



BRUSH CONTROL IN ILLINOIS

Brush control is used to improve and maintain pastures, recreational areas, fencerows, drainage-ditch banks, rights-of-way, and other noncrop areas. Table 1 lists the common and scientific names of the brush species referred to in this chapter. Brush can be controlled by mechanical or chemical methods (herbicides) or by a combination of mechanical removal of the plant and herbicides either to control the plant or to minimize resprouting.

MECHANICAL CONTROL

Mechanical brush control is time-consuming and costly, but it may be necessary in areas where herbicide use is undesirable. Brush can be controlled by cutting, girdling, or grubbing. *Cutting brush* at ground level can be successful if sprouts are controlled by multiple cuttings or by the use of herbicides. Brush should be cut when food reserves in the roots are lowest (in the spring after full leaf) to minimize production of new sprouts. Any sprouts that develop should be removed until new sprouts no longer develop.

Girdling requires cutting a ring of bark and sapwood (the cambium layer) completely around the trunk of a woody plant to inhibit water and nutrient flow between roots and shoots. This practice is most effective in the summer months during sap flow. Girdling is practical only for scattered stands of large trees, as it is labor intensive.

Grubbing is the uprooting of plants by pulling or digging. Grubbing is difficult, time-consuming, and costly; but it can be effective if an adequate amount of the root system is removed. Bulldozers are often used to remove brush or trees and are most effective when fitted with special attachments for cutting off the tree

below the groundline to lift out the tree and most of the larger roots.

CHEMICAL CONTROL

Chemical brush control with herbicides is generally less time-consuming and labor intensive than mechanical control. However, chemical control does not remove the dead plants; and foliar “brownout,” or dead leaves, may be considered unsightly or offensive in areas of high visibility. An effective chemical brush-control program should be carefully planned and applied to minimize potential environmental and financial risk.

Brush herbicides are registered (labeled) only for certain areas and methods of application. Table 2 lists common brush herbicides and indicates the areas for which they are labeled, the appropriate application methods, and the general types of brush they control. Herbicides applied in pastures or where livestock graze must have grazing and harvest clearances. Some herbicides cannot be applied to aquatic areas, drainage ditches, or areas where they could run off or leach into aquatic areas. Information in this chapter has been taken from herbicide labels, so consult current labels because the information changes over time. Be sure to note and closely follow label restrictions and recommendations, and make applications carefully. Herbicides and their rates for use in brush control are listed in Table 3.

METHODS OF APPLICATION

Brush herbicides may be applied to the leaves (foliar treatment), onto or into the stem or trunk (basal-bark

The information in this chapter is provided for educational purposes only. Product trade names have been used for clarity, but reference to trade names does not imply endorsement by the University of Illinois; discrimination is not intended against any product. The reader is urged to exercise caution in making purchases or evaluating product information.

Label registrations can change at any time. Thus the recommendations in this chapter may become invalid. The user must read carefully the entire, most recent label and follow all directions and restrictions. Purchase only enough pesticide for the current growing season.

or cut-surface treatment), or to the soil (Table 2). The best choice depends on many factors, including the herbicide, the site, the season of the year, and the environment. Tables 4 to 7 describe the susceptibility of common brush species to various herbicides applied by foliar, basal-bark, cut-surface, cut-stubble, or soil application. Much of this information was taken from *Response of Selected Woody Plants in the United States to Herbicides* (Agriculture Handbook no. 493, USDA), but it has been modified to match new label and manufacturer information.

Foliar treatments are most effective when sprays are applied just after full-leaf expansion, during late spring or early summer; adequate foliar coverage is essential. Foliar herbicide effectiveness is often improved by adding spray adjuvants such as oils (see labels for information). Effectiveness is often reduced if rainfall occurs too soon after application. Adverse temperature and moisture stress also affect foliar penetration and translocation of the herbicide. Foliar applications may be made as low- or high-volume sprays, depending on the equipment, the need for spray coverage, the size of the area, and the sensitivity of the surrounding area to drift. Applications may be broadcast or made as directed sprays with spray guns. Foliar treatments should usually be limited to shrubs or small trees because the drift potential is greater with tall trees.

Drift potential changes with the weather, the choice of herbicide, the herbicide formulation, and the spray equipment. Do not spray when the wind velocity is greater than 5 to 10 miles per hour or when the wind is blowing toward sensitive desirable plants or critical areas. Do not apply low-volume sprays (smaller droplets) during periods of high temperature or low humidity. Low-pressure sprayers have less drift potential than high-pressure sprayers. Specialized nozzles or spray thickeners (drift-reduction agents) may be used to reduce small-droplet formation and spray drift. Certain herbicide formulations volatilize and should not be used when minimizing drift is crucial. Some herbicide labels list sensitive species and critical areas that must be protected from drift or direct application. *Read and follow label precautions about spray or vapor drift to susceptible plants or sensitive areas.*

Basal-bark treatments are more labor intensive than foliar treatments, but they are useful as a technique for selectively removing undesirable species from stands of desirable trees. These treatments are used to control brush with trunks or stems less than 5 inches in diameter. Basal-bark treatments may be made throughout the year except when the bark is very wet or covered with ice or when the depth of snow prevents application. However, dormant-season

application may be desirable to reduce drift complaints and concerns about foliar brownout.

Oil-soluble, usually ester, formulations of herbicides are applied in diesel oil or kerosene to penetrate the bark. Penetrating oils with less offensive odors are available, but they are more expensive. Standard basal-bark treatments are applied around the lower 12 to 15 inches of the stem, including the root collar and exposed roots. Conventional basal-bark technique uses 1 to 3 percent herbicide in oil, while the low-volume basal-bark technique uses 20 to 30 percent herbicide in oil. Smaller bands (broad band or thin line) using a higher concentration of herbicide in oil can be effective on many species. Follow instructions on the herbicide label.

Cut-surface treatments are used to control trees having thick bark or trunks greater than 5 inches in diameter. Application may be made anytime except during heavy sap flow in the spring. Dormant-season application minimizes the potential for drift and foliar brownout complaints. The herbicide is applied into frills or notches cut around the trunk, going through the bark to penetrate at least ½ inch into the sapwood. Treat cuts within 2 to 3 hours of cutting. Special equipment often is used to cut and inject the herbicide into the tree in one operation, reducing labor cost and drudgery. You can minimize sprouting from freshly cut stumps by treating the area next to the bark (cambium) and drenching the root collar (soil at ground level) soon after cutting.

Cut-stubble treatments combine cut-surface and soil treatment. Herbicide is broadcast in a water carrier to cut stems and exposed ground soon after a mowing operation. Applications may be made anytime during the year except when the ground is frozen or completely saturated with water. Apply carefully to minimize drift or runoff to off-target species or sensitive areas.

Soil treatments, sometimes called basal-soil, are applied within the dripline of the target species so the herbicide can move by rainfall into the root zone. Soil treatments are applied as sprays, granules, or pellets. Because the soil-treatment herbicides are quite persistent and mobile in water, do not use them where they can run off toward or leach into surface- or underground water sources. Do not apply them to frozen ground or land sloping toward nontarget species where lateral movement will be a problem. The killing of nontarget species has been one of the major problems with soil treatments.

BRUSH HERBICIDES

Some brush herbicides are selective, leaving grasses unharmed while controlling brush and broadleaf

weeds. These herbicides can injure desirable broadleaf plants if they are allowed to drift, run off, or leach out of the treatment area. Nonselective herbicides are potentially hazardous to desirable plants, but they may be used as spot treatments to control brush if applied carefully. If possible, dedicate application equipment to a single use or be sure to clean the equipment thoroughly. Most labels have recommendations for type of application equipment and equipment cleaning. Brush herbicides may be growth-hormone regulators, foliar phosphono herbicides, ALS amino acid-synthesis inhibitors, or photosynthetic inhibitors. Each type has specific advantages and disadvantages.

Growth-hormone regulator herbicides are absorbed by foliage and plant roots and translocated to growing areas (meristems). These herbicides include 2,4-D, dichlorprop, dicamba, picloram, and triclopyr, plus many mixtures. Prevent drift or runoff into sensitive areas because minute amounts may injure highly sensitive species. Ester formulations are more subject to vapor drift than are amine formulations although dicamba amine can hydrolyze and then volatilize. Vapors can move far from the site of application. Do not apply any of these herbicides when the temperature is expected to exceed 85°F within several days. Ester formulations may be applied in oil carriers for basal-bark treatments, while amine formulations are preferable for injection and cut-surface treatments.

Foliar treatments are often more subject to drift than are other methods of application. Symptoms of injury from growth-hormone herbicides are usually foliar deformities (strapping or cupping) and stem or petiole twisting (epinasty). These herbicides have foliar and soil activity, so do not treat areas where the herbicide may leach or run off and contact the roots of desirable species. Closely follow all restrictions on the labels.

2,4-D, dichlorprop, and dicamba, as well as their mixtures, are registered for brush control on drainage-ditch banks, rights-of-way, and noncrop areas. Dicamba and 2,4-D also are registered for brush control in pastures, but follow label restrictions on grazing. 2,4-D is sold under many trade names as esters, amines, or salts.

DPD Ester Brush Killer is a dichlorprop ester plus 2,4-D ester formulation, while **Brushmaster** is a mix of 2,4-D ester, dichlorprop ester, and dicamba amine. **Banvel, Clarity, Sterling, or Vanquish** (dicamba) and **Weedmaster** or **Brash** (dicamba + 2,4-D) may be used for brush control in noncropland or pasture. Clarity and Vanquish are the diglycoylamine formulations of dicamba, with fewer volatility problems than Banvel, which is a dimethylamine.

Tordon K (picloram) and **Tordon 101 Mixture, Grazon P + D, or Pathway** (picloram + 2,4-D) contain the amine formulation of picloram. Tordon K and Tordon 101 Mixture are restricted use pesticides (RUPs). Pathway, however, is a ready-to-use (RTU), general use herbicide for cut-surface or injection application only.

Garlon 3A (triclopyr amine); **Garlon 4, Pathfinder II, or Remedy** (all esters); and **Crossbow** (triclopyr ester + 2,4-D ester) all contain triclopyr, which is much less persistent than picloram. All can be used for noncropland brush control. Pathfinder II is an RTU formulation for basal-bark or cut-stump treatment. Crossbow may also be used in grass pastures as a foliar treatment. Check the label for grazing and haying restrictions.

Foliar phosphono herbicides such as fosamine and glyphosate are applied to the foliage because they have little soil activity. **Krenite S** (fosamine) may be used where foliar brownout is a problem because treated foliage does not immediately die. It goes through normal fall coloration and leaf drop; but, the next spring, susceptible plants fail to refoliate, and they die. Thorough spray coverage is required for complete control. A spray directed to only part of a susceptible species results in a trimming effect without killing the entire plant.

Glyphosate (many formulations) may be used for foliar treatments. There are many different glyphosate formulations; see labels for which ones are used for noncropland, forestry, utility rights-of-way, and general use (including cropland). Some trade names for these products are Roundup Pro, Accord, Glyfos, Touchdown, Credit, and Roundup Weathermax. The glyphosate formulation used for aquatic applications is Rodeo. Glyphosate is nonselective, so it should be applied as a spot treatment for brush where loss of ground cover is detrimental. Some formulations can be used for spot treatment of brush in pastures, but check the product label for grazing restrictions.

ALS amino acid-synthesis inhibitors for brush control are imazapyr and metsulfuron. They control both herbaceous and woody broadleaf plants and may suppress or kill some grass species, so read labels carefully before applying near desirable species or sensitive areas. Plants absorb imazapyr and metsulfuron through both foliage and roots and translocate them to growing (meristematic) areas. Growth inhibition of susceptible species occurs rapidly, but typical symptoms of action may not be visible for some time after application. Ultimate effects on brush species may not occur until the season after treatment.

Arsenal, Chopper, and Stalker contain imazapyr. Arsenal is for general noncropland use, Arsenal AC for forestry use. Chopper and Stalker are registered for noncropland basal-bark and cut-surface brush treatments. Imazapyr controls a broad spectrum of woody and herbaceous (broadleaf and grass) species. Arsenal may be applied pre- or postemergence; but to control perennials, including brush species, postemergence is the method of choice.

Metsulfuron is sold as **Escort** for industrial use and as **Ally** and **Cimarron** for pasture use. Apply as a foliar treatment for control of selected brush species (Table 2). For greatest effectiveness, complete spray coverage of foliage and stems is necessary.

Photosynthetic inhibitor (PSI) herbicides used for soil-applied brush control include bromacil, hexazinone, and tebuthiuron. Because these herbicides translocate only in the xylem, they are generally soil applied for brush control; but, when applied to foliage, they provide contact-type activity, especially when a surfactant is added. Injury symptoms on brush are generally slow to appear from soil application because the herbicides require rainfall to infiltrate the soil and to be taken up by the roots. These herbicides are non-selective, so avoid application to the foliage or near the root zone of desirable plant species. Spot treatment is necessary where bare ground is undesirable.

Hyvar X (bromacil) may be soil applied for brush control. Hyvar X-L, a liquid formulation, may be soil applied undiluted with a special handheld applicator that delivers a predetermined volume when triggered. Hyvar X-L also is registered for soil-applied spot treatment of brush on ditch banks.

Velpar (hexazinone) is available as Velpar L or Velpar DF for spray application to soil in industrial or forestry areas. Velpar is registered for use in alfalfa. Thus, treated areas may be grazed or cut for hay when label restrictions are followed.

Spike (tebuthiuron) is available as Spike 80DF for spray application or Spike 20P for direct soil application of pellets. Spike 20P may be used for spot treatment of brush in pastures, but observe grazing and haying restrictions on the label.

Do not apply PSI herbicides to brush standing in water or spray toward water. Do not apply these herbicides to frozen soil or to areas sloping toward water or desirable species because these herbicides are quite mobile and persistent.

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Table 1. Common and scientific names of brush species

Common names	Scientific names
Ash, white	<i>Fraxinus americana</i>
Birch	<i>Betula</i> spp.
Box elder	<i>Acer negundo</i>
Brambles (blackberry, etc.)	<i>Rubus</i> spp.
Cedar, eastern red	<i>Juniperus virginiana</i>
Cherry, black and choke	<i>Prunus serotina</i> , <i>P. virginiana</i>
Cottonwood	<i>Populus deltoides</i>
Crabapple	<i>Malus</i> spp.
Elderberry	<i>Sambucus canadensis</i>
Elm	<i>Ulmus</i> spp.
Grapes, wild	<i>Vitis</i> spp.
Greenbriar	<i>Smilax</i> spp.
Hackberry	<i>Celtis</i> spp.
Hawthorn	<i>Crataegus</i> spp.
Honeylocust	<i>Gleditsia triacanthos</i>
Honeysuckle	<i>Lonicera</i> spp.
Locust, black	<i>Robinia pseudoacacia</i>
Maple, red	<i>Acer rubrum</i>
Maple, silver or sugar	<i>A. saccharinum</i> , <i>A. saccharum</i>
Mulberry, red and white	<i>Morus rubra</i> , <i>M. alba</i>
Oak	<i>Quercus</i> spp.
Olive, Russian	<i>Elaeagnus augustifolia</i>
Osage orange (hedge)	<i>Maclura pomifera</i>
Persimmon, common	<i>Diospyros virginiana</i>
Plum, wild	<i>Prunus</i> spp.
Poison ivy, poison sumac	<i>Toxicodendron radicans</i> , <i>T. vernix</i>
Rose, multiflora	<i>Rosa multiflora</i>
Sassafras	<i>Sassafras albidum</i>
Sumac	<i>Rhus</i> spp.
Tree-of-heaven	<i>Ailanthus altissima</i>
Trumpetcreeper	<i>Campsis radicans</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Willow	<i>Salix</i> spp.

Table 2. Label clearances for common brush herbicides

Brush herbicide	Area or site							Application method					Type of brush	
	CRP areas	Pasture	Fencerows	Forest	Ditch bank	Rights-of-way	Noncrop	Foliar-stem spray	Cut-surface or injection	Conventional basal ^a	Low-volume basal ^a	Soil	Deciduous	Coniferous
2,4-D amine, ester	x	x	x	x	x	x	x	x	x	x ^a	x ^a	—	x	—
DPD Brush Killer	—	—	x	x	x	x	x	x	x	x	x	—	x	x
SuperBrush Killer or Brushmaster	—	—	x	—	x	x	x	x	x	x	—	—	x	x
Brash/Weedmaster	x	x	x	—	x	x	x	x	x	—	—	—	x	x
Dicamba (many) ^b	x	x	x	—	x	x	x	x	x	x ^c	—	—	x	—
Tordon K	—	—	—	x	—	x	x	x	—	—	—	x	x	x
Pathway (RTU)	—	—	x	x	—	x	x	—	x	—	—	—	x	x
Tordon 101 Mixture	—	—	—	x	—	x	x	x	x	—	—	x	x	x
Grazon P + D	x	x	—	—	—	—	x	x	—	—	—	—	x	—
Garlon	x	—	x	x	x	x	x	x	x	x ^a	x ^a	—	x	x
Remedy	x	x	x	x	x	x	x	x	x	x ^a	x ^a	—	x	x
Crossbow	x	x	x	—	x	x	x	x	—	x	x	—	x	x
Pathfinder II (RTU)	—	—	—	x	x	x	x	—	—	—	x	—	x	x
Krenite S	—	—	—	—	x	x	x	x	—	—	—	—	x	x
Glyphosate ^d	x	x ^e	x	x	x	x	x	x	x	—	—	—	x	x
Ally XP, Cimarron	x	x	—	—	—	x	x	x	—	—	—	x	x	x
Arsenal	—	—	x	x ^f	x	x	x	x	x	—	—	—	x	—
Escort XP	x	—	x	x	—	x	x	x	—	—	—	x	x	x
Stalker/Chopper	x	—	x	x	x	x	x	—	x	x	x	—	x	—
Hyvar-X or X-L	—	—	—	—	—	x	x	—	—	—	—	x	x	x
Spike	x	x ^g	x	—	—	x	x	—	—	—	—	x	x	x
Velpar	—	—	—	x	—	x	x	x	—	—	—	x	x	—

x = labeled for use; — = not labeled for use.

^aOil-soluble ester forms only.

^bThere are many dicamba formulations.

^cNot for pasture use.

^dMany trade names (for example, Accord, Roundup Pro, Touchdown, etc.). Be sure to read and follow label directions.

^eSpot treatment only (10% of each acre).

^fUse AC formulation.

^gSoil application only.

Table 3. Herbicides and rates for brush control

Trade name and form	Generic name and form	Rate for foliar spray, ground application ^a		Rate for basal-bark per 100 gal. ^c
		Per acre	Per 100 gal. ^b	
Arsenal 2S	imazapyr	2–3 qt	0.5–1 gal.	— ^d
Brushmaster	dichlorprop + 2,4-D (esters) + dicamba amine	1–2 gal.	1–2 gal.	4 gal.
Crossbow 3E	triclopyr + 2,4-D (esters)	1.5–4 gal.	1–1.5 gal.	1–4 gal.
Dicamba (many)	dicamba	1–2 qt	— ^d	— ^d
DPD Brush Killer	dichlorprop + 2,4-D (esters)	1–2 gal.	1–1.5 gal.	3–4 gal.
Escort 60DF	metsulfuron	1/3–1 oz	1–3 oz	— ^d
Garlon 3A	triclopyr, amine	2–3 gal.	0.5–1 gal.	— ^d
Garlon 4E/Remedy	triclopyr, ester	0.5–2 gal.	1–2 gal.	1–5 gal.
Glyphosate (many) ^e	glyphosate	4–8 pt	1–2.5 gal.	1–2 gal.
Grazon P + D	picloram + 2,4-D (amines)	3 qt–1 gal.	2 gal.	— ^d
Hyvar X 80WP	bromacil	7–15 lb	— ^d	— ^d
Hyvar X-L 2S	bromacil	2.5–6 gal.	— ^d	— ^d
Krenite S, UT	fosamine	1.5–6 gal.	1.5–3 gal.	— ^d
Pathfinder II	triclopyr ester	— ^d	— ^d	RTU ^f
Spike 20P	tebuthiuron	10–30 lb	— ^d	— ^d
Stalker 2S	imazapyr	— ^d	— ^d	0.75–1 gal.
Tordon K	picloram	1–2 qt	— ^d	— ^d
Tordon 101	picloram + 2,4-D (amines)	1–2 gal.	— ^d	— ^d
Velpar 2L	hexazinone	2–4 gal.	— ^d	— ^d
Velpar 75DF	hexazinone	5–10 lb	— ^d	— ^d
Weedmaster 3.87S	dicamba + 2,4-D (amines)	2.0 gal.	— ^d	— ^d
Weedone LV4	2,4-D ester	1–2 gal.	2 gal.	— ^d

^aSee label for aerial application.

^bFoliar mix: herbicide + water (+ 1 gal. oil + emulsifier if label allows).

^cBasal-bark spray mix: herbicide + fuel oil total.

^dNot labeled for this purpose.

^eRates based on 3 lb a.e. per gallon formulations.

^fRTU = Ready-to-use formulation; apply undiluted.

Table 4. Foliar herbicide treatment: Susceptibility of common brush species

	2,4-D	Arsenal	Brushmaster	Crossbow	dicamba ^a	DPD Brush Killer	Escort	Garlon/ Remedy	glyphosate ^b	Hyvar	Krenite S	Tordon 101/ Grazon P + D	Weedmaster
Ash, white	P	G	F	F	F	P	G	F	F	F	F	P	P
Birch	F	P	G	F	G	F	P	F	F	F	G	F	F
Box elder	F	F	G	F	—	F	P	P	FG	G	FP	G	F
Brambles (blackberry, etc.)	P	P	F	G	F	F	G	G	F	F	FG	F	F
Cedar, eastern red	P	P	P	P	FP	P	F	P	P	F	P	F	P
Cherry, black and choke	FP	G	F	FG	G	F	G	FG	G	G	F	FG	G
Cottonwood, eastern	FG	G	G	FG	G	F	F	G	F	G	FG	G	G
Crabapple	F	—	G	FG	G	G	—	FG	G	—	—	G	G
Elderberry	FG	G	G	FG	G	F	P	G	G	G	FG	G	G
Elm, American and slippery	F	P	F	F	F	F	G	F	F	F	F	F	F
Grapes, wild	FG	G	FG	G	F	FG	F	G	G	—	G	FG	F
Greenbriar	P	G	F	P	FP	P	P	FP	P	P	P	FP	F
Hackberry	FP	P	F	G	F	F	P	G	F	F	FP	FG	F
Hawthorn	FP	G	F	F	FP	P	G	F	FG	F	F	FG	F
Honeylocust	P	G	F	FG	FP	F	P	FG	P	F	F	G	P
Honeysuckle	F	G	F	FP	F	G	F	FP	F	F	F	G	F
Locust, black	F	P	G	G	G	FG	F	G	F	P	G	F	G
Maple, red	P	G	P	F	FP	P	F	FG	F	F	F	F	P
Maple, silver or sugar	P	G	F	G	F	—	G	G	F	F	F	F	F
Mulberry, red or white	P	G	F	F	F	P	P	F	P	F	F	F	P
Oak	P	G	F	F	F	F	FG	FG	FG	F	G	P	F
Olive, Russian	F	G	—	F	F	—	P	FG	F	—	F	G	F
Osage orange (hedge)	P	P	P	F	FP	P	F	F	P	F	F	F	P
Persimmon, eastern	F	F	F	F	FG	P	P	F	F	P	F	FG	FP
Plum, wild	FG	G	FG	F	FG	F	P	FG	G	—	FG	G	F
Poison ivy	F	G	F	G	FG	F	P	G	F	F	P	F	F
Rose, multiflora	F	G	G	G	G	G	F	FG	G	F	F	G	G
Sassafras	F	G	F	F	F	F	P	F	F	F	F	G	F
Sumac	F	G	G	G	FG	G	P	G	F	F	G	FG	G
Tree-of-heaven	F	F	F	FG	P	F	P	G	F	F	FG	FG	P
Trumpetcreeper	P	FP	FP	P	FG	P	P	P	F	P	F	P	F
Virginia creeper	FG	G	G	F	FP	F	G	F	F	G	P	F	F
Willow	G	G	G	G	FG	G	G	FG	F	F	F	G	G

G = good; F = fair; P = poor; FG = fair to good; FP = fair to poor; — = no information available. Data are adapted from *Response of Selected Woody Plants in the United States to Herbicides*, Agriculture Handbook no. 493, U.S. Department of Agriculture, and from herbicide companies.

^aThere are many dicamba formulations.

^bThere are many glyphosate formulations.

Table 5. Conventional basal-bark herbicide treatment: Susceptibility of common brush species

	2,4-D ester	Brushmaster	dicamba ^a	Garlon 4/ Remedy	Stalker	Weedone CB
Ash, white	P	FG	FG	G	G	P
Birch	G	F	G	G	G	F
Box elder	G	G	G	P	G	G
Brambles (blackberry, etc.)	FG	G	G	G	F	F
Cedar, eastern red	P	F	FG	F	P	P
Cherry, black and choke	F	F	G	G	G	F
Cottonwood, eastern	G	G	G	G	G	F
Crabapple	FG	G	G	—	—	FG
Elderberry	FG	G	G	G	G	FG
Elm, American and slippery	FG	FG	G	F	FG	F
Grapes, wild	—	F	F	FG	G	F
Greenbriar	F	F	P	P	G	P
Hackberry	G	F	FG	G	P	G
Hawthorn	F	F	FP	F	—	F
Honeylocust	F	F	F	G	FG	FP
Honeysuckle	G	G	G	P	G	F
Locust, black	F	F	FG	FG	P	F
Maple, red	P	P	G	FG	G	P
Maple, silver or sugar	FP	F	G	G	G	FP
Mulberry, red or white	P	FP	F	F	G	P
Oak	P	G	G	G	G	FG
Olive, Russian	—	—	F	FG	G	—
Osage orange (hedge)	F	F	P	P	P	F
Persimmon, eastern	FP	F	G	F	G	P
Plum, wild	FG	FG	G	P	G	FG
Poison ivy	F	F	FG	P	G	F
Rose, multiflora	F	FG	F	F	G	F
Sassafras	FG	FP	FG	FG	G	F
Sumac	F	F	G	G	G	G
Tree-of-heaven	FP	F	F	G	FG	F
Trumpet creeper	P	G	FG	P	G	P
Virginia creeper	P	G	—	P	G	P
Willow	G	G	—	FG	G	F

G = good; F = fair; P = poor; FG = fair to good; FP = fair to poor; — = no information available. Data are adapted from *Response of Selected Woody Plants in the United States to Herbicides*, Agriculture Handbook no. 493, U.S. Department of Agriculture, and from herbicide companies.

^aThere are many dicamba formulations.

Table 6. Injection, cut-surface, and cut-stubble herbicide treatment: Susceptibility of common brush species

	2,4-D amine	Arsenal/ Stalker	Brushmaster	dicamba ^a	DPD Brush Killer	Garlon 3A	Pathway
Ash, white	P	G	FG	G	F	F	FG
Birch	F	G	FG	G	FG	F	FG
Box elder	F	G	F	—	F	G	G
Cedar, eastern red	P	P	F	FG	F	FP	F
Cherry, black and choke	G	G	FG	—	FG	FG	G
Cottonwood, eastern	G	G	G	—	F	G	G
Crabapple	—	—	G	—	—	G	G
Elderberry	F	G	G	—	F	FG	G
Elm, American and slippery	G	F	FG	—	F	F	F
Grapes, wild	FG	F	FP	—	P	FG	FG
Greenbriar	P	P	F	—	F	P	P
Hackberry	F	P	F	—	F	G	G
Hawthorn	F	F	F	—	F	F	F
Honeylocust	F	F	G	—	G	F	G
Honeysuckle	P	G	F	—	F	P	G
Locust, black	G	F	G	—	FG	G	G
Maple, red	P	G	F	F	F	G	F
Maple, silver or sugar	P	G	F	FG	F	G	G
Mulberry, red or white	F	G	F	—	F	F	F
Oak	P	G	G	P	G	G	F
Olive, Russian	—	G	—	F	—	G	G
Osage orange (hedge)	F	P	F	—	F	F	F
Persimmon, eastern	F	G	F	G	F	F	F
Plum, wild	F	G	F	—	F	FG	F
Poison ivy	F	G	FG	—	FG	G	F
Rose, multiflora	FP	G	G	—	G	F	F
Sassafras	G	G	F	—	F	F	F
Sumac	F	G	G	—	G	G	F
Tree-of-heaven	F	FG	F	—	F	G	G
Trumpetcreeper	F	G	F	—	—	P	P
Virginia creeper	P	G	F	—	—	F	F
Willow	G	G	F	—	FG	FG	G

G = good; F = fair; P = poor; FG = fair to good; FP = fair to poor; — = no information available. Data are adapted from *Response of Selected Woody Plants in the United States to Herbicides*, Agriculture Handbook no. 493, U.S. Department of Agriculture, and from herbicide companies.

^aThere are many dicamba formulations.

Table 7. Soil herbicide treatment: Susceptibility of common brush species

	Hyvar X-L	Spike 20P	Velpar
Ash, white	F	F	F
Birch	FG	FG	F
Box elder	G	G	FG
Brambles (blackberry, etc.)	F	F	F
Cedar, eastern red	F	FP	F
Cherry, black and choke	FG	FG	FG
Cottonwood, eastern	FG	G	G
Crabapple	F	—	F
Elderberry	G	G	G
Elm, American and slippery	F	FG	F
Grapes, wild	G	G	FG
Greenbriar	P	F	P
Hackberry	FG	G	G
Hawthorn	P	F	G
Honeylocust	F	FG	G
Honeysuckle	F	G	G
Locust, black	G	F	G
Maple, red	F	F	F
Maple, silver or sugar	F	FG	G
Mulberry, red or white	F	G	FG
Oak	F	G	FG
Olive, Russian	—	FG	FG
Osage orange (hedge)	F	P	FG
Persimmon, eastern	F	P	F
Plum, wild	G	G	FG
Poison ivy, poison sumac	G	FP	FG
Rose, multiflora	F	G	G
Sassafras	F	P	FP
Sumac	G	G	F
Tree-of-heaven	FG	G	F
Trumpet creeper	P	F	P
Virginia creeper	P	FG	F
Willow	FG	F	FG

G = good; F = fair; P = poor; FG = fair to good; FP = fair to poor; — = no information available. Data are adapted from *Response of Selected Woody Plants in the United States to Herbicides*, Agriculture Handbook no. 493, U.S. Department of Agriculture, and from herbicide companies.

