

Appendix A: Invasive Plant Control

Preamble: Many invasive plant species were introduced as ornamentals. Some invasives are still commercially available. All invasives are causing rapid detrimental changes to the native habitats they invade and to the ability of those habitats to support native wildlife. Control of invasive species is extremely difficult because they are resistant to attack, they can re-establish faster and more aggressively than most native species, and many establish tremendous seed stock in the soil, so can re-establish for years to come. Successful control, therefore, requires a long-term commitment.

Disposal of invasive plant material: Care should always be taken when disposing of invasive plant material after management activities. Many stem and root materials are capable of regenerating and care should also be taken when disposing of fruits and seeds. The best method of disposal is to put all plant materials (including roots) into a black plastic bag and place it in a sunny location for 2-3 weeks. Alternatively, you can make a brush pile and burn it in the winter. Always monitor areas where invasive plants were handled, and remove any sprouts.

Use of Herbicides: The control of invasive plants by manual methods whenever possible is preferable. However; when use of herbicides is necessary, read the label thoroughly and follow all instructions for mixing, application, protective clothing, etc. with great care. If you have any questions regarding the application methods mentioned above, please seek professional assistance. Do not attempt to apply herbicides without the assistance of an experienced land manager and a licensed pesticide applicator. A license to apply herbicides from the MA Pesticide Bureau is required by law to apply herbicide anywhere but on your own property. Glyphosate and Triclopyr are the two most common active ingredients in herbicides used for invasive plant control.

- Glyphosate is found in Roundup, Rodeo, Accord and Agway's Kleen Up. Glyphosate tends to biodegrade rapidly and is recommended for most applications, but is non-selective and care should be taken to avoid non-target species.
- Triclopyr is the active ingredient in Brush-B-Gone and Garlon 3A and 4. Some Triclopyr formulations are volatile and capable of spreading to other plants via root translocation, so extra care is needed when working with this chemical.

Key to Control Methods:

C: Cut to the ground

H: Hand-pull when soil is moist

D: Dig to remove all roots

F: Foliar spray with herbicide (g=glyphosate, t=trichlopyr) (2-3%)

P: Paint herbicide on a freshly cut stem (g=glyphosate, t=trichlopyr) (50%)

B: Basal spray trees <6" dia. (20% Garlon 4 in Basal oil or Pathfinder in a ready to use formulation)

M: Cover ground with black plastic mat to preclude sunlight – leave plastic in place for 1-2 years.

Invasive Species	CONTROL METHODS						Do's	Don'ts
	Apr	May	Jun	Jul	Sep	Oct		
Norway Maple	H C	H C	H C	H C	H Pgt	H Pgt	Seedlings can be pulled by hand. Small to large trees can be cut to the ground, repeating as necessary to control any re-growth from sprouts.	
Glossy Buckthorn <i>Rhamnus frangula</i>	H D	H D Pgt	H D Pgt		Pgt Fg B*	Pgt Fg B*	Pull small patches of small plants. Dig/weed wrench larger plants. Chemical control can be done anytime, but is best in the fall or on warm winter days when natives are dormant. *In winter, <u>basal bark</u> apply (a) 6-25% a.i. triclopyr (formulated for oil dilution) solution, (b) 12.5% 2-4-D, or (c) 3% Fosamine, a non-selective woody bud inhibitor. For stems >2" spray all the way around stem, for smaller stems, spray one side.	Cutting or girding (remove phloem connection of roots to shoots, retain xylem connection of shoots to roots) alone result in vigorous re-sprouting. Pulling disturbs the soil; tamp it to minimize seeding.
Oriental Bittersweet <i>Celastrus orbiculata</i>	H	Fgt C	Fgt		Pgt	Fgt	Control small populations with pulling. Cut early in the growing season, followed with a foliar spray one month later. OR Cut in September and apply herbicide directly to the cut stem. OR foliar spray in early spring or late fall when other species are dormant.	Established stands may require careful application of a triclopyr herbicide (<i>assistance from a professional land manager with pesticide license is recommended</i>).
Winged Euonymus (Burning Bush) <i>Euonymus alata</i>	H	H	Fg		C Pg B	C Pg B	Pull smaller plants when soil is moist. Cut larger shrubs and grind out stumps and/or clip re-growth and/or paint. <i>Produces vast number of seeds.</i>	Grinding stumps can produce new plants from broken roots. Mowing and spraying 1 month later doesn't work.
Tree of Heaven <i>Ailanthus altissima</i>	H	H	Fg		Pt B		Hand pull seedlings. Foliar spray seedlings. Cut and paint late summer or late winter.	Cutting stimulates re-sprouting. Develops significant taproot in 3 months – remove entire root, as broken roots may re-sprout.
Multiflora Rose <i>Rosa multiflora</i>	C	C	C	C Fg	C Pg Fg	C Pg Fg	Cutting 3-6 times per growing season for several years can be effective. If repeated cutting is not an option, Glyphosate should be applied to freshly cut stumps, as basal bark application, or foliar spray.	
Japanese Knotweed <i>Polygonum cuspidatum</i>	M	C D	C	C	C Pg	C	Dig small patches taking care to get whole runner system. Cutting several times per growing season for several years can be effective. Cutting with spot application of herbicide can be effective. Shading (e.g. several layers of black polyethylene film) is effective.	Extensive underground runners. Be very careful with disposal – new plants can form from root material & stems.
Japanese Barberry <i>Berberis thunbergii</i>	H D	H D	H D	Fg	Fg Pg	Fg Pg	One of first plants to leaf out, so easily seen and dug out – use hoe, weed wrench or mattock to uproot entire bush. Wear gloves to protect from spines.	Glyphosate is non-specific, so care must be taken.
Garlic Mustard <i>Alliaria petiolata</i>	Fg	H C	H C			Fg	Hand pull and remove plants for 7 years. Cutting should be conducted when plants are in full bloom for 7 years. Herbicide application should be directed to the basal florets in early spring or late fall.	

Invasive Species	ACTION						Do's	Don'ts
	Apr	May	Jun	Jul	Sep	Oct		
Japanese/vine Honeysuckle <i>Lonicera japonica</i>	H Fg	H Pg		Pg	Pg	Fg	Control small populations with pulling. Mowing must be often enough to remove flowers, fruits and significant re-growth over a five-year period. Foliar application of Glyphosate applied at 0.75%-5% concentration shortly after the first frost may be the most effective treatment	Mowing reduces spread, but can encourage re-sprouting and increase stem density. Tricholpyr is not effective.
Bush Honeysuckle <i>Lonicera morrowii</i> (Shrub: <i>xbella</i>)	H D	C H D	H D	Pgt Fgt	Pgt Fgt	C Pgt B	Light infestations may be cleared with a shovel or hoe – continue for 3-5 years. Cutting in early spring and late fall can be effective. Cut stump treatments late summer through the dormant season (20-25% glyphosate or triclopyr) work. Foliar treatments (2% glyphosate or triclopyr) can be used late in the growing season.	Entire root must be removed since root fragments can re-sprout.
English Ivy <i>Hedera helix</i>	C	C	C H	C H	C H	C Fgt	Repeated mowing or cutting is effective. Repeated applications of Triclopyr amine [2.5%] can be effective.	Plant is resistant to Glyphosate.
Purple Loosestrife <i>Lythrum salicaria</i>	D H	D H	F*	F*	F* H		Pull or spray before seeds set in summer to early fall. *Only herbicides permitted for wetland use, such as Accord® or Glypro®, may be used. (with Conservation Commission approval). Apply them directly to the plant in a low volume.	Remove entire root, since broken stems can re-sprout. For large populations, contact professionals.
Black and Pale Swallowwort <i>Cynanchum louiseae, rossicum</i>	D	D	Fg	Fg	Pg F	Pg	Dig and remove root clump from the site. Cut stem and apply Glyphosate-based herbicide at high concentration (50% or higher). Tricholpyr is less effective. Treat before seeds mature in late summer.	Large-scale infestations should be treated with foliar application by professional land manager with a pesticide license.
Black Locust <i>Robinia pseudoacacia</i>		Pg		Pg	Fg Bg		Cut stumps and apply Glyphosate-based herbicide 2-3 times/yr. Herbicide applied directly to frill cuts (open cuts through the tree bark) is also effective.	Repeated cutting only stimulates stump and root re-sprouting.
Cypress Spurge <i>Euphorbia cyparissias</i>			H	H			Spray application of glyphosate is effective against spurge, but kills everything growing beneath spurge. Nurturing taller competitors may decrease cover and extent of spurge.	Hand pulling, mowing, fire, and grazing are not effective in the long term.
Autumn Olive <i>Eleagnus umbellata</i>	H D	H D	H D	Fgt	Pgt B	Pgt B	Pull or dig, making sure entire root system is removed. Treat large patches with Glyphosate in late summer or fall.	Mowing and cutting stimulate re-sprouting.

This document is based on one developed for the Orleans Invasive Species Committee and distributed at the 2005 MACC Conference as a simple guidance resource used in conjunction with sensible land management practices. Contributors include:

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Appendix B: Recreational Trail Design and Construction and Maintenance Guidelines

Before beginning any construction - Flag/stake the entire project before beginning any construction

- Guide pedestrians near interesting natural features
- Avoid wet areas
- Avoid traversing on steeply sloped foot beds
- Avoid cutting healthy trees larger than 7 inches stem diameter
- Stake the limits of clearing. Follow dimensional guidelines:
 - Allow treadway to be no more than 8 feet wide for heavy-use trails
 - Allow treadway to be no more than 3 feet wide for light-use trails

Clear the trail

- Remove trees, brush, and rocks from the treadway
 - Prune vegetation to 12" in 2-foot swaths on either side of the treadway
 - Prune overhanging branches to 12 feet
 - Cut shrubs and small trees flush with the ground to prevent tripping and to reduce stump sprouting. Some trees may require chemical stump treatments to prevent re-sprouting.
 - Prune overhanging branches cleanly at the branch collar on the tree trunk or where a branch forks.
 - Trim exposed roots flush with the soil surface.
 - Scatter branches and other debris off the trail or pile for wildlife cover.
- In wet areas, raise the treadway 3 to 6 inches above the surrounding terrain to allow water to drain away, or use gravel, flat stones, fabric mats, corduroy, or even boardwalks to elevate the trail surface.
- Finish the treadway as required.
 - The ideal surface is natural soil free of large stones, stumps, and protruding roots.
 - Avoid unnecessary disruptions of the ground surface.
- Remove large rocks and fallen logs from the trail, unless they are to be kept as obstacles to prevent motorized use.

Mark the trail

- Use aluminum nails (backed-off at least .5") and standard trail markers.

Appendix B: Recreational Trail Design and Construction and Maintenance Guidelines (continued)

