

Identification and Control Techniques for Common Upland Invasive Plants in Massachusetts

Prepared by:
Chris Polatin
Land Stewardship, Inc.



Management

- We will emphasize manual, mechanical and chemical techniques because their uses individually and combined will yield substantial results.
- Established populations of invasive plants are difficult to control without use of herbicides
(And not easy to control *with* herbicides, either!)
- Selective and proper use of herbicides is usually less environmentally disruptive than allowing invasive plants to spread unchecked
 - “Biological pollutant” will increase over time
 - “Chemical pollutant” dissipates over time
- This workshop will instruct you to conduct two types of herbicide applications within upland areas only: 1) cut stem treatment (CST) and 2) foliar treatment.
- ❖ The CST technique involves cutting tall plants (>6') within 6" of the ground with a suitable cutting tool and applying herbicide to the freshly cut stem within 1 hour of cutting. This technique may be used from April through December when temperatures are above freezing. Don't cut during sap season (late February through early April because sap will push herbicide out of stems. We recommend using Roudup Pro Concentrate at full strength or Rodeo herbicide at 50% with 50% water and indicator dye.
- ❖ A foliar treatment should moisten all of the leaves of the small (<6') target species, but not to the point of runoff. Practice using water with indicator dye so you are sure to not over or under apply. Most invasive plant species can be controlled with a 2% volume/volume solution of Rodeo herbicide (glyphosate). An exception to this is bittersweet which is more effectively treated with the triclopyr based herbicide Garlon 3A or Garlon 4. These herbicides are also used at a 2% solution. Foliar treatments may be conducted from mid-May (after threat of frost) through the end of September (before frost).
- ❖ All foliar herbicide solutions need to be mixed with a non-ionic surfactant at 0.25% early season and 0.50% late season (mid-July cut off date). A surfactant is essential for the treatment to be effective. The surfactant helps the herbicide penetrate and adhere to the leaves.
- ❖ I recommend also using a blue indicator dye so that you can really see the applied herbicide. The dye will remain on the leaves for several days before it dissipates. Using the dye helps train your eye to cover the whole plant. It also helps you see areas of overspray or if it is getting on your clothing.
- ❖ Please be sure to take the proper precautions for protecting yourself from herbicide exposure by wearing the labeled personal protective equipment (PPE) which consists of a long sleeved shirt, chemical resistant gloves, eye protection (when mixing), and shoes with socks.

Recommended General Use Herbicides

Triclopyr (*Garlon 3A, Garlon 4 Ultra, Vastlan*)

- Chlorinated pyridine compound
- Disrupts normal plant function —————> Abnormal elongation & division of cells
- Selective – most grasses and sedges are tolerant
- Controls broadleaf weeds and woody plants
- Systemic – moves through the root system
- Initial symptoms appear rapidly —————> Distorted growth, leaf cupping, stem twisting
- Formulations: *Garlon 4* (Ester) more volatile than *Garlon 3A* (Amine) can be used in proximity to wetlands

Glyphosate (*Round Up, Rodeo, Accord*)

- Strong bond to soil —————> Inactive in soil and does not migrate through soil
- Minimal potential for leaching into groundwater or runoff
- Readily biodegraded by bacteria and fungi
- Generally short half-life in soil (6 weeks)
- Very low toxicity to non-target organisms
- Roundup not approved for wetland sites due to surfactant —————> *Rodeo* approved for wetland resource areas
- Derivative of glycine, an amino acid
- Inhibits an essential plant enzyme (EPSP Synthase)
- Blocks production of aromatic amino acids
- Non-selective herbicide – will kill grasses and other non-target plants if sprayed
- Systemic – moves through root system
- Gradual yellowing of leaves with the newest leaves first
- Non-volatile, but avoid spray drift

Asiatic Bittersweet

An aggressive, fast growing vine that grows into trees, overtopping and girdling them. Look for oval leaves, yellowish-orange outer skin covering scarlet red berries, and vines wrapping around trees. Can grow up to 10 ft. per year and up to 60 ft. high into the tree canopy.



Management Techniques

As Seedlings

Hand pulling

- Pull plant by the base of the stem, removing all roots
- Bag and dispose or place in paper leaf bags for brush burning of any fruit to prevent seed dispersal
- If no fruit then you can hang them on tree branches to keep them off the ground.

Equipment: Gloves

Growing into Trees

Cut-Stem Treatment

- Cut stems in fall or winter to make work more manageable. One can more readily find the vines in the dormant season.
- Cut high & low to help distinguish what has been cut.
- Apply herbicide to cut surface within 1 hour of cutting.

Equipment: Buckthorn blaster, Extra applicator tips, glyphosate concentrate, and blue dye

Application Rate: 100% Roundup Concentrate or 50% Rodeo

Growing on the ground

Foliar Treatment

- Spray leaves with low volume backpack sprayer.
- Return every 2 weeks to treat any missed or leaves still looking green and vital.

Equipment: Solo backpack sprayer, Triclopyr concentrate, indicator dye



April to May	June to September	September to January
Hand pull young plants & Cut stem	Foliar Treatment & Cut-stem	Cut-stem treatment

Multiflora Rose

Once used as a natural fence in agricultural fields, multiflora rose often grows in sunny, forest and field edges but can grow in a variety of areas. Look for compound leaves with 5-11 sharply toothed leaflets, alternate leaf pattern, curved thorns, fringes (fringed stipule) at the leaf stem, and white flowers in late spring.



Management Techniques

Mowing

- Rose mows very well with a brush hog or walk behind mower. I highly recommend reducing it with mowing followed by foliar application after it resurges.

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for burning

Cut-Stem Treatment

- Cut stems in fall or winter to make work more manageable (Should not be cut during sap season – February / March)
- Cut with a brush saw with steel brush knife blade for best result. Wear a Filson Tin Cloth Suit!
- Apply herbicide to cut surface within 1 hour of cutting

Equipment: Buckthorn blaster, Extra applicator tips, glyphosate concentrate, and blue dye

Application Rate:

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

March to June	July to September	October to January
Hand pull young plants & cut-stem treatment	Foliar application & cut-stem treatment	Cut-stem treatment



Japanese barberry

A low growing shrub that thrives in shady areas, wetlands, and pastures. Look for small, oval shaped leaves, thin and sharp spines at the leaf nodes, and red berries remain through winter. It does not resemble any species native to Massachusetts. When cut, stems are bright yellow. Deer ticks prefer areas with high density barberry so take precautions!



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

Propane Torching

- More info:

http://www.ct.gov/caes/lib/caes/documents/publications/special_bulletins/special_bulletin_feb_2013_ward.pdf

Cut-Stem Treatment

- Only recommended for sensitive areas. Very tedious and thorny!

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

March to May	June to August	September to January
Hand pull young plants & cut stem treatment	Foliar and cut-stem treatment	Cut-stem treatment

Common Buckthorn

Common buckthorn is a small deciduous shrub-tree that grows between 6 and 20 ft. tall and is often found in meadows and forest edges. Leaves are oval shaped in opposite pairs with sharp spines near the shoots. Dark purple to black berries appear in the fall through the winter. It can be confused with apple trees or glossy buckthorn, another invasive. To be sure, scrape the bark to check for an orange inner bark.



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

Cut-Stem Treatment

- Cut stems in fall or winter to make work more manageable
(Cannot be cut during sap season – February / March)
- Apply herbicide to cut surface within 1 hour of cutting

Equipment: Buckthorn blaster, Extra applicator tips, glyphosate concentrate, and blue dye

Hack and Squirt

- Large stems (>4" diameter) can be girdled with a saw and the CST solution sprayed into the cuts for control. Saves the trouble and mess of cutting down the whole tree.

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate: Use a higher solution rate than written in the general recommendations. 5% Rodeo and 1% surfactant may be needed for adequate control of this hard to control species.

March to June	July to September	October to November
Hand pull young plants	Foliar and cut-stem treatment	Cut-stem treatment

Glossy Buckthorn

A small deciduous tree that can grow up to 20 ft. tall. Glossy buckthorn can be found in a variety of habitats but prefers sunny conditions. Look for shiny, dark green leaves opposite near branch tips. Leaf margins are untoothed. Larger stems have a hollow fissure through the center of the stem and the roots are bright red. Glossy buckthorn seedlings are easy to hand pull in the spring. Berries appear in late summer and ripen from red to black.



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

Cut-Stem Treatment

- Cut stems in fall or winter to make work more manageable
(Cannot be cut during sap season – February / March)
- Apply herbicide to cut surface within 5 minutes of cutting

Equipment: Buckthorn blaster, Extra applicator tips, glyphosate concentrate, and blue dye

Application Rate:

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate:

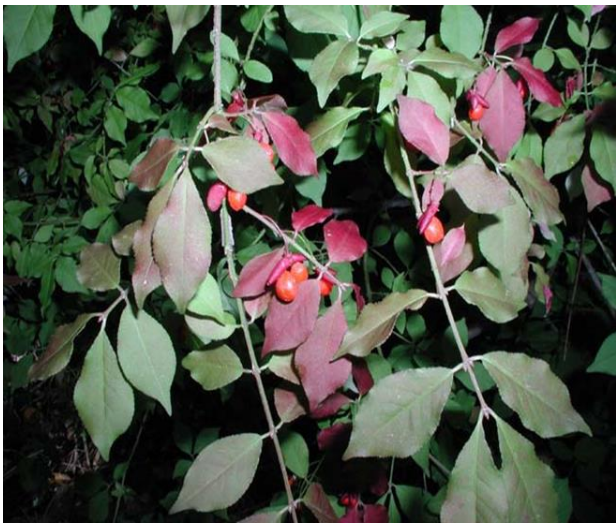


March to June	July to August	September to December
Hand pull small- medium plants	Foliar and cut-stem treatment	Cut-stem treatment

Winged Euonymus

(Burning Bush)

Burning bush gets its name from its bright red foliage that occurs in the fall. It is a shrub that can grow up to 10 ft. tall and is most easily identifiable by the prominent tan ridges that grow along dark green stems and branches. It prefers habitats with moist and well-drained soils. Leaves are tapered on both ends and grow in opposite pairs. It can be confused with some blueberry species.



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

Cut-Stem Treatment

- Cut stems in fall or winter to make work more manageable
(Cannot be cut during sap season – February / March)
- Apply herbicide to cut surface within 5 minutes of cutting

Equipment: Buckthorn blaster, Extra applicator tips, glyphosate concentrate, and blue dye

Application Rate:

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate:



March to June	July to September	October to November
Hand pull young plants	Foliar and cut-stem treatment	Cut-stem treatment

Garlic Mustard

Garlic mustard is a biennial herbaceous plant that grows in moist, disturbed soils and prefers shaded areas. It often spreads to roadsides and drainage ditches. First-year plants are short and nonflowering while second-year plants can grow up to 3 ft. tall and produce white flowers at the top of the stem in late spring and early summer. Leaves are dark green and heart shaped. Crushed leaves produce a pungent garlic odor. Garlic mustard changes the soil chemistry around it to outcompete native plants and produces thousands of seeds per plant. Garlic mustard can be used to make homemade pesto.



Management Techniques

The best treatment for garlic mustard is hand pulling. To ensure the entire plant is removed, grab the plant by the root stalk, which forms a distinct 'J' shape. First-year plants do not produce seeds, so it is unproductive to pull small seedlings.

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

March to May

Hand pull second year plants

Black Swallowwort

Black swallowwort is a perennial herbaceous vine that can grow up to 6 ft. long. It prefers sunny fields and roadsides but can also grow on forest edges. Leaves are narrowly oval shaped, dark green, and grow in opposite pairs. In late summer, black swallowwort develops dark purple flowers with 5 triangular petals that form a star shape. Black swallowwort does not resemble any native plants, but does resemble pale swallowwort, a similar invasive vine with pink or yellowish flowers. Seeds are formed in pods.

Black swallowwort is toxic to livestock and insects such as the monarch butterfly.



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal
- Seed pods can be carefully collected in late summer

Equipment: Gloves and contractor bags or leaf bags for disposal

Foliar Treatment

- Spray leaves with low volume backpack sprayer
- Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate:

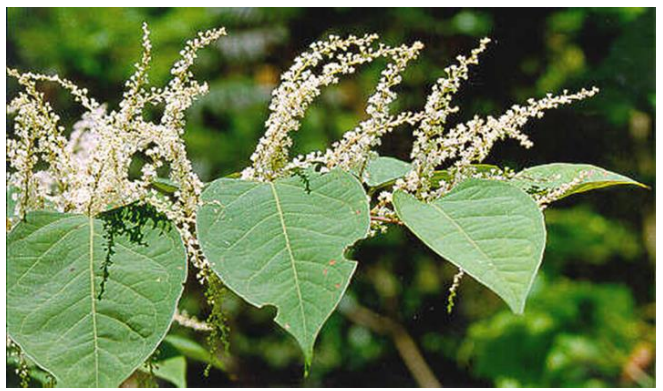
Small infestations can be smothered with plastic



March to June	July and August	September
Hand pull young plants	Foliar Treatment	Carefully collect and destroy seed pods

Japanese Knotweed

Knotweed is one of the most well adapted invasive plants. It prefers sunny and moist areas, but can survive in full shade, high salinity, dry conditions, and can grow up to 10 ft. tall. It often grows along river banks but can also grow in forested and field areas. It has hollow, bamboo-like stems that turn red to green with maturity. Leaves are broad, oval shaped that grow in an alternate pattern. In late summer, distinctive white flowers can be seen growing above the leaves.



Management Techniques

Hand pulling Seedlings

- Pull plants when soil is moist
- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal
- Collect and dispose of any root material from previous treatments

Equipment: Gloves and contractor bags or leaf bags for disposal

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate:

Stem Injection is preferred over cut-stem treatment

- Mark each stem and inject with herbicide

Equipment: Stem injector, glyphosate herbicide, nitrile gloves

Application rate:



March to May	August and September
Hand pull young plants and remove left over root material from previous treatments	Foliar and stem injection treatments

Knotweed is similar in flavor to rhubarb and can be used to create a variety of recipes including pie, wine, sushi, and muffins.

Japanese Honeysuckle

Japanese honeysuckle is a perennial climbing vine that grows in a variety of sunny conditions including roadsides, fields, and forest edges. Leaves are light green, oval shaped and grow in opposite pairs. Flowers are tube shaped and yellowish white in color and bloom in late spring. Dark blue berries are present in the fall. Japanese honeysuckle is similar to native honeysuckle but can be differentiated by the leaves, which grow on the tips of native vines rather than throughout the entire stem.



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

Foliar Treatment

- Spray leaves with low volume backpack sprayer
- Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate:

Mechanical Treatment

- Mow close to the ground twice annually during the summer



May to July	August to October
Hand pull small plants or mow low to the ground	Foliar treatment and mowing



Autumn Olive

Autumn olive is a deciduous shrub that can grow up to 20 ft. tall and 30 ft. wide in the right conditions. It is a drought-tolerant shrub that prefers sunny conditions. Leaves are narrow and wavy, almost shriveled in appearance. The top of the leaves are green with a silver bottom. The stems of young plants are a distinct, shiny orange color while older stems are grey. Light colored tubular flowers bloom in spring and red, olive shaped fruit appears in the fall. It is similar in appearance to Russian Olive, which is also invasive.



Management Techniques

Hand pulling Seedlings

- Pull plant by the base of the stem, removing all roots
- Bag and dispose of any fruit to prevent seed dispersal

Equipment: Gloves and contractor bags or leaf bags for disposal

Cut-Stem Treatment

- Cut stems in fall or winter to make work more manageable (Cannot be cut during sap season – February / March)
- Apply herbicide to cut surface within 5 minutes of cutting

Equipment: Buckthorn blaster, Extra applicator tips, glyphosate concentrate, and blue dye

Application Rate:

Foliar Treatment

- Spray leaves with low volume backpack sprayer

Equipment: Solo backpack sprayer, glyphosate concentrate, blue dye

Application Rate:

March to June	July to September	October and November
Hand pull young plants	Foliar and cut-stem treatment	Cut-stem treatment

Equipment packages

Manual Removal – Weed Wrenches

- Puller Bear - \$125 to \$170
www.pullerbear.com
- Extractigator - \$115 to \$225
www.extractigator.com

Mechanical Removal

- Chainsaw
- Brush saw
- Tractor with brush hog
- Walk behind brush mower
- Rental options – Taylor Rental

Chemical Application Equipment

- Buckthorn Blaster - \$6.50 from *Landscape Restoration*
<https://landscape-restoration.com/product/buckthorn-blaster/>
- Applicator tips - \$2.50 from *Landscape Restoration*
<https://landscape-restoration.com/product/buckthorn-blaster-replacement-applicator-tips/>
- *Solo* backpack sprayer from Home Depot - \$126.44
<https://www.homedepot.com/p/SOLO-4-gal-Backpack-Sprayer-425/205184749>

Herbicides

- Glyphosate (*Roundup Concentrate Plus* - \$25/quart, *Rodeo* - \$21.00/gallon)
- Triclopyr (*Garlon 3A* - \$59/gallon, *Garlon 4* - \$84/gallon)
- Surfactant (non-ionic) for foliar applications using products above (*Aquachem 90* from Arborchem - \$12.75/gallon or *Agridex* from Helena Chemical)
- Blue indicator dye

Herbicide Sources:

Helena Chemical – Phone: (413) 247-3126 Address: 101 Elm St, Hatfield, MA 01038

Arborchem – www.arborchem.com

Crop Production Services – Phone: (413) 665-2115 address: 25 Elm Street, S. Deerfield, MA 01373, www.cpsagu.com

Forestry Suppliers – www.forestry-suppliers.com

Personal Protective Equipment

- Goggles / Glasses
- Nitrile Gloves (Chemical resistant)
- Tyvek Coveralls (optional)

PPE Sources: Gemplers – www.gemplers.com