



Tips for Managing Problem Weeds in Forest and Wildland Settings

The simple definition of a weed is a 'plant out of place'. An important part of managing weeds is knowing your 'place' - what your goals are and what purpose the land you are managing is to fulfill.

Managing problem weeds in a forested setting is best accomplished by clearly defining the management objective for your land, knowing the resources and capabilities at hand, and understanding the plants you are trying to preserve, and the plants you are trying to remove. This is a simplified definition of Integrated Pest Management.

Integrated Pest Management

Integrated Pest Management, or Integrated Vegetation Management is a systematic approach to common sense management. Your management plan can be viewed in three phases - define the pest, select and implement your control practices, and evaluate the results.

Define the Pest

To manage a pest, you have to know that it is a pest, and also know where the pest has to be and how many have to be there before you can justify expending finite resources to remove the pest. Weeds are infinite - your capacity to manage them is not.

Set Your Priorities

Before you can manage weeds, you have to prioritize your assets, economically and biologically. Determine where your effort and money is best spent in terms of your goals.

Setting Pest Thresholds

Based on your management goals and priorities, you need to determine the population level when it 'pays' to control a weed. If you are managing a forest for wood products, you can base this decision on economics. If you are managing a property to preserve habitat value, your decision is based on biological value.

The threshold level is a function of how many weeds are present, and where they are - or what they are impacting.

Scouting

Once you have defined what you are protecting and which weeds pose a threat, you need to systematically inventory your property to determine when pests have reached their threshold level.

Control the Pest

The best program will use as many techniques as feasible, and use them in concert to maximize the benefit. Pest management techniques are commonly categorized as cultural, mechanical, biological, and chemical.

Cultural Control

Cultural controls include practices that enhance the growth of desirable plants, as well as preventive practices to limit the establishment of weeds. Harvesting and planting practices that enhance regeneration are cultural control methods. Cleaning soil and vegetative debris from vehicles before they move between sites is another example of a cultural control practice.

Mechanical Control

A mechanical control physically damages a pest. Pulling, digging, and cutting weeds, and tillage are examples of mechanical control.

Biological Control

The term biological control usually refers to using one organism to prey on another. The most common approaches are to identify and release insects or diseases that limit their activity to just the target pest species.

Chemical Control

Chemical control refers to the use of pesticides. Herbicides are the pesticides that are specific to controlling weeds.

Evaluate the Results

Keep Accurate Records

Recordkeeping is often the least appealing task in pest management. However, detailed records are your best tool to evaluate the success of your program. Good records allow you to determine the productivity of your management practices and to better plan future operations.

Modify the Program

If some aspect of your program is not satisfactory - fix it! Your program can only improve if you scrutinize the results and improve the practices that are not helping you reach your goals.

Herbicide Application Methods

Herbicides are a potent tool to manage vegetation. Used properly, they represent your most productive approach. Used improperly, herbicides can do great damage to non-target plants, and can have a significant negative impact on an ecosystem.

Foliar Herbicide Applications

Applying herbicides to the target plant foliage is usually the most effective means to control weeds. The foliage is an effective point of entry into the plant, it provides the most obvious target, and the leaves are where herbicides act on the plant. We typically describe foliar applications as being 'high volume' or 'low volume'.

By Art Gover, Research Support Associate, 2004. The contents of this work reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of The Pennsylvania State University, at the time of publication. Mention of product names does not imply endorsement. THE PESTICIDE LABEL IS A LEGAL DOCUMENT - ALWAYS READ AND FOLLOW THE PESTICIDE LABEL.

High Volume Foliar Applications

High volume applications can be described as 'spray to wet'. A high volume application is usually made with a handgun with an adjustable-pattern nozzle, at the end of a length of hose, powered by a motorized sprayer with a high-pressure pump. This configuration is ideal for treating large or dense targets, and large areas that are not suitable for vehicles with fixed pattern sprayers. 'Spray to wet' is an easy concept to teach to applicators, and it has proven to be a very effective technique over the five decades that synthetic herbicides have been used.

Low Volume Foliar Applications

Low volume applications can be described as 'spray to glisten'. Rather wetting the foliage to the point of runoff, the spray is visible as distinct droplets on the leaf surface. Low volume applications are ideal for smaller, low-density targets, and are effectively applied with backpack sprayers. Low volume applications use a more concentrated herbicide solution than high volume treatments, usually in the range of five to ten times more concentrated.

Cut Surface Treatments

Cut surface techniques are used to control woody plants. Cut surface treatments utilize low doses of concentrated herbicide solution applied to individual stems. Methods include stump treatment; and treatments that leave the stem largely intact, which are commonly categorized as injection treatments. Injection treatments take on several forms, but the easiest is hack-and-squirt.

Stump Treatment

When it is best to remove the top growth of a wood plant, stump treatment is used to prevent sprouting from the stump. These treatments can be water- or oil-based. Water-based treatments need to be applied to the cut surface immediately after treatment. Oil based treatments will penetrate bark and should be applied to the sides and top of the stump. Timing of application is not critical for oil based treatments, however it is easier to do it immediately after cutting. It can be difficult to find stumps among the slash and debris after a cutting operation.

Hack-and-Squirt Treatments

Hack-and-squirt treatments can be applied with simple tools such as a hatchet and a squirt bottle. Cuts are made to expose the tissue under the bark (cambium) at a three to four inch spacing around the stem, and these cuts are sprayed with a concentrated herbicide solution.

Basal Bark Applications

Like cut surface treatments, basal bark treatments are applied to individual woody stems, and are very selective. An oil-based herbicide mixture is applied to completely cover the lower 12 to 18 inches of the woody stem. The treatment is applied to the point of wetting the bark, but not to the point of runoff. This treatment uses a concentrated herbicide solution, and should be applied with a sprayer equipped with a low-volume spray tip, such as a Spraying Systems #5500 Adjustable ConeJet with a Y-2 tip. Using a small tip reduces waste.

Soil Treatments

Herbicides are applied to the soil to be taken up into target plants through their roots. Soil applications can be categorized as preemergence and spot concentrate.

Preemergence Soil Applications

The term preemergence is used to describe both an application timing (before emergence), and an herbicide that prevents emergence of weeds from seed. Preemergence applications are often broadcast over a defined area, such as a crop field, or tree rows in a nursery. Many preemergence herbicides can be used selectively - they can be applied to prevent weeds from establishing from seed without injuring the existing vegetation. A common example would applying a 'weed-and-feed' product to your lawn in the early spring to provide fertilizer and prevent crabgrass germination.

Spot Concentrate

Some soil active herbicides can be applied to the soil to control existing plants. These herbicides tend to be non-selective, so such applications are made on a spot basis, at the base of the target plants. The same herbicides can be applied over larger areas to treat infestations, but all vegetation in the treated area is killed, and treated areas often remain bare for one to two growing seasons.

Herbicide Selection

There is a dizzying array of herbicides available for vegetation management. However, you can implement a broad-based program with many treatment options while using just a few products.

Two useful products for vegetation management in forested and non-crop settings are glyphosate and triclopyr. Each of these products is quite effective on their own, and they can be mixed to together to broaden control spectrum.

This publication will discuss guidelines for using these products. However, the product label is the legal document describing the proper use of any product. ALWAYS READ AND FOLLOW THE PRODUCT LABEL.

Glyphosate

Glyphosate is the active ingredient in the widely used 'RoundUp' products. It is available in many products, ranging from professional-use-only to ready-to-use (RTU) homeowner products.

The following are some of the characteristics of glyphosate:

- non-selective - injures all vegetation
- systemic, relatively slow acting
- no soil activity - only affects plants through foliar/stem contact
- low toxicity
- aquatic labeling
- off patent - widely available and inexpensive
- labeled for foliar and cut surface applications.

The most common formulation is the isopropylamine salt at 4 lbs salt/gallon, or 41 percent by weight. Aquatic-labeled products (example 'Rodeo') are usually 5.4 lbs salt/gallon.

Triclopyr

Another active ingredient that provides a lot of use flexibility is triclopyr, the active ingredient in 'Garlon' products. Though not as ubiquitous as glyphosate, it is

widely available for professional and consumer use.

The following are some characteristics of triclopyr:

- selective - controls broadleaf plants without injuring grasses, sedges, or rushes.
- systemic, faster-acting than glyphosate
- effective on both herbaceous and woody species
- available in water- and oil-soluble formulations
- little soil activity at typical use rates
- aquatic labeling
- labeled for foliar, cut surface, and basal bark applications

Triclopyr is available in three common forms: an amine salt (example 'Garlon 3A') with 3 lbs of triclopyr acid per gallon, an emulsifiable concentrate (example 'Garlon 4') that can be used with water or oil, and a RTU product for basal bark and cut surface treatments (example 'Remedy RTU').

Other Herbicides

Some weed species are very sensitive to specific herbicides. When an infestation of such a species is great enough, it may be useful to purchase this additional product. Such products will be briefly mentioned in the management section of this factsheet. For more information, you can download the publication *Use and Characteristics of Herbicides for Non-crop Weed Control* at <http://rvm.cas.psu.edu/Publications.html>.

Managing Difficult Species

The following sections provide a very brief discussion of managing seven different pests of forest and wildland areas. The suggestions will focus on using a simple program, featuring the use of glyphosate and triclopyr. Dosages will be described for calibrated applications (product/acre).

Spot foliar applications will be described only as high volume or low volume. High volume glyphosate or triclopyr applications are commonly mixed at 1 percent herbicide by volume, and low volume treatments of either product are commonly mixed at 5 percent herbicide by volume. If glyphosate and triclopyr are mixed, it should be at a ratio of 4:1, glyphosate to triclopyr. This ratio has not been stringently tested, but it has proved effective in limited trials. The conventional wisdom is that the faster-acting triclopyr should be at a low concentration so that it *adds* to the activity of glyphosate without interfering with it.

Mile-a-minute (*Polygonum perfoliatum*)

Mile-a-minute is a rampant, annual vine native to East Asia that came to the US in container stock. It grows up to 20 ft per year, has stout spines, and produces abundant fleshy fruit that is spread widely by birds. It climbs onto and over adjacent vegetation, and easily smothers even shrubs and small trees. It is a Noxious Weed in PA.

Keys to Control

Mile-a-minute is quite susceptible to many herbicides. The issue is treating early in the season before the vine climbs onto non-target vegetation, making selective control difficult. Mile-a-minute seed is viable for at least five years. Once an area is infested, it is essential to continue your program until the seedbank is exhausted.

Control Suggestions

If an infestation is small the plants are easy to pull-as long as you have thick gloves.

Glyphosate or triclopyr are effective at rates as low as 1 pint to 1 quart/ac.

Preemergence applications of Velpar, Oust, Plateau, or Goal 2XL will prevent establishment of mile-a-minute.

Purple loosestrife (*Lythrum salicaria*)

Purple loosestrife is a perennial forb native to Eurasia. It thrives in wetland areas, develops near-monocultures, eliminating habitat value. It can produce up to 350,000 seed per plant in a year. These seed move readily with flowing water. Loosestrife has an attractive bloom and was introduced to the US for horticultural purposes, as well as accidentally in ship ballast. Purple loosestrife is a Noxious Weed in PA. The PA Department of Agriculture and USDA-APHIS are releasing the *Galerucella* beetle in selected sites to control loosestrife.

Keys to Control

Purple loosestrife is difficult to control because it usually occurs in wetland or aquatic settings. This limits herbicide selection and requires certification and a permit for an aquatic application. These are not insurmountable obstacles, but they are beyond the 'comfort zone' of most applicators and land managers.

Control Suggestions

Both glyphosate and triclopyr are available with aquatic labels. Either product is best applied on a spot-basis, in late spring when the plants are still relatively small, but dense infestations may require a broadcast application. Glyphosate will injure all treated vegetation, while triclopyr will not affect grasses, sedges, rushes, or cattails.

Japanese knotweed (*Polygonum cuspidatum*)

Japanese knotweed and its close relative giant knotweed (*Polygonum sachalinense*) are herbaceous perennials native to East Asia. They grow in tall (up to 15 ft), dense colonies, and grow in almost any setting, from mine spoils and road cuts to shaded streambanks. They have thick, deep rhizomes, and also spread by seed.

Keys to Control

Don't be intimidated, and target the root/rhizome system. With a little bit of backbreaking work and persistence, knotweed can be controlled. Due to its imposing size, knotweed can be difficult to treat, especially if you are under-equipped. Though laborious, the best way to improve control is to cut knotweed around June 1. This reduces the energy stored in its rhizomes, and the shortened regrowth is much easier to effectively treat.

Control Suggestions

Glyphosate is very effective against knotweed. If you are going to cut knotweed around June 1, you can treat the regrowth between mid-July and September 1. This should provide you at least 95 percent reduction. Treat the regrowth the following July. Make annual visits to the site to prevent the remnants from regenerating.

If you are not going to cut the knotweed, you should make a high-volume application. To be effective, you will need to

fight your way through the infestation to get good coverage. When not cutting first, you should treat in July or early August, and do a low volume follow-up in September before frost kills the foliage.

Woody Vines

This category includes exotic species such as Oriental bittersweet (*Celastrus orientalis*), Japanese honeysuckle (*Lonicera japonica*), and the native species wild grape (*Vitis spp.*) and poison ivy (*Toxicodendron radicans*). In general, vines are problematic because they compete for light in the canopy, add significant weight to the tree, they may damage the trunk, and they compete for soil resources. In addition, poison ivy is problematic to anybody using the property, either for work or recreation.

Keys to Control

Selectivity is the issue. Vines are often in intimate contact with the trees you are trying to preserve. You have to treat the vines without treating the tree.

Control Suggestions

Unless the vines are not yet climbing, or on an inanimate object like a pole or fence, foliar applications are not an option. If you can apply a foliar treatment, the glyphosate plus triclopyr combination will be effective on all species. Poison ivy is quite sensitive to triclopyr.

If the vine is in a desirable tree, you will need to treat the stem of the vine. If the vine is free of the tree at the base, you can cut and stump treat the vine with glyphosate or triclopyr, or apply a basal bark treatment to the vine.

If the vine is right against the tree, the safest approach to the tree is to cut the vine and treat it with glyphosate. There is no chance of soil activity, and as long as the tree's bark is intact (and not green), there is minimal chance of getting any glyphosate into the tree.

Multiflora rose (*Rosa multiflora*)

Multiflora rose is a widely adapted, thorny shrub that infests sites ranging from sun-baked road cuts to wetlands. It is native to Japan, and was widely planted in the mid-1900's as a conservation plant. It spreads by seed, enclosed in a fleshy *hip* eaten by birds, and by layering - where a stem roots when it contacts the ground and forms a new crown. Multiflora rose is a PA Noxious Weed.

Keys to Control

Access. Due to its dense branching habit, formidable thorns, and hedge-like tendencies, it is difficult to effectively treat multiflora rose. If possible, the best approach is to mow the plants with an implement such as a FECON Bullhog, MeriCrusher, or other brush-specific mowing device. This eliminates the thorny canopy and allows you to treat the much-smaller regrowth.

Control Suggestions

After mowing, a foliar treatment on the resprouts will be the easiest and most effective approach. Glyphosate alone or with triclopyr will be effective. If you have a lot of multiflora rose, the herbicide metsulfuron (example 'Escort XP') is an option. Multiflora rose is extremely sensitive to metsulfuron, and is readily controlled at rates of a fraction of an ounce per acre. Escort is labeled for non-crop sites, and for silvicultural sites producing red pine, yellow poplar, or red alder.

Basal bark and stump treatments are effective, but very

difficult to accomplish. Another option is to use metsulfuron as a soil spot concentrate. An exact delivery handgun is used to apply a fixed dose of a concentrated solution of metsulfuron at the base of each plant. The handgun shoots a straight stream that allows you to stay out the thorns. It's fast and effective, but only labeled for non-crop settings. This treatment is recommended for early spring to summer.

Tree-of-heaven (*Ailanthus altissima*)

Ailanthus is a fast-growing, weak-wooded, suckering tree that will grow in almost any setting. It is native to China, and was introduced to the US in the late 1700's for use as an urban tree. Ailanthus can quickly grow to heights of 50 ft, and exceed 80 ft if it doesn't fall apart first. Dispersal is by winged seed and prolific suckering. Sucker or stump sprout growth can exceed 10 ft per year. Ailanthus can easily get too big to be managed if you delay your efforts to manage it.

Keys to Control

You must injure the root system to control ailanthus, and you must plan to implement a several-step process to gain control. Sometimes you will need to bring down a very tall canopy to get started.

Control Suggestions

Foliar applications are the most productive and effective approach, but may not be an option if ailanthus is mixed in a desirable canopy.

If foliar applications are an option, make the application in the July-September window, treating all the canopy you can reach *and* the younger shoots in the understory. Glyphosate, or glyphosate plus metsulfuron are effective, inexpensive mixtures. After a few weeks, treat the misses and large stems that could not be reached with cut surface or basal bark treatments. Even if you want to eventually remove the larger stems, use hack-and-squirt or basal bark to kill the stem first, then cut it. Leaving the stem intact improves the chances of getting herbicide into the root system

After the initial clearing is complete, plan on annual visits to treat suckers. The amount of time and materials to complete this will decrease each year, but it is necessary to persist to prevent reestablishment.

If initial foliar treatments are not an option due to desirable species in the canopy, use basal bark or hack-and-squirt to eliminate the canopy. Follow-up treatments on the suckers can be foliar applied now that there is separation between the desirable and desirable canopies.

Summary

Difficult weed species are difficult because they thrive under our 'normal' management conditions. Developing a sound, strategic plan, and understanding the vulnerabilities of the target weeds, and the current limitations of your program is the first step towards controlling them. It is also essential to accept the principle that additional effort and resources need to be invested - there is no 'silver bullet' for these weeds.

Timely and persistent operations with readily available herbicides and equipment will provide effective results.