Gylla MacGregor

MULTIFLORA ROSE

(*Rosa multiflora*)

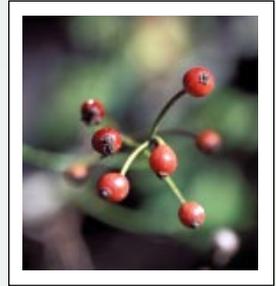


Leaves Photo by James H. Miller

BIOLOGY: This somewhat large perennial shrub has thorny, arching stems. Leaves are oblonged and toothed. Flowers are white to pinkish, in clusters, and have a fragrant odor. Flowers appear in May followed by bright red fruit in the summer. Fruit remains throughout the winter. As with most invasive plants, multiflora rose tolerates a wide range of conditions.

DISPERSAL: Dispersal is by seed (birds consume the fruit) and the rooting of branches that come in contact with the ground.

CONTROL: Repeated mowing can help prevent the spread of multiflora rose.



Rose hips Photo by James H. Miller

• Herbicides:

- Glyphosate: Spring or mid-summer treatment appears most successful in controlling this plant over the growing season. Application: 1 to 2% V/V solution (can be reduced to 0.5% V/V solution with addition of surfactant).
- 2,4-D and Picloram: As sprays, these are also reported to provide excellent control.
- Fosamine: This targets woody plants and may be effective but there is limited information regarding the success of this chemical control method.

ALTERNATIVE PLANT OPTIONS:

Common blackberry (*Rubus allgheniensis*); flowering raspberry (*Rubus odoratus*); pasture rose (*Rosa carolina*); swamp rose (*Rosa palustris*).



Multiflora rose flowers

Photo by James H. Miller



Photo by Gylla MacGregor

TREE OF HEAVEN

(*Ailantus altissima*)

BIOLOGY: This is a large tree (80 feet) that grows rapidly. Leaves are large (1 to 4 feet in length), compound and composed of 11 to 25 smaller leaflets (21+ is standard on mature leaves). Small greenish flowers appear in June. Female plants produce flat, twisted, papery fruit during late summer.

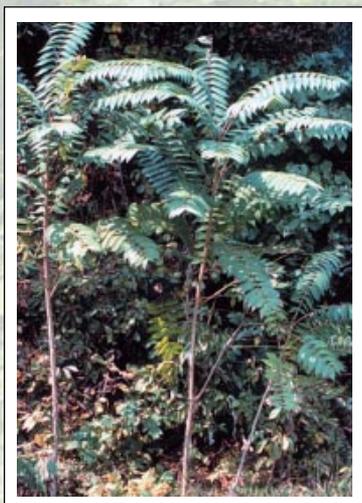
DISPERSAL: This tree spreads via seed and re-sprouting.

CONTROL: One option is to use heat-girdling followed by herbicide treatment to prevent resprouting. Plants may also be hand pulled but all fragments must be removed to prevent regrowth.

- Herbicides: With cut stump treatments, herbicide should be applied within 5 to 20 minutes of cutting to ensure effectiveness. If using a broadcast spray method, plants should be sprayed when in the fruiting stage for best results.
- Garlon 3A®: On large trees, use as a stem injection with application dilution as specified on herbicide bottle. May also use as a 2% solution on resprouts and seedlings.
- Garlon 4®: Spray a 20% solution with basal oil, diesel fuel or kerosene (2.5 quarts per 3-gallon mix) with penetrant to young trees. May also use as a 2% solution on resprouts and seedlings.
- Arsenal AC: On large trees, use as a stem injection with application dilution as specified on herbicide bottle.
- Tre-Hold®: Spot chemical treatment may be directly applied to cut stumps or injected into stems to prevent resprouting. Application amount as directed on herbicide label.



Flowering Photo by Barbara Tukarska-Guzik



October stems and leaves of tree of heaven

Photo by James H. Miller

ALTERNATIVE PLANT OPTIONS:

Box elder (*Acer negundo*); smooth sumac (*Rhus glabra*); black walnut (*Juglans nigra*); staghorn sumac (*Rhus typhina*); fringetree (*Chionanthus virginicus*); green or white ash (*Fraxinus pennsylvanica* or *americana*).

Tree of heaven in July

Photo by James H. Miller

JAPANESE BARBERRY

(*Berberis thunbergii*)

BIOLOGY: This shade-tolerant shrub is successful in nearly all habitat types. Plants grow 2 to 8 feet high. Pale yellow flowers appear from mid-April to May and produce bright red berries. Leaves are small and oval-shaped. Stems have simple spines.

DISPERSAL: Small mammals and birds assist in the dispersal of seed; however, Japanese barberry may also reproduce through vegetative means.

CONTROL: Smaller shrubs can be removed by hand.

• **Herbicides:**

- Glyphosate: Use independently as a 2% solution or use on cut stumps in a 25% solution (with water).
- Triclopyr: Use independently as a 2% solution or use on cut stumps in a 25% solution in water. Must apply immediately to cut stumps.

ALTERNATIVE PLANT OPTIONS:

Sweet pepperbush (*Clethra alnifolia*); spicebush (*Lindera benzoin*); northern bayberry (*Myrica pensylvanica*); highbush blueberry (*Vaccinium corymbosum*); pasture rose (*Rosa carolina*); swamp rose (*Rosa palustris*).



Flowers Photo by Leslie J. Merhoff



Japanese barberry Photo by Gylla MacGregor



Young Japanese barberry plant Photo by John M. Randall



Japanese barberry bush

Photo by Gylla MacGregor



Berries of Japanese barberry

Photo by Barry Rice

WINEBERRY

(*Rubus phoenicolasius*)

BIOLOGY: Wineberry is an upright, long stemmed plant. Stems are covered with distinctive red hairs and small spines giving the plant a reddish color when viewed from a distance. Leaves consist of three heart-shaped, serrated leaflets with purplish veins and are silvery white underneath. The plant produces small green flowers with white flowers in the spring. The bright red fruit appears during June and July.

DISPERSAL: Wineberry reproduces by seeds, root buds, and the sprouting of new plants from where stems touch the soil. The fruit is consumed by birds and mammals who are the primary sources of seed dispersal.

CONTROL: There is no control information available for this species specifically. In general, *Rubus* species are commonly controlled by burning, mowing/cutting, hand-pulling plants or using herbicides.

• Herbicides (effective on other *Rubus* species):

- Picloram: Most effective at controlling regrowth.
- Glyphosate (with surfactant by Monsanto). Standard (bottle prescribed) usage in the fall.
- Triclopyr Amine/Glyphosate: A 2:1 mixture of glyphosate with triclopyr amine has been effective. Be sure to add most of the water to the tank mix of glyphosate before adding triclopyr.
- Triclopyr Amine: Use prescribed application amounts.

ALTERNATIVE PLANT OPTIONS:

Common blackberry (*Rubus allegheniensis*); winterberry (*Ilex verticillata*); spicebush (*Lindera benzoin*); flowering raspberry (*Rubus odoratus*); red or black chokeberry (*Aronia arbutifolia* or *melanocarpa*).



Infestation Photo by John M. Randall



Photo by Jill M. Swearingen

Wineberry leaves and berries



Photo courtesy of The Nature Conservancy



Photo by Britt Slattery

BUSH HONEYSUCKLE

(*Lonicera species*)



Flowering Photo by John M. Randall

BIOLOGY: This upright, multi-stemmed shrub may be found in disturbed areas, semi-shaded fencerows, weedy thickets or brushy groves. May be distinguished most easily from native honeysuckle by its red berries.

DISPERSAL: Small mammals and birds disperse seed.

CONTROL: May be mechanically removed by pulling seedlings and mature shrubs, or repeated clipping of mature shrubs. Any root

segments remaining in the soil may resprout. Controlled burns during growing season will kill adult plants and inhibit new shoots.

• **Herbicides:**

- **Glyphosate:** Treatment with a 20 to 25% solution can be applied to cut stumps in late summer. A 2% solution can be used as a foliar treatment late in the growing season.
- **Triclopyr:** Treatment with a 20 to 25% solution can be applied to cut stumps in late summer. A 2% solution can be used as a foliar treatment late in the growing season.



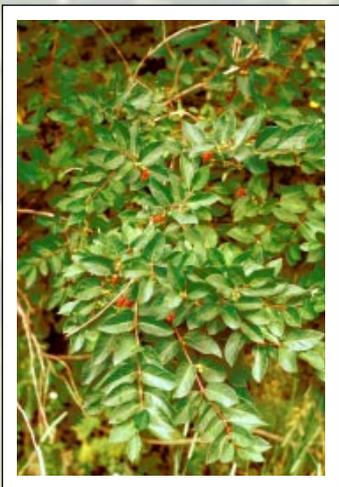
Foliage and flowers of bush honeysuckle

Photo by Chris Evans

ALTERNATIVE PLANT OPTIONS:

Spicebush (*Lindera benzoin*), highbush blueberry (*Vaccinium corymbosum*), maple-leaf viburnum (*viburnum acerifolium*), arrowwood (*Viburnum dentatum*).

Bush honeysuckle berries in late summer and autumn Photos courtesy of The Nature Conservancy



BLACK JETBEAD

(*Rhodotypos scandens*)

BIOLOGY: This non-native deciduous shrub has reddish stems. Leaves are opposite, simple and toothed. It produces a solitary white flower and shiny black fruit in clusters of four.

DISPERSAL: This plant spreads both vegetatively and by seed.

CONTROL: Small plants can be removed by digging however the entire root system must be removed to prevent resprouting.

- Herbicides:
 - Glyphosate: Cut shrub in fall and apply glyphosate in spring. Use recommended dosage on label.



Clustered fruit Photo courtesy of UC Davis



Black jetbead foliage Photo by John M. Randall

ALTERNATIVE PLANT OPTIONS:

Black chokeberry (*Aronia arbutifolia*), spicebush (*Lindera benzoin*), pasture rose (*Rosa carolina*), mapleleaf viburnum (*Viburnum acerifolium*), southern arrowwood (*Viburnum dentatum*).



Leaves and berries of black jetbead

Photo by John M. Randall

HERBICIDE TRADE NAMES

2,4-D (tradenames: Amine4[®], Hi-Dep[®], Weedar64[®])

2,4-DP (tradename: Dichlorprop[®])

Arsenal AC (tradename: Arsenal[®])

Bentazon (tradenames: Basagran SG[®] and Basagran T/O[®])

Clopyralid plus 2,4-D (tradename: Curtail[®])

Fluazifop-p (tradename: Fusilade[®])

Fosamine (tradename: Krenite[®])

Glyphosate (tradename: RoundUp[®] for upland areas or Rodeo[®] in wetland areas)

Imazameth (tradename: Plateau[®])

Picloram (tradename: Tordon[®])

Sethoxydim (tradenames: Post[®] or Vantage[®])

Tebuthiuron (tradename: Spike[®])

Triclopyr Amine (tradename: Garlon 3A[®])

ALTERNATIVE PLANT OPTIONS

Please visit your local nursery or garden center to purchase the native alternatives listed in this guide, or, contact the New Jersey Audubon Society's Scherman-Hoffman Wildlife Sanctuary for upcoming native plant sale dates.

Field of purple loosestrife

Photo by John M. Randall

REFERENCES

- (The) Global Invasive Species Initiative <http://tncweeds.ucdavis.edu/esadocs.html> The Nature Conservancy.
- Invasive plants of the Eastern United States <http://www.invasive.org/eastern/biocontrol/>.
USDA Forest Service Publication FHTET-2002-04.
- Invasive.org <http://www.invasive.org/eastern/srs/prescriptions.html>. A joint project by The Bugwood Network, USDA Forest Service & USDA APHIS PPQ, and The University of Georgia.
- Jordan, M.J., B. Lund and W. A. Jacobs. 2002. Effects of mowing, herbicide and fire on *Artemisia vulgaris*, *Lespedeza cuneata* and *Euphorbia cyparissias* at the Hempstead Plains Grassland, Long Island, New York. Northeast Natural History Conference (poster).
- McLaughlin, G.S., R.J. Cartica and M. VanClef. 2002. Preliminary comparison of techniques for control of invasive plants in four New Jersey natural areas. NJ Department of Environmental Protection Division of Parks and Forestry Natural Lands Management.
- Okay, J. Mile-A-Minute Weed. Virginia Dept. of Forestry and the U.S. National Park Service. <http://www.nps.gov/plants/alien>.
- Plant Invaders of Mid-Atlantic Natural Areas. Undated. Published by the National Park Service and U.S. Fish and Wildlife Service.
- Snyder, D. and S. R. Kaufman. 2004. An overview of nonindigenous plant species in New Jersey. State of NJ DEP Division of Parks & Forestry, Office of Natural Lands Management, Natural Heritage Program. Trenton, NJ 107 pages.
- NJAS and Franklin Township Somerset County would like to acknowledge The Nature Conservancy. A number of photos came from their Invasive Species Initiative Image Guide. <http://tncweeds.ucdavis.edu/photosg-p.html>.
- Maine Invasive Plants. University of Maine Cooperative Extension Bulletin 2534.

No matter where you live, one of our staffed centers serves your community. Each reflects the uniqueness of its region's natural treasures; all are portals to a world of excitement and discovery and are staffed by people whose knowledge is exceeded only by their eagerness to share.

Over 80,000 people annually partake of a New Jersey Audubon program, field trip, natural history class, or special event. If you are not one of them, please consider this an invitation to see what you have been missing.

1 Weis Ecology Center
150 Snake Den Rd., Ringwood, N.J. 07456
Phone: (973) 635-2160

2 Lorimer Sanctuary
790 Ewing Avenue, Box 125
Franklin Lakes, N.J. 07417
Phone: (201) 891-2185

3 Scheman-Hoffman Wildlife Sanctuary
11 Hardscrabble Road
Bernardsville, N.J. 07924
Phone: (908) 766-5787

4 Sandy Hook Bird Observatory
20 Hartshome Drive,
P.O. Box 553
Fort Hancock, N.J. 07732
Phone: (732) 872-2500

5 Plainsboro Preserve
80 Scotts Corner Road
Cranbury, N.J. 08512
Phone: (609) 897-9400

6 Rancocas Nature Center
794 Rancocas Road
Mount Holly, N.J. 08060
Phone: (609) 261-2496

7 Cape May Bird Observatory Center for Research & Education
800 Rt. 47 North
Cape May Court House, N.J. 08210
Phone: (609) 861-0700

8 Nature Center of Cape May
1600 Delaware Avenue, Cape May, N.J. 08204
Phone: (609) 898-8848

9 Cape May Bird Observatory Northwood Center
701 East Lake Dr., Box 3, Cape May Point, N.J. 08212
Phone: (609) 884-2736

10 Essex County Environmental Center (NJAS Partner Site)
621 Eagle Rock Avenue, Roseland, N.J. 07068
Phone: (973) 228-8776

MAP KEY

 1. Nature Center
 2. Localized Wildlife Sanctuary
 3. County Office

NEW JERSEY AUDUBON SOCIETY
www.nj.audubon.org

Copy this page,
complete the application and mail to:
New Jersey Audubon Society
9 Hardscrabble Road
Bernardsville, NJ 07924

NJAS Membership

Members strengthen the voice with which NJAS speaks out for protection of New Jersey's wildlife and natural areas, and members provide inspiration and essential financial support for the Society's sanctuaries and programs in conservation, education, and research.

Summary of NJAS Membership Benefits

- Subscription to *New Jersey Audubon* magazine and *Seasons* quarterly events.
- Advance notice & member rates on NJAS events.
- Discounts on books, optics, and gift items.
- Domestic and foreign travel opportunities.
- Membership card and decal.
- The satisfaction of helping to preserve New Jersey's natural heritage.

NJ Audubon Membership Application

- Basic.....\$39/\$30*
- Family.....\$45/\$35*
- Dual NJAS/CMBO.....\$50*
- Friend.....\$100
- Goldfinch.....\$250
- Golden Eagle.....\$500
- Life.....\$2,000

* For NEW members only.

I cannot join at this time, but here is my tax-deductible contribution of \$ _____
Please print complete name and address below:

NAME _____

ADDRESS _____

CITY, STATE, ZIP _____

Daytime PHONE _____

EMAIL (Optional) _____

Method of payment

- Check or money order enclosed payable to:
New Jersey Audubon Society
- Charge my: MC Visa AmEx
(check one)

CARD NUMBER _____ Exp. / _____

SIGNATURE _____



New Jersey Audubon Society
Department of Conservation
11 Hardscrabble Road
Bernardsville, New Jersey 07924

www.njaudubon.org/Conservation/
Phone: (908) 837-9571
Fax: (908) 837-9569
Email: conservation@njaudubon.org



Canada thistle

Photo by Chris Evans, U of GA

