



ISU FORESTRY EXTENSION

Chemical Control of Unwanted Shrub & Tree Vegetation

By Jesse A. Randall

Woody plants often interfere with the productivity and utility of both agricultural and non-crop lands. Woody vegetation may reduce forage production in pastures, limit water movement in ditches, limit visibility along rights-of-ways, and interfere with people's activities in others ways. Several management strategies are available to manage unwanted woody plants. No single strategy is appropriate for all situations. A basic understanding of the principles of woody vegetation control will help when designing an effective management plan.

Management Methods

CULTURAL The principles of suppressing vegetative weeds by maintaining a highly competitive mix of desired species also apply to woody species. However, cultural practices alone may not be sufficient to prevent brush establishment in many situations. Nevertheless, efforts to maintain a dense, vigorously growing mix of desired forbs and grasses usually will reduce problems with woody vegetation. Grasses and forbs are excellent belowground competitors for soil moisture and rooting space and can limit woody vegetation to only the most competitive species.

MECHANICAL control measures vary in effectiveness from species to species. Oaks, maples, walnut, willow, black cherry, mulberry, honey locust, and box elder will usually resprout from the stump if the stump is left intact or untreated chemically. Ash, hickory, sycamore, alder, willow, and elm resprout readily when cut as young saplings or small trees, but they lose much of this resprouting potential as they age. As a general rule, sprouting is most vigorous in young deciduous trees before they reach their respective seed bearing years. Conifers will not resprout after cutting.

The season when trees are cut influences resprouting vigor. Food reserves stored in the roots are highest during the dormant season from November to early May and lowest just after the leaves are fully expanded in the late spring. The greatest degree of sprouting occurs when trees are cut while dormant and the least if they are cut after full leaf expansion. Cutting in the late summer may not give sprouts time to harden off before winter comes making them susceptible to winter injury and death.

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Stump height also affects resprouting vigor. Taller stumps can sprout more because of higher food reserves in the remaining stem and because of more dormant buds beneath the bark on the stem, but sprouts higher up on the stem develop poorer root structures and lead to weak soil attachment. Long term survival of trees developing from taller stump sprouts appears to be lower than if trees were cut at ground level.

CHEMICAL control of woody vegetation is often very effective and economical. Herbicides often require less labor per acre to control woody plants than mechanical means. Frequently, mechanical and chemical means can be integrated into successful control programs by treating the cut stumps to prevent resprouting or by cutting woody plants and spraying the regrowing foliage several weeks or months later.

There are three major considerations involved in chemical selection for control of woody vegetation: 1) identify the species of brush you are wanting to control; 2) identify the site classification; and 3) select the preferred method of applying the chemical.

First, correctly identify the woody species you wish to control. Many landowners may already be familiar with the tree and shrub types common to their area. However, if you don't know, identification is not difficult. The following link will take you directly to Iowa State University Forestry Extension's Tree Identification website (http://www.extension.iastate.edu/forestry/iowa_trees/tree_id.html). This site can be used to identify most unknown plants. The product label or state Extension personnel can then be consulted to help select the right chemical for control of your woody plant problem.

The next step is to determine the classification of the site you wish to treat. Application sites are classified as either cropland or non-cropland. Cropland is any land on which a crop is raised for the purpose of harvest or grazing. Cropland includes pastures and rangeland. Non-cropland is any land that is not pastured or cropped. Non-cropland includes fence rows, storage areas, industrial sites, around farm buildings, utilities, drainage ditch banks and right-of-ways such as pipelines, communications lines, electrical power lines, highways, and railroads.

Product use should always be consistent with labeled uses. Products that are not labeled for pasture or rangeland use may, however, be used in areas where livestock grazing is anticipated if grazing restrictions specifically identified on the label are followed. The grazing restriction is the length of time livestock must be fenced out of the treated area before grazing can be resumed. When two or more products are combined, the longest grazing restriction must be followed.

Third, consider the way you wish to apply the chemical. The various methods of application are: 1) **Foliage sprays** – sprays applied to stem and actively growing foliage; 2) **Basal spray** – sprays prepared by mixing chemicals in kerosene, diesel oil or bark penetrants and applied as a drench to the lower 18" of tree's trunk or canes, thoroughly soaking the root crown around the stem; 3) **Cut stump** – chemical applied to freshly cut stump surface; 4) **frill** or **Hack-n-Squirt**– chemical placed in frill made by overlapping ax-cuts around the base of the tree; 5) **Hatchet injection** – chemical is injected into tree using a hypohatchet; and 6) **Soil application** – sprays, granules or pellets applied to soil surface or injected into the subsoil.

Foliage spray applications should be made when leaves are fully expanded and the main spring sap flow has subsided (July - fall color change). Care must be taken to minimize drift of the herbicide from the target site. Low pressure, coarse (large water droplet) sprays, and drift reducing additives or equipment are recommended. Selective herbicides can be used to only target broadleaf deciduous trees and shrubs which leave grasses

unharmful. For multi-flora rose one of the best times to use a foliar spray is just after peak bloom in the early summer. Just after the white blooms fall off the plant is at its weakest point and a foliar spray with a product such as Crossbow is highly effective. Within days you will be able to see what has “take” and what you missed with the first spray.

Basal sprays are very effective on resprouting species and can be used to kill cane patches and thickets, as well as large trees up to 6-8 inches in diameter. Oil soluble herbicides are applied in a bark penetrant, diesel oil, or kerosene carrier. The spray should saturate the lower 18 inches of trunk, crown buds, exposed roots and the soil directly around the base of the trees or brush to optimize control. Applications can be made any time of year, although fall and dormant season treatments often are most effective. Due to the high cost of diesel oil, which is used as the herbicide carrier, products have been developed that allow water to be used as a portion of the carrier liquid. Most vegetative ground cover will be killed by chemicals applied in a diesel oil carrier. **Do Not Use** if there are desirable species close by. Carefully read the label if you are working near bodies of water!



Cut-stump, Girdle, Frill – “Hack-n-Squirt”, and Hatchet injection methods are very effective on resprouting species of any size. Treatment can be made any time of year. However, application made during periods of heavy sap flow in spring may result in poor control or injury to surrounding trees. These treatments are excellent for selectively controlling unwanted trees and thick stemmed brush without injury to surrounding trees, bushes, and ground cover. However, brushy thickets, canes, and multi-trunk trees are difficult to treat. Treat the plant before the cut surface dries (within 2 to 3 hours after cutting but preferably within 15-30 minutes) for optimum control. Only the outer edge (sapwood-cambium area) needs to be treated. Several products are formulated specifically for cut-surface treatments (Tordon RTU, Weedone CB, Banvel CST). These products usually contain penetrants and dyes, and do not require mixing. A common error when using any of these three methods involves over-application of chemical. This wastes the chemical which can be expensive and it can lead to flashback in the soil. Flashback is where the chemical enters the soil around the tree or shrub that you were intending to kill and it kills all plant material in that zone. Some chemicals can sterilize the soil for years and not allow desired trees to establish and grow. Glyphosate “Roundup” has been shown to be equally effective in cut stump, frill, and hatchet injections by varying the concentration. A 50/50 mix of Glyphosate/water is highly effective from August-November and from November –February a 75/25 roundup /water and even a 100% glyphosate spray will control trees.



Cut stump treated with glyphosate and dyed blue to ensure all stumps were treated with chemical



Girdled tree treated with glyphosate and dyed blue to ensure all stems were treated with chemical.



Frill and treat is also called "Hack-n-Squirt". This treatment severs the vascular structure of tree allowing herbicide to move from the frill to above and below parts of the tree.

Soil treatments include pellets, beads, granules, and liquids. The herbicide moves through the soil to the root zone and then is translocated upward in the vascular structure of the plant to kill the above and belowground portions of the plant. Treatments are applied within the drip-line of target plants. Any sensitive nearby trees that root into the treated area will be injured or killed. Soil-applied herbicides usually remain active in the soil for several months; these chemical may be applied any time of the year except when the ground is frozen.

Table 1 (on pages 4 and 5) provides basic information on several products registered for controlling woody plants. Before using any product, read the current label to insure that the product is used appropriately. No endorsement of products or firms is intended, nor is criticism implied of those not included.

Table 1. Chemical Treatment According to Species

Species	Chemical Options	Treatment Delivery Options
Autumn Olive	2% Garlon 4 Ultra 2oz. Escort XP 20% Garlon 4 Ultra + Bark Oil:	Foliar (when growing) Foliar (when growing) Basal Bark and Cut Stump (Mid-summer – late fall)
Black Locust	5% Transline w/ water 5% Transline 2. Basal Oil 16 oz. Transline 7 oz. Milestone VM 10% Milestone VM w/ water for cut surface	Cut Stump (Mid-summer – late fall) Basal Bark (Mid-summer – late fall) Girdling (Mid-summer – late fall) Hack-n-Squirt, Cut Stump (Mid-summer – late fall) Cut Stump, Hack-n-Squirt (Mid-summer – late fall)
Box Elder	20% Garlon 4 Ultra + Bark Oil: 2% Garlon 4	Basal Bark or cut stump (Mid-summer – late fall) Foliar when growing
Buckthorn	20% Garlon 4 Ultra + Bark Oil Pathfinder II (RTU) 2% Garlon 4 Ultra, spray to thoroughly wet	Basal Bark (Mid-summer – late fall) Cut Stump (Mid-summer – late fall) Foliar (when growing)
Chinese/Siberian Elm	7 oz. Milestone VM 1.5 oz. Escort XP	
Eastern Red Cedar	Chemicals are normally not used – mechanical means of girdling below the lowest branch, mowing, and prescribed fire will all remove red cedar.	
Multiflora Rose	3.3 oz. Opensight 1 oz. Escort IP or 1 gram/gal 2% Garlon 4 Ultra 3% Crossbow at flowering 6-12% Stalker + Oil	Foliar (when growing) Foliar (when growing) Foliar (when growing) Foliar (when flowering) Basal Bark (year round)
Poison Ivy	1-2% Garlon 4 Ultra	
Prickly Ash	20% Garlon 4 Ultra + Bark Oil: 2% Garlon 4 ultra 1.5 oz. Escort XP per 50 gal. water	Basal Bark and Cut Stump (Mid-summer – late fall) Foliar (when growing) Foliar (when growing)
Reed Canary Grass	12 oz. Plateau 2 oz. Oust XP 32 oz. Journey 48 oz. Habitat 1% Intensity 10% Accord XRT II + .5-2 oz. Oust XP late season <i>All mixes should include TACTIC surfactant</i>	

Garlic Mustard	2-3% Garlon 4 Ultra 3% Accord XRT II 1 oz. Oust XP	Foliar (early spring when growing) Foliar (early spring when growing) Foliar (early spring when growing)
Honey Locust	20% Garlon 4 Ultra + Bark Oil Pathfinder II (RTU) 2% Grazon P+D	Basal Bark (Mid-summer – late fall) Cut Stump (Mid-summer – late fall) Foliar spray (when growing)
Honeysuckle	2 oz. Escort XP 5% Accord XRT II 20% Glyphosate 15% Garlon 4 Ultra + Oil	Foliar (when growing) Foliar (when growing) Cut Stump (year round) Cut Stump (year round) Basal Bark (fall)
Ironwood	20% Garlon 4 Ultra + Bark Oil Pathfinder II (RTU) 2% Garlon 4 Ultra,	Basal Bark (Mid-summer – late fall) Cut Stump (Mid-summer – late fall) Foliar spray for resprouts
Japanese Barberry	2-3% Garlon 4 Ultra 2 oz. Escort XP	Foliar (when growing) Foliar (when growing)
Japanese Knotweed	1% Arsenal or Habitat .5 oz. Milestone VM/gal	Cut twice in the growing season and spray foliar regrowth in fall
Sumac	Tordon RTU 2% Garlon 4 Ultra 7 oz. Milestone VM per 50 gal. water	Cut Stump Foliar (when growing) Foliar (when growing)

* Arsenal, Habitat, Journey, Oust, Overdrive, and Plateau are trademarks of BASF.

* Escort, Krenite, and Oust are trademarks of DuPont

* Liberate is a trademark of Loveland.

* Bark Oil LT is a trademark of CPS Timberland.

* Accord XRT II, Garlon, Grazon P+D, Milestone VM, Opensight, Pathfinder II, Tordon RTU, and Transline are trademarks of Dow ArgoSciences LLC.

Table 2. Approved Application Sites and Methods of Application for Herbicides Registered for Brush Control

Commercial Product	Active Ingredient	Approved Sites		Application Method				Residual Activity ²
		Pasture	Ditch Banks	Foilar-Stem Spray	Cut-Surface	Basal Bark	Soil	
2, 4-D	2, 4-D	Yes	Yes	Yes	Yes	Esters	No	1-2 weeks
Access	Picloram + triclopyr	No	No	No	No	Yes	No	1 year
Arsenal	Imazapyr	No	Yes	Yes	Yes	No	No	1-2 years
Banvel, Vanquish	Dicamba	Yes	Yes	Yes	Yes	No	No	2-6 weeks
Chopper	Imazapyr	No	Yes	No	Yes	Yes	No	1-2 years
Chopper RTU	Imazapyr	No	Yes	No	Yes	Yes	No	1-2 years
Contain	Imazapyr	No	Yes	Yes	No	No	Yes	1-2 years
Crossbow	Triclopyr + 2, 4-D	No	Yes	Yes	No	Yes	No	2-3 months
Escort, Ally	Metsulfuron methyl	Yes ¹	Yes	Yes	No	No	Yes	1 year
Garlon	Triclopyr	No	Yes	Yes	Yes	Yes	No	2-3 year
Hyvar	Bromacil	No	Yes	No	No	No	Yes	1 year
Kernite	Fosamine	No	Yes	Yes	No	No	No	1 year
Pathfinder II	Triclopyr	No	Yes	No	No	No	No	2-3 months
Pathway	2, 4-D + picloram	No	No	No	Yes	No	No	1 year
Round Up Pro	Glyphosate	Yes	Yes	Yes	Yes	No	No	None
Spike	Tebuthiuron	Yes	No	No	No	No	Yes	1-2 years
Tordon 101	Picloram + 2, 4-D	No	No	Yes	Yes	No	Yes	1 year
Tordon K	Picloram + 2, 4-D	No	No	Yes	Yes	No	Yes	1 year
Velpar	Hexazinone	No	No	Yes	No	No	Yes	3-6 months
Weedone 170	Diclorprop + 2, 4-D	No	Yes	Yes	Yes	Yes	No	2-4 weeks

¹Only Ally may be used for pasture

²Residual Activity is dependent upon rate applied and environmental conditions