

# Agronomy Advice

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August 2007

## BRUSH MANAGEMENT IN WISCONSIN

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Woody plants often interfere with the productivity and utility of both agricultural and non-crop lands. In pastures, brush reduces forage production, limits animals' ability to graze, and may physically injure or poison livestock. Along roadsides and in other right-of-way sites unmanaged brush reduces visibility, interferes with electric power lines, reduces drainage, and may create a fire hazard. Poisonous woody plants, such as poison ivy and poison oak, also present serious health problems to humans and multiflora rose and prickly ash thickets are nearly impenetrable to humans and livestock. Managing woody species can be difficult as they can often resprout and tolerate management methods. Within this document is an overview of the various methods of management for woody species.

### MANAGEMENT METHODS

*CULTURAL.* In general, the principles of suppressing weeds by maintaining a highly competitive mix of desired species also apply to woody species. However, once established, cultural practices alone are not sufficient to control brush. Nevertheless, efforts to maintain a dense, vigorously growing mix of desired broadleaf plants and grasses can prevent brush from germinating and becoming established. If possible locate the source of the infestation(s) and remove it to prevent further infestations. This may be difficult, as some species can move long distances by wildlife (e.g. buckthorn and multiflora rose) or by wind (e.g. box elder), but at a minimum nearby plants should be actively managed to reduce the chance of reinfestation.

*MECHANICAL* control measures vary in effectiveness from species to species. Oaks, maples, black cherry, mulberry, honey locust, and boxelder will usually resprout from the stump if cut. Ash, hickory, sycamore, alder, willow, and elm also resprout when cut as young saplings or small trees, but less so as they mature. 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 resprouting occurs when trees are cut while dormant and the least if they are cut after full leaf expansion. Cutting in the late summer may

also be an opportune time as sprouts may not develop enough in the fall to survive the winter. If possible cut all trees at the ground level to minimize stored energy available for resprouting.

*HERBICIDES* are often more effective, economical and require less labor per acre to control brush than mechanical means. Many times integrating herbicides with mechanical methods provides the best results. These include treating cut stumps to prevent resprouting or by cutting brush more than 6 to 8 feet tall and spraying the regrowth several weeks or months later. Herbicides differ in how they kill plants, how long they persist in the soil, and the range of plants they affect. Be aware of these characteristics before you select and apply any product. Follow these steps to achieve the desired results with herbicides for brush control:

1. *Identify the species to be controlled.* Woody plants vary in susceptibility to herbicide applications and accurate identification of the species to be killed is essential. Many brush species are easily recognized by leaf shape and bark characteristics. If you find brush that you cannot identify, collect a sample of the plant and take it to your local County Extension office, Department of Natural Resources Forester, or another plant expert in your vicinity.
2. *Select the preferred method of treatment.* Several methods exist, and the appropriate one for each situation must be determined (see Table 1). The possible methods of herbicide applications and their characteristics are:
  - a. Foliar applications wet the leaves or leaves and stems with spray solution applied evenly throughout the plant canopy. While most labels recommend spraying the foliage to the point that it is visibly “wet”, avoid applying excess herbicide that results in the spray solution dripping off the plant. Water is the carrier for foliar applications. Treatments are made from the time the leaves are fully expanded until they begin to turn color in the fall. Some products, like fosamine (Krenite), should only be applied in late summer or early fall. Plants should not be under moisture or heat stress when treated. The risk of particle drift to nearby sensitive vegetation is greater for these applications than for other methods.
  - b. Basal sprays are directed to the lower 12 to 18 inches of stems and trunks along with the collar area around the base of the plant. Basal treatments are effective on canes and small stems as well as on trees up to 6 inches in diameter. Diesel fuel, kerosene, and commercially available basal oil are carriers used to apply herbicides in basal treatments. Application can be made any time of the year except when snow is present. Some products are ready to be applied without mixing as basal sprays (ex. Pathfinder). While such products are convenient to use because no mixing is required, they may be more expensive than concentrated products. Basal treatments can be more labor intensive than foliar sprays but are useful in selectively removing undesirable species from stands of desirable trees.
  - c. Cut-stump treatments are made to freshly cut stems or stump surfaces. As with basal sprays, diesel fuel, kerosene or basal oil are the carriers except when using glyphosate products. Application should be made within one hour after cutting or control may be reduced. Generally the cut stump, remaining trunk and exposed roots are treated with

the herbicide solution. For larger diameter stumps, products can be applied to the outer edge of the cut surface (the cambium area) and the shoulder of the remaining trunk. Cut stump applications are effective year-round as long as no snow is on the ground and sap is not heavily flowing out of the cut surface. Similar to basal bark treatments, several ready-to-apply products for cut surface treatment are available.

- d. Injection, hack and squirt, or frill applications require less herbicide to kill standing trees than basal applications as the area that is treated is much smaller. Specific tools are required for injection methods, while hack and squirt or frill applications require the applicator to create a wound where the herbicide will be applied. When creating a wound, attempt to cut the bark in a manner that will allow the herbicide solution to pool and apply the herbicide soon after making the wound.
  - e. Soil applications of sprays, pellets, or concentrated liquids control many brush species. After application, rainfall moves the herbicide into the root zone where the herbicide is taken up by the roots and translocated to the shoots, stems and leaves where it kills the plant. The treatment is made to the base of the plant or under the drip line of target plants. Nearby trees may be injured or killed if their roots extend into the treated zone or the herbicide moves off site. Soil-applied herbicides usually remain active in the soil for several months or even years. Treatments can usually be made any time of the year when the ground is not frozen, but activity will only be seen after sufficient rain has fallen.
3. *Select the herbicide and the appropriate rate and carrier.* The site to be treated will influence the selection of the herbicide to be used (Table 1). Herbicide labels are seldom exact in giving a fixed rate for each species controlled. If the label suggests a “1 to 2% solution” start with a 1% solution and evaluate the results. If they are acceptable, this is the rate to use. If not, increase the rate, but never beyond the label’s recommendation.
  4. *Have the right equipment.* Matching the equipment to the type of application, nature of the terrain and size of the area to be treated is important. For large areas, commercial scale equipment may be required. In most of the state, commercial applicators can be found to make broadcast applications but these are not normally the best approach for brush control. If a tractor or truck boom sprayer is available, it could be fitted with a hose and hand wand to allow treating individual plants or clusters of plants with a foliar or cut surface application. Light weight spray tanks (15 to 30-gallon capacity) fitted with an electrical pump can be mounted onto an all terrain vehicle to reach brush on slopes or in wooded areas. And a standard 3- to 4-gallon backpack sprayer fitted with a durable and adjustable nozzle tip is adequate for many brush control situations.

## PRODUCT DESCRIPTIONS

A wide range of products are available to manage woody species, however it is important to understand what the active ingredient is and how it interacts with the environment you intend to use it in. Unfortunately it can be difficult to know the active ingredient of a herbicide as manufacturers are mixing two or more active ingredients or providing the same ingredients in

different formulations or different concentrations and giving each product a new name. Generic versions of products that have lost their patent are also now common (e.g. Roundup). The following section describes common active ingredients used for woody species management, including environmental restrictions. All products have limitations and precautions described on their labels, read and follow them closely.

*Dicamba* is a selective systemic herbicide available in several formulations, all of which contain dicamba as the active ingredient. Banvel and Clarity contain 4 lb/gal dicamba amine and are usually applied as a foliar spray. The formulation sold in Clarity and Vanquish reduces the risk of dicamba vapor movement from the target site. Banvel and Clarity are labeled for use in pastures and Vanquish is the non-crop version of dicamba. Weedmaster and Brash are premixes that contain 2.8 lb/gal 2,4-D amine and 1 lb/gal dicamba. Products can be applied as a foliar spray to control several brush species and are generally safe on grasses, but are used primarily on herbaceous vegetation.

*Fosamine* (sold as Krenite) is a selective, broadleaf, contact herbicide with almost no soil activity. It kills many brush species, but only affects treated vegetation so thorough coverage of the brush is essential. Krenite has little visible effect on plants the year of application, but the following season, plants do not leaf out and subsequently die.

*Glyphosate* is a systemic, non-selective herbicide with no soil activity that is registered for use on brush in pastures and right-of-way sites. Introduced as Roundup, it is now sold under many commercial names. Glyphosate controls many woody brush and tree species. Unfortunately, vegetation below and immediately around treated brush is usually killed if contacted with spray solution. While most brush are foliarly treated, a 50% solution of glyphosate with water applied to a cut surface (stump) can provide excellent control of some species (e.g. buckthorn). In pastures, no more than 10% of an acre can be treated per season with this method.

*Hexazinone* is a non-selective herbicide that is absorbed by plant roots killing plants by stopping photosynthesis. It is sold as Velpar and is applied to the soil below woody plants. Hexazinone is subject to leaching or horizontal movement from the application site, but is less persistent than Spike.

*Imazapyr* is a nonselective, systemic herbicide that prevents the production of specific amino acids. This herbicide will cause treated plants to stop growing soon after application, but complete kill may not be evident for several weeks. This herbicide can persist in the environment and provide residual control for many months if broadcasted. It can provide complete vegetation control of a wide range of brush and grassy weeds, and can be applied as a foliar, basal application, cut stump, hack and squirt, or frill application. Imazapyr is available in several products including Arsenal, Chopper, Stalker, and Habitat which are labeled for different methods of applications or sites.

*Metsulfuron* (sold as Ally, Cimarron, and Escort) is a selective, broadleaf herbicide that also kills plants by inhibiting the production of the same amino acids as imazapyr. Application rates are in ounces or fraction of ounces per acre so calibrate sprayers and measure the product very accurately. Metsulfuron at the appropriate rates is safe to grasses, but higher amounts have been documented to injure seedling and mature grasses. It is effective on brush only as a foliar spray that is applied during the growing season.

*Picloram* is a systemic, broadleaf herbicide that can persist in the environment for extended periods and is available in several formulations and brand names to control a wide range of brush species. Its use in Wisconsin is limited because no formulation allows picloram to be used in pastures east of the Mississippi River. Once applied, picloram remains in the soil for a considerable time (half life up to 300 days) and is highly soluble, thus picloram has the potential to leach into groundwater. Due to this, formulations containing picloram are restricted, requiring that the applicator have a pesticide applicator's license to purchase and use. Picloram is usually mixed with other products. Pathway is a ready-to-use product that contains 3% picloram and 11.2% 2,4-D. It is primarily used as a cut stump or injection treatment.

*Tebuthiuron* is a non-selective herbicide that controls nearly all brush and herbaceous species. This herbicide persists in the soil for several years so caution should be used when applying this herbicide. It is sold in several formulations, but only the Spike 20P formulation is labeled for use in pastures.

*Triclopyr* is a systemic, broadleaf herbicide that is the active ingredient in several products. Garlon 3A contains 3 lb/gal of triclopyr formulated as an amine and Garlon 4 and Remedy have 4 lb/gal of triclopyr formulated as an ester. Triclopyr has activity on all broadleaf species, but little effect on grasses. It is often applied in combination with 2,4-D or other herbicides, and several other products are now available with the same active ingredient.

Pathfinder II is a ready-to-use product that contains 0.75 lb/gal of triclopyr ester, the same active ingredient as in Garlon 4.

Crossbow is a premix that contains 2 lb/gal 2,4-D and 1 lb/gal triclopyr. Avoid applications when temperatures are high as both have the potential to vaporize and drift. Crossbow can be applied in many sites and by several methods for selective control of many brush and herbaceous broadleaf species.

The following tables summarize basic information on these products. Table 1 lists the approved sites and methods of application. Tables 2, 3 and 4 list the effectiveness of foliar, cut surface, and basal bark herbicide applications on common woody species found in Wisconsin. Product uses change occasionally so be sure to consult recent product labels and supplemental information for up-to-date registrations before making any herbicide application. References to pesticide products in this publication are for your convenience and are not an endorsement of one product over other similar products. Users are responsible for using pesticides according to the manufacturer's label directions. Labels change frequently. Obtain a current label before purchasing any product to ensure that it will be legal and effective for your situation.

Table 1. Approved sites and methods for specific herbicides used in managing woody weeds.

Herbicide		Area or site <sup>1</sup>					Method of Application <sup>1</sup>			
Active ingredient	Product name(s) <sup>2</sup>	pasture	right-of-way	forest	noncrop	ditch banks	foliage-stem	cut surface	basal	soil
Dicamba	Banvel, Clarity, Vanquish	Y	Y	Y	Y	Y	Y	Y	Y	N
Dicamba + 2,4-D	WeedMaster, Brash	Y	Y	N	Y	Y	Y	Y	N	N
Fosamine	Krenite	N	Y	N	Y	Y	Y	N	N	N
Glyphosate	Many	Y	Y	Y	Y	Y	Y	Y	N	N
Hexazinone	Velpar	N	Y	Y	Y	N	N	N	N	Y
Imazapyr	Arsenal, Habitat, Stalker <sup>3</sup>	N	Y	Y	Y	Y	Y	Y	Y	N
Metsulfuron	Ally, Cimarron, Escort	Y	Y/N <sup>4</sup>	Y	Y/N <sup>4</sup>	N	Y	N	N	N
Picloram	Tordon K	N	Y	Y	Y	N	Y	Y	N	N
Picloram + 2,4-D	Tordon 101, Pathway	N	Y	Y	Y	N	Y/N <sup>5</sup>	Y	N	N
Tebuthiuron	Spike	Y/N <sup>6</sup>	Y	N	Y	N	N	N	N	Y
Triclopyr	Garlon, Remedy, Pathfinder II <sup>7</sup>	Y/N	Y	Y	Y	Y	Y/N	Y	Y	N
Triclopyr + 2,4-D	Crossbow	Y	Y	N	Y	Y	Y	Y	Y	N
2,4-D ester/amine	Many	Y	Y	Y	Y	Y	Y	Y	Y	N

<sup>1</sup> Y = labeled for site or use; N = not labeled for site or use

<sup>2</sup> Other products may also be marketed with these ingredients

<sup>3</sup> Stalker is not labeled for foliar applications

<sup>4</sup> Escort is labeled for use in right-of-way and non-crop sites.

<sup>5</sup> Pathway is only labeled for cut surface and injection applications.

<sup>6</sup> Only Spike 20P is labeled for use in pastures

<sup>7</sup> Pathfinder II not labeled for foliar applications; only Remedy is labeled for use in pastures

Table 2. Effectiveness of **foliar herbicide** applications on selected woody species<sup>1</sup>.

Brush species	Dicamba	Dicamba + 2,4-D	Fosamine	Glyphosate	Imazapyr	Metolufuron	Picloram + 2,4-D	Triclopyr	Triclopyr + 2,4-D	2,4-D
Barberry, common	--	G	G	--	--	--	--	--	--	F
Box elder	--	F	PF	G	F	P	G	P	F	F
Brambles (blackberries, etc.)	PF	F	FG	FG	P	G	F	G	G	P
Buckthorn, common & glossy	--	PF	FG	--	--	--	G	G	--	PF
Chokecherry	G	G	PF	G	G	G	FG	G	G	PF
Elderberry	G	G	FG	G	G	P	G	G	FG	FG
Grapes, wild	F	F	G	F	G	FG	FG	G	G	FG
Greenbriar	PF	F	P	P	G	P	PF	PF	P	P
Hawthorn	PF	F	F	FG	FG	G	FG	G	F	PF
Honey locust	PF	P	F	P	G	P	G	FG	FG	P
Honeysuckle	F	F	F	FG	G	G	G	PF	G	F
Maple, silver	F	F	F	F	G	G	F	G	G	P
Mulberry, red & white	F	P	F	F	G	P	F	F	F	P
Multiflora rose	FG	FG	F	G	G	G	G	FG	G	F
Olive, autumn	F	F	--	FG	--	--	--	FG	FG	F
Olive, Russian	F	F	F	F	G	P	G	FG	F	F
Poison ivy	FG	F	P	FG	G	P	F	G	G	F
Poplars	G	F	F	F	F	P	F	FG	F	F
Prickly ash	PF	P	PF	--	--	--	--	G	F	P
Tree of heaven	P	P	FG	F	F	P	FG	G	FG	F
Sumac	FG	G	G	F	G	P	FG	G	G	F
Virginia creeper	PF	F	P	FG	G	G	FG	P	F	G
Willow	FG	G	PF	FG	G	G	G	FG	G	G

<sup>1</sup> These ratings are based on information from agency and university publications as well as the experience of professionals.

G = good; FG = fair to good; F = fair; PF = poor to fair; -- = no information.

It is assumed that all label guidelines are followed and that the environmental conditions are favorable for herbicide performance.



Table 3. Effectiveness of **cut surface herbicide applications** on selected woody species<sup>1</sup>.

Brush species	Dicamba	Glyphosate	Imazapyr	Picloram + 2,4-D	Triclopyr ester	Triclopyr + 2,4-D	2,4-D ester
Box elder	--	--	G	G	G	G	G
Buckthorn, common & glossy	--	G	--	--	G	G	--
Chokecherry	--	--	G	G	G	G	F
Elderberry	--	--	G	--	G	G	FG
Grapes, wild	--	--	G	--	P	--	F
Hawthorn	--	--	F	--	F	--	F
Honey locust	--	F	FG	G	G	FG	F
Honeysuckle	--	F	G	G	P	--	G
Maple, silver	FG	F	G	G	G	--	PF
Mulberry, red & white	--	--	G	--	F	--	P
Multiflora rose	--	G	G	F	G	G	F
Olive, autumn	--	--	G	--	FG	FG	--
Olive, Russian	F	--	G	--	FG	--	--
Poison ivy	--	G	G	PF	P	--	F
Poplar	--	F	G	F	F	--	G
Prickly ash	--	PF	FG	G	G	FG	--
Sumac	--	F	G	FG	G	--	F
Tree of heaven	--	--	FG	--	G	--	F
Virginia creeper	--	--	G	--	P	--	P
Willow	--	F	G	FG	FG	--	G

<sup>1</sup> These ratings are based on information from agency and university publications as well as the experience of professionals.

G = good; FG = fair to good; F = fair; PF = poor to fair; -- = no information.

It is assumed that all label guidelines are followed and that the environmental conditions are favorable for herbicide performance.



Table 4. Effectiveness of **basal bark herbicide applications** on woody species<sup>1</sup>.

Brush species	Dicamba	Imazapyr	Triclopyr ester	Triclopyr + 2,4-D	2,4-D
Box elder	G	G	P	--	G
Buckthorn, common & glossy	--	--	--	--	--
Chokecherry	G	G	G	--	F
Elderberry	G	G	G	G	FG
Grapes, wild	F	G	FG	--	F
Hawthorn	FP	--	F	FG	F
Honey locust	F	FG	G	--	F
Honeysuckle	G	G	P	--	G
Maple, silver	G	G	G	--	PF
Mulberry, red & white	F	G	F	--	P
Multiflora rose	F	G	F	--	F
Olive, autumn	--	--	--	--	--
Olive, Russian	F	G	FG	--	--
Poison ivy	FG	G	P	--	F
Poplar	--	--	--	G	--
Prickly ash	--	--	--	--	--
Sumac	F	G	G	--	F
Tree of heaven	--	FG	G	--	PF
Virginia creeper	--	G	P	--	P
Willow	--	G	FG	--	G

<sup>1</sup> These ratings are based on information from agency and university publications as well as the experience of professionals.

G = good; FG = fair to good; F = fair; PF = poor to fair; -- = no information.

It is assumed that all label guidelines are followed and that the environmental conditions are favorable for herbicide performance.