

## BECOME AN INFORMED APPLICATOR

- ✓ **Use an integrated approach.** Herbicides are an effective method for controlling invasive plants. If you choose to use herbicides, use them judiciously and in combination with other management methods.
- ✓ **Develop an invasive plant management plan.** Decide what your land management goals are. Use this plan to determine which plants you want to work on, where, and when. Good planning will result in ineffective treatment and well used resources.
- ✓ **Learn before you buy or apply.** Before you head to the store or pull the trigger, research which chemicals and methods are most appropriate for your land and the plants that you want to manage. Take a workshop from a reputable person or organization.
- ✓ **The label is the law.** Each herbicide comes with a label that tells you where you can apply the herbicide, and how to mix and apply it to the problem species.
- ✓ **You need to be certified to apply herbicides on any land that you do not own.** Contact the Vermont Department of Agriculture Pesticide Certification & Training Program at 802-828-3482.
- ✓ **You need a permit to apply herbicides near water.** Contact Department of Water Quality State Wetlands Coordinator, Alan Quackenbush, at 802-241-3761.
- ✓ **If you are working with large infestations, hire a contractor.** Contractors have years of experience to draw upon, and already own the necessary chemicals. Contact the Vermont Department of Agriculture Pesticide Certification & Training Program at 802-828-3482.

## HERBICIDES COMMONLY USED TO MANAGE INVASIVE TERRESTRIAL PLANTS

**Glyphosate:** A non-selective herbicide which inhibits the synthesis of amino acids necessary in protein formation in most annual and perennial plants. It is relatively non-toxic to humans, birds, mammals, and fish, Most formulations have additions of surfactants to increase the efficacy of absorption into plants. This surfactant makes these highly toxic to aquatic organisms and should not be used near water. Common non-aquatic trade names are Roundup®, Roundup-Pro®, Accord®. A few formulations are registered for use in aquatic areas, including Rodeo\*\*®, and Aquamaster\*\*®. In Vermont, you need to be a certified applicator before you can purchase aquatic formulations.

**Triclopyr:** A selective herbicide which mimicks a plant hormone and causes uncontrolled growth in plants. It is labeled for use on woody and herbaceous broadleaved plants, does not affect monocots (grasses, lillies, orchids), and is relatively non-toxic to terrestrial animals. It comes in 2 formulations, a salt and an ester. Both can only be applied in upland, dry sites. Common trade names are Garlon™, Pathfinder™, and Brush-B-Gone™. You need to have a herbicide applicators license in order to purchase products with Garlon.

## SPECIFIC TREATMENT METHODS

**Cut stump:** This method is used for shrubs, trees, vines, and knotweed. Cut the plant 4" from the ground. Wipe the stump with a herbicide solution mixed with a colored dye to help you remember which stumps have been treated. This is most effective in the late August through mid-November when plants are relocating resources to their root systems.

**Low volume foliar spray:** When you have a large, dense population it is more efficient and uses less chemical to apply chemicals using a backpack or mist sprayer. This technique is the most likely to affect non-target plants when the spray drifts, so apply a spray when there is no wind. Foliar spray is done during the growing season when plants are in flower or fruit.

**Basal bark:** This method is most successful on small trees under 6 inches in diameter. It is only effective with the ester-triclopyr herbicide (Garlon 4®) and should not be used in wetlands. Use a backpack sprayer or handheld bottle to coat the lower 12-18 inches of the trunk. Avoid herbicide dripping down the bark.

## SPECIES SPECIFIC TREATMENT TECHNIQUES

*The treatments described below are based upon field experience, research, and most importantly the law. The label is the law.*

garlic mustard ( <i>Alliaria petiolata</i> )	<b>Foliar Spray:</b> A 1-3% glyphosate solution will provide greater than 95% control when infestations are treated from September to October. Most native species are dormant at this time, and spraying will not affect them.
goutweed ( <i>Aegopodium podagraria</i> )	<b>Foliar Spray:</b> A 2–10% glyphosate solution will brown goutweed leaves but not kill the roots. Repeat applications are necessary. If possible, after spraying the patch, cover the area with a thick plastic sheet that is secured around the edges with ground staples or sandbags. Keep covered for at least an entire season. Goutweed treatment sites need to be monitored yearly.
Asiatic bittersweet ( <i>Celastrus orbiculatus</i> )	<b>Foliar Spray:</b> Low, dense patches may be cut to the ground in April and May. After 1 month, foliar applications of 1–2% concentrations of triclopyr herbicide to re-growth will result in nearly 100% rootkill. <b>Cut Stump:</b> Cut vines 6” from the ground and treat stumps with 25% glyphosate solution. <b>Basal bark:</b> Spray 2-4% triclopyr around the vine’s stump. This is best done in the fall or early winter, after herbaceous plants are gone and before there is snow on the ground.
black swallowwort ( <i>Cynanchum louiseae</i> )	<b>Foliar spray:</b> Provides the most effective control when applied prior to seed production before mid-July. A 2% glyphosate solution or 1% triclopyr-ester solution reduces biomass by over 80% and density of stems by over 60%. Repeat applications are necessary.
purple loosestrife ( <i>Lythrum salicaria</i> )	<b>Foliar Spray:</b> Apply a 1-2% glyphosate solution after peak bloom in late August. Cut and dispose of flower heads before treating. Because of the sensitivity of wetland areas, hand spraying or wiping plants with sponges will protect other plants from herbicide drift. <i>Contact the state to obtain the proper permits.</i>
common reed ( <i>Phragmites australis</i> )	<b>Foliar Spray:</b> Good for dense stands of reed with no other vegetation present. Spray, or wipe using gloves and a sponge, a 2% glyphosate solution after the plants tassel (late August through October). If possible, return to site to cut back and remove dead stalks to encourage growth of suppressed vegetation. <i>Contact the state to obtain the proper permits.</i> <b>Cut Stump:</b> Cut and dispose of stalks. Drip into the hollow middle of the stem a 25% glyphosate solution from July to August.
Japanese knotweed ( <i>Polygonum cuspidatum</i> )	<b>Foliar Spray:</b> In May, cut back the plants. In August, when other knotweed is blooming, spray a 3%-8% glyphosate or triclopyr solution on the regrowth. It is likely that repeat applications will be necessary the following year. <i>Foliar spray uses a lesser concentration of the active chemical, it is therefore a better choice when faced with a large stand of knotweed.</i> <b>Cut Stump:</b> Cut stems and dispose of stalks. Drip into the hollow middle of the stem with 21% glyphosate solution from July to August. An injector gun can also be used.
Woody Shrubs & Trees Bush honeysuckle ( <i>Lonicera spp.</i> ) Common buckthorn ( <i>Rhamnus cathartica</i> ) Glossy buckthorn ( <i>Frangula alnus</i> ) Japanese barberry ( <i>Berberis thunbergii</i> )	<b>Foliar Spray:</b> This method is best used for dense populations. In the fall, when native plants are losing their leaves, spray a 2% glyphosate or triclopyr solution on the entire leaf surface of the plant. In order to avoid drift to native plants, spray on calm days. <b>Cut Stump:</b> Cut the plant 4” above the ground. Use a drip bottle to apply a 18—21% glyphosate solution to the stump. Apply chemical within one hour of cutting. This is best done in late summer through winter when plants are transporting resources to their root systems. <b>Basal Bark:</b> Spray the base of plants with a 2-4% triclopyr solution from August through November.

Additional Resources: **The Nature Conservancy:** [www.nature.org/Vermont/weeds](http://www.nature.org/Vermont/weeds)  
**Vermont Invasive Exotic Plant Committee:** [www.vtinvasiveplants.org](http://www.vtinvasiveplants.org)  
**Center for Invasive Species and Ecosystem Health:** [www.bugwood.org](http://www.bugwood.org)