

Controlling Undesirable Trees, Shrubs and Vines in Your Woodland

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Timber stand improvement is the removal or deadening of undesirable vines, shrubs and trees in a forest stand. It is a major forest management tool to help woodland owners achieve their management objectives. Once ownership objectives are identified, the less desirable trees can be removed to favor the growth of those that better satisfy the owner's objectives (e.g., quality timber, wildlife habitat, etc.). At the same time, woody plants that pose a threat to human health or safety, such as poison ivy, can be eliminated. Several timber stand improvement techniques can also be used to develop standing dead trees to provide various types of wildlife habitat such as perches, dens and foraging trees for animals and birds.

Timber stand improvement can be accomplished by cutting the less desirable woody vegetation or by killing it in place. Undesirable trees with commercial value can be sold, making the timber stand improvement operation an income-generating forest management activity. Some undesirable trees may be used for lumber, firewood or other products. Grapevines might be used for wreaths. In most timber stand improvement operations, however, the undesirable vegetation is of little economic value or use. Although it can be cut and left in the woods, the safest and most efficient way to remove undesirable vegetation is often to kill the trees, shrubs or vines and leave them standing.

The most effective method for killing standing trees, shrubs and vines will usually involve the use of an herbicide. For those who prefer not to use pesticides, cutting, frilling or girdling can be used without herbicides. However, physical methods of deadening standing trees that do not use herbicides are generally less dependable (particularly with hard-to-kill species such as red maple, hickories and dogwoods) and require longer to be effective than those that incorporate herbicides into the treatment.

Selected Timber Stand Improvement Techniques

The remainder of this fact sheet discusses when and how to use four commonly applied timber stand improvement techniques: frilling or girdling, spaced cuts or injection, basal bark spraying, and cut stump application. Tables 1-5 present herbicides commonly used with each method, along with brief recommendations for their use. These recommendations are not complete instructions; they are provided to help you select among the herbicides. It is essential that you read the entire label before using any herbicide. The label contains complete instructions for use, along with other valuable information such as personal and environmental safety considerations and procedures. Many of the labels also list information about the effectiveness of the herbicide in

controlling different species of trees, shrubs and vines. All herbicides are not equally effective in controlling different species.

Herbicides, like all pesticides, are approved (labeled) for specific uses by the Environmental Protection Agency. These approved uses are listed and described on the pesticide's label. The herbicides listed in Tables 1-5 were appropriately labeled at the time of publication (Winter 1993-94). Because pesticide labeling may change at any time, you should verify that a particular herbicide is still labeled for your intended use.

Frilling or Girdling

Girdling and frilling are methods of killing standing trees that may be done with or without an herbicide.

Girdling involves cutting a groove or notch into the trunk of a tree to interrupt the flow of sap between the roots and crown of the tree (Figure 1). The groove must completely encircle the trunk and should penetrate into the wood to a depth of at least 1/2 inch, preferably 1 to 1 1/2 inches on larger trees. Girdling can be done with an ax, hatchet or chainsaw. When done with an ax or hatchet, the girdle is made by striking from above and below along a line around the trunk so that a notch of wood and bark is removed. The width of the notch varies with the size of the tree. Effective girdles may be as narrow as 1 or 2 inches on small-diameter trees, and as wide as 6 or 8 inches on very large-diameter trees. When a chain saw is used to girdle, usually two horizontal cuts between 2 and 4 vertical inches apart are made completely around the tree (Figure 2).

Frilling is a variation of girdling in which a series of downward angled cuts are made completely around the tree, leaving the partially severed bark and wood anchored at the bottom (Figure 3). Frilling is done with an ax or hatchet.

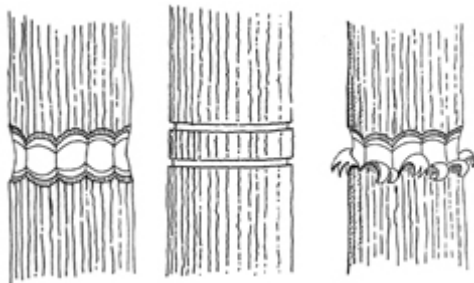


Figure 1. Figure 2. Figure 3.

By themselves, girdling and frilling are physical methods to deaden trees that require very little equipment and may be done without herbicides. Both techniques require considerable time to carry out, particularly with an ax or hatchet. Girdling with a chain saw is much faster. The effectiveness of girdling and frilling depends on the tree species and on the size and completeness of the girdle or frill. To be effective, girdles and frills

must completely encircle the tree. Because frills can heal-over more easily, girdling is usually more effective.

Table 1. Herbicides commonly used when girdling or frilling undesirable trees in a timber stand improvement operation. Column one contains the common names of frequently used herbicides; column two contains one or more examples of commonly used brands along with their manufacturers or distributors; and column three contains a brief summary of use recommendations.

COMMON NAMES	BRAND NAMES (MANUFACTURER OR DISTRIBUTOR)	RECOMMENDATIONS
Dicamba	Banvel CST (Sandoz or Riverdale)	Spray or paint cut surface of girdle with undiluted Banvel CST.
Glyphosate	Accord (Monsanto)	Spray or paint Accord on the cut surface of girdle or frill at a rate of 1 ml for each 2 inches of trunk diameter, either undiluted or mixed with water at a concentration of no less than 25 percent. For best results, application should be made during periods of active growth and full leaf expansion.
	Roundup (Monsanto)	Spray or paint Roundup on the cut surface of girdle or frill at a rate of 1 ml for each 2 to 3 inches of trunk diameter, either undiluted or mixed with water at a concentration of no less than 50 percent. For best results, application should be made during periods of active growth and full leaf expansion.
Imazapyr	Chopper (American Cyanamid)	Mix 8-12 oz. of Chopper in one gallon of water, diesel oil, or penetrating oil (such as Cide-Kick, Cide-Kick II, or ArborChem Basal Oil) and spray or paint mixture on cut surface of girdle or frill. Apply enough of the spray mixture to completely wet the cut surface.
Picloram + 2,4-D	Pathway, Tordon RTU (DowElanco)	Spray or paint the girdle or frill with undiluted Pathway or Tordon RTU. Apply enough herbicide to wet the cut surface completely.
	Tordon 101*, Forestry Tordon 101* (DowElanco)	Spray or paint the cut surface of the girdle with Tordon 101 or Forestry Tordon 101 diluted 1:1 with water. Apply enough of the spray mixture to completely wet the cut surface.
Triclopyr	Garlon 3A (DowElanco)	Wet the cut surface of a single girdle that completely encircles the tree with Garlon 3A, undiluted or diluted 1:1 with water.

2,4-D + 2,4-DP Ester	Weedone 170 (Rhone-Poulenc)	Fill frill with mixture of Weedone 170 or Brush Killer 2D + 2DP and oil mixed at a rate of 3.8 to 5.1 ounces of herbicide in 1 gallon of oil.
	Brush Killer 2D + 2DP (Riverdale)	
2,4-D + 2,4-DP Amine	Riverdale 2D + 2DP Amine (Riverdale)	Fill fresh frill with mixture equivalent to 3.8-5.1 oz. of Riverdale 2D + 2DP Amine in 1 gallon of water.
2,4-D + 2,4-DP Ester + Dicamba	Acme Super Brush Killer, BK 800 (pbi/Gordon)	Fill fresh frill full with mixture equivalent to 3.8-5.1 oz. of Acme Super Brush Killer or BK 800 in 1 gallon of diesel oil or mineral oil.
* Restricted Use Pesticide, must be certified applicator to purchase and use.		

The effectiveness of both girdling and frilling can be increased by using herbicides (Table 1). With frilling and girdling, water soluble forms of herbicides are most commonly used to get maximum movement of herbicide within the plant. When using water-soluble herbicides, the herbicide/water mixture is commonly applied by squirting it on the girdle or frill until the cut surface is wet. Hand-held, pint or quart spray bottles, such as those available at local garden stores, are ideal for applying herbicide to the girdle (Figure 4). Exceptions to the above recommendations are the commonly-used forestry herbicides that contain the ester formulation of 2,4-D + 2,4-DP, such as Weedone 170 and Acme Super Brush Killer. They are labeled for use with frilling in an oil carrier, and the recommendation is to fill the frill with the mixture. They are commonly applied with a backpack or hand-held, hand-pumped sprayer.

Spaced Cuts - Tree Injection

Tree injection involves introducing an herbicide into the undesirable tree through spaced cuts made around the trunk of the tree with an ax, hatchet or tree injector (Figure 5). The procedure can be visualized as a discontinuous frill with a small amount of herbicide placed in each cut. With an ax or hatchet, non-overlapping horizontal cuts penetrating into the sapwood (the outer area of lighter-colored wood in the stem cross section) are made completely around the tree. Cuts are approximately 2 inches long and are spaced 1 to 3 inches apart, depending on tree species and specific herbicide being used. A small amount of herbicide is then placed in each cut (Table 2). This can be done conveniently with a pint or quart spray bottle (such as those available at garden stores). The amount of herbicide to be placed in the cut is specified on the herbicide label, but is generally 1 to 2 milliliters. There are also various tree injectors available including the "hypo-hatchet," which is a hatchet constructed to inject herbicide when it is struck into the tree.

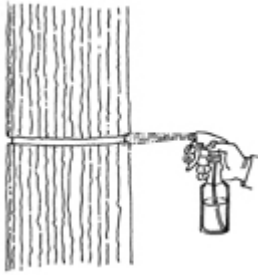


Figure 4.

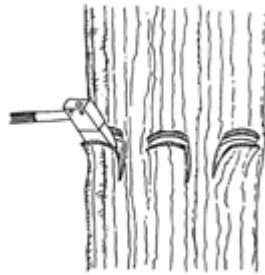


Figure 5.

Table 2. Herbicides commonly used when injecting undesirable trees in a timber stand improvement operation. Column one contains the common names of frequently used herbicides; column two contains one or more examples of commonly used brands along with their manufacturers or distributors; and column three contains a brief summary of use recommendations.

COMMON NAMES	BRAND NAMES (MANUFACTURER OR DISTRIBUTOR)	RECOMMENDATIONS
Glyphosate	Accord (Monsanto)	Inject the equivalent of 1 ml of Accord for each 2 inches of trunk diameter full strength or diluted with water to a concentration of not less than 25%. Injections should be evenly spaced around tree. With larger trees, a continuous frill is more effective than spaced injections. Best results will be obtained if treatment is made during periods of active growth and after full leaf expansion.
	Roundup (Monsanto)	Inject the equivalent of 1 ml of Roundup for each 2-3 inches of trunk diameter full strength or diluted with water to a concentration of not less than 50%. Injections should be evenly spaced around tree. With larger trees, a continuous frill is more effective than spaced injections. Best results will be obtained if treatment is made during periods of active growth and after full leaf expansion.
Imazapyr	Chopper (American Cyanamid)	Mix 8 to 12 ounces of Chopper in 1 gallon of water, diesel oil, or a penetrating oil such as Cide-Kick, Cide-Kick II, or ArborChem Basal Oil. Inject 1 ml of the solution at each injection site completely around the tree with no more than 1-inch intervals between cut edges.
Picloram +	Pathway, Tordon RTU	Inject 1 ml of undiluted Pathway solution around

2,4-D	(DowElanco)	the tree trunk at intervals of 2 to 3 inches between edges of the injector wounds. Treatment can be done any time during the year except for species which have a spring sap flow. Those species, such as the maples, should not be treated during the flow period. Difficult to control species, such as dogwood, hickory, and sugar maple, may require edge to edge injections, essentially a complete frill.
	Tordon 101*, Forestry Tordon 101* (DowElanco)	Inject 1/2 ml of undiluted or 1 ml of diluted (1:1 with water) through the bark at intervals of 3 inches between edges of the injector wound. Injections should completely surround the tree.
2,4-D Amine	Weedar 64 (Rhone- Poulenc)	In one injection per inch of trunk diameter (measured 4 1/2 feet above the ground), inject 1 to 2 ml of undiluted Weedar 64. Injections must penetrate the bark. For best results, injections should be made during the growing season, May 15 through October 15.
	Weedestroy AM-40 (Riverdale)	In injections spaced 2 inches apart (edge to edge) around the tree trunk, inject 1 ml of undiluted Weedestroy AM-40. Injections must penetrate the bark. For difficult to control species, such as hickory, dogwood, red maple, and blue beech, space injections 1 1/2 inches apart. For best results, injections should be made during the growing season, May 15 through October 15.
	Solution Water Soluble (Riverdale)	Dissolve a 2 lb. 13 oz. packet of Solution Water Soluble in 1 1/2 gallons of water. Inject 3/4 ml of the solution in each injection. For most species, space injections 2 inches apart, edge to edge. For hard to kill species, such as hickory, dogwood, red maple, blue beech, and ash, space injections 1 1/2 inch apart, edge to edge. For best results, injections should be made during the growing season, May 15 through October 15.
2,4-D Ester	2,4-D L.V. 4 Ester (Riverdale)	In injections spaced 2 inches apart (edge to edge) around the tree trunk, inject 1 ml of undiluted 2,4-D L.V. 4 Ester. Injections must penetrate the bark. For difficult to control species, such as hickory, dogwood, red maple, and blue beech, space injections 1 1/2 inches apart. For best results, injections should be made during the growing season, May 15 through October 15.

* Restricted Use Pesticide, must be certified applicator to purchase and use.

Tree injection is generally more effective than mechanical girdling or frilling without herbicide because of the use of the herbicide. However, on difficult-to-control species, such as red maple, hickories and dogwoods, a continuous frill or girdle with herbicide may be necessary to obtain acceptable control. For this reason, many commercial TSI (timber stand improvement) contractors routinely use a single chainsaw girdle with herbicide on all species to maximize effectiveness.

As with most of the herbicides suggested for use with girdling and frilling, the herbicides for tree injection are mostly water-soluble materials that move vertically and horizontally within the tree to complete a chemical girdle.

Basal Bark Spray

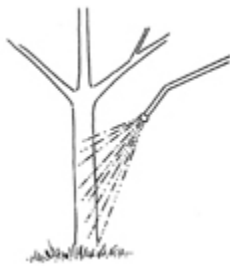


Figure 6.

Basal spraying, or basal bark as it is sometimes referred to, is a technique to deaden small trees, shrubs and occasionally vines by spraying the lower 12 to 18 inches of the trunk with an herbicide (Figure 6). The intent is for the herbicide to penetrate the bark and kill the tree and any basal buds that might sprout. Herbicides used for basal spraying are generally applied in oil carriers (Table 3). The technique is effective on trees less than 4 to 6 inches in diameter. As bark becomes rougher and thicker the techniques becomes less effective. Care must be taken when the herbicide is applied to minimize the amount that runs into the soil. This is important not only from an environmental quality standpoint, but also to avoid damaging non-target trees. The roots of trees often extend well out beyond their crowns. It would not be at all unusual for the roots of an adjacent desirable tree to extend below the trunk of a tree being basal sprayed. If excess amounts of herbicide were applied to the treated tree, the adjacent desirable tree could absorb the herbicide and be killed or seriously damaged.

Cut Stump

When a tree or vine, such as grapevine, is cut, there is a high probability that the stump will sprout. When this is undesirable, the sprouting can be eliminated by treating the cut

stump with an herbicide. Herbicide can be applied to the stump in many ways, the most common being to spray with a backpack or hand-held sprayer.

How much of the stump needs to be treated depends on the formulation of herbicide used. Many of the herbicides labeled for cut stump application are water soluble (Table 4). With these materials it is not necessary to treat the entire stump. The critical area of the stump that must be treated to prevent sprouting is the sapwood and bark of the stump's cut surface (Figure 7). Stump treatment with water soluble herbicides must be done immediately after cutting the tree or vine in order to be effective. If treatment is delayed, adequate downward movement of the herbicide will not occur and sprouting will not be eliminated.

Some herbicides labeled for cut stump application are formulated to be mixed with oil (Table 5). These materials do not move readily within the plant, but penetrate the bark. To be effective in suppressing stump sprouting, the entire stump, particularly the bark and exposed roots, must be thoroughly sprayed (Figure 8). Timing is less critical with these materials because they are not so dependent on movement downward from the cut surface to distribute the herbicide. In situations where immediate treatment of stumps is not possible, an herbicide in an oil carrier should be used rather than one in a water carrier.



Figure 7.



Figure 8.

Treatment with an oil-carried herbicide is also recommended in the spring when treating species that exhibit a spring "sap flow," such as the maples (*Acer*), grape (*Vitis*) and ironwood (*Ostrya*). Water-carried herbicides will usually not be adequately absorbed to be effective during the spring "sap-flow."

Table 3. Herbicides commonly used when basal spraying undesirable trees in a timber stand improvement operation. Column one contains the common names of frequently used herbicides; column two contains one or more examples of commonly used brands along with their manufacturers or distributors; and column three contains a brief summary of

use recommendations.

	COMMON NAMES	BRAND NAMES (MANUFACTURER OR DISTRIBUTOR)	RECOMMENDATIONS
Dicamba + 2,4-D Ester	Banvel 520	Conventional Basal Bark Treatment: Spray the root crown, exposed roots, and the entire circumference of the lower plant stem to a height of 24 inches until runoff with a mixture of 3.8 to 7.6 ounces of Banvel 520 in enough oil to make a gallon of spray mixture.	
		Low Volume Basal Bark Treatment: Spray the entire circumference of the lower 24 inches of the plant stem including the root collar to the point of wet with a mixture of 51 to 64 ounces of Banvel 520 in enough oil to make a gallon of spray mixture. Wet the stem and root collar, but do not spray to runoff.	
Imazapyr	Chopper RTU (American Cyanamid)	Apply undiluted Chopper RTU to the entire circumference of the lower 12-18 inches of plant stem.	
	Chopper (American Cyanamid)	Mix 8.0 to 12.0 ounces of Chopper in one gallon of water, diesel oil, or a penetrating oil such as Cide-Kick, Cide-Kick II OR Arborchem Basal Oil, and spray to wet the entire circumference of the lower 12 to 18 inches of the plant stem.	
Triclopyr	Garlon 4, Forestry Garlon 4 (DowElanco)	Conventional Basal Bark Treatment: Mix 1.3 to 6.4 ounces of Garlon 4 or Forestry Garlon 4 with enough oil to make a gallon of mixture, and spray the entire circumference	

		of the bottom 12 to 15 inches of the woody stems until runoff is noted at the ground line using a low pressure (20-40 psi) backpack or power sprayer.
		Low Volume Basal Bark Treatment: Mix 25.6 to 38.4 ounces of Garlon 4 or Forestry Garlon 4 with enough oil to make a gallon and spray to wet the entire circumference of the bottom 12 to 15 inches of the woody stems, including the root collar area with a backpack or knapsack sprayer using low pressure (20-40 psi) and a solid cone or flat fan nozzle. Do not spray to the point of runoff.
Triclopyr + 2,4-D Ester	Crossbow (DowElanco)	Spray to runoff the entire circumference of the lower 15 to 20 inches of the plant stem with a mixture of 5.1 ounces of Crossbow and enough oil to make a gallon. Spray runoff should visibly wet the ground surface at the base of the trunk. Best results will be obtained with winter or early spring treatments, but treatments can be made at any time of the year when snow or ice do not prevent spraying the ground line.
Triclopyr + Picoloram	Access* (DowElanco)	Conventional Basal Bark Treatment: Using a low pressure (20-40 psi) backpack or power sprayer, thoroughly wet the lower stem and root collar with a mixture of 1.3 to 2.6 ounces of Access in enough oil to make a gallon. Spray until runoff at the ground line is noticeable. Best results will

		be obtained with applications made during the late dormant or active growing season.
		Low Volume Basal Bark Treatment: Using a low pressure (20-40 psi) backpack or knapsack sprayer, thoroughly wet the lower stem and root collar with a mixture of 25.6 to 38.4 ounces of Access in enough oil to make a gallon. Spray lower stem and root collar to wet but not to runoff.
2,4-D + 2,4-DP Ester	Weedone CB (Rhone-Poulenc)	Apply Weedone CB undiluted to the entire circumference of the lower 18-24 inches of the plant stem. Treat all around the stem including the root collar area and any exposed roots. It is not necessary for the herbicide to run down or puddle in the root collar area.
	Weedone 170 (Rhone-Poulenc)	Thoroughly wet the entire circumference of the base of the stems and root collars until spray collects around the root collar at ground line using a mixture of 3.8 to 5.1 ounces of Weedone 170 or Brush Killer 2D + 2DP added to 1 gallon of oil.
	Brush Killer 2D +2 DP (Riverdale)	Thoroughly wet the entire circumference of the base of the stems and root collars until spray collects around the root collar at ground line using a mixture of 3.8 to 5.1 ounces of Weedone 170 or Brush Killer 2D + 2DP added to 1 gallon of oil.
2,4-D + 2,4DP + Dicamba	Acme Super Brush Killer, BK 800(pbi/Gordon)	High Volume Basal Spray: Spray the entire circumference of the lower 18 to 24 inches of

		stems with a spray mixture of 3.8 to 6.4 ounces in enough oil to make a gallon. Spray each stem until runoff and pooling at the ground line is noticed.
		Low Volume Basal Spray: Spray the entire circumference of the lower 18 to 24 inches of the stems with a spray mixture of 42 ounces of Acme Super Brush Killer or BK 800, 60.2 to 73 ounces of oil, and 12.8 to 25.6 ounces of surfactant (such as Cide-Kick, Cide-Kick II or other surfactants/penetrants appropriate for oil soluble herbicides). Note: the spray mixture above should total 1 gallon (128 ounces).
* Restricted Use Pesticide, must be certified applicator to purchase and use.		

Table 4. Water soluble herbicides commonly used when treating cut stumps to prevent sprouting. Column one contains the common names of frequently used herbicides; column two contains one or more examples of commonly used brands along with their manufacturers or distributors; and column three contains a brief summary of use recommendations.

COMMON NAMES	BRAND NAMES (MANUFACTURER OR DISTRIBUTOR)	RECOMMENDATIONS
Dicamba	Banvel CST (Sandoz or Riverdale)	Spray or paint freshly cut surface with undiluted Banvel CST. The area adjacent to the bark should be thoroughly wet.
Glyphosate	Accord, Roundup (Monsanto)	Apply a 50 to 100 percent solution of this product to the freshly cut surface immediately after cutting. For best results, treatment should be made during periods of active growth and full leaf expansion.
Imazapyr	Chopper RTU (American Cyanamid)	Spray or brush Chopper RTU undiluted onto the cambium area of the freshly cut surface and

		bark of the cut stump.
	Chopper (American Cyanamid)	Mix 8.0 to 12.0 oz. of Chopper in one gallon of water and spray or brush the mixture onto the cambium area of the freshly cut surface and bark of the cut stump.
Picloram + 2,4-D	Pathway, Tordon RTU (DowElanco)	Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Pathway or Tordon RTU.
	Tordon 101*, Forestry Tordon 101* (DowElanco)	Spray or paint to wet the cut surfaces of freshly cut stumps or stubs with Tordon 101 or Forestry Tordon 101 undiluted or diluted 1:1 in water.
Triclopyr	Garlon 3A (DowElanco)	Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Garlon 3A.
2,4-D + 2,4-DP Amine	Riverdale 2D + 2DP Amine (Riverdale)	Mix 3.8 to 5.1 oz. of herbicide with 1 gallon of water and thoroughly spray the entire stump, including exposed roots and bark, as quickly as possible after trees are cut. Freshly cut stumps 3 inches in diameter or smaller may be treated with undiluted Riverdale 2D + 2DP Amine.

* Restricted Use Pesticide, must be certified applicator to purchase and use.

Table 5. Oil soluble herbicides commonly used when treating cut stumps to prevent sprouting. Column one contains the common names of frequently used herbicides; column two contains one or more examples of commonly used brands along with their manufacturers or distributors; and column three contains a brief summary of use recommendations.

COMMON NAMES	BRAND NAMES (MANUFACTURER OR DISTRIBUTOR)	RECOMMENDATIONS
Dicamba + 2,4-D Ester	Banvel 520 (Sandoz or Riverdale)	Conventional Stump Treatment: Spray the entire stump, including any exposed roots, with a spray mixture equivalent to 3.8 to 7.6 oz. of Banvel 520 in enough oil to make a gallon.
		Low Volume Stump Treatment: Spray the entire stump, including any exposed roots, with a spray mixture equivalent to 51 to 64 oz. of Banvel 520 in enough oil to make a gallon.
Imazapyr	Chopper (American Cyanamid)	Mix 8.0 to 12.0 oz. of Chopper in one gallon of diesel oil or a penetrating oil (e.g., Cide-Kick, Cide-Kick II, or ArborChem Basal Oil) and

		spray or brush the mixture onto the cambium area of the freshly cut surface and bark of the cut stump.
Triclopyr	Garlon 4, Forestry Garlon 4 (DowElanco)	Mix 25.6 to 38.4 oz. of Garlon 4 or Forestry Garlon 4 with enough oil to make a gallon and apply to the outer portion of the cut stump surface, the sides of the stump, and the root collar area. Thoroughly wet, but do not apply to point of runoff.
Triclopyr + 2,4-D Ester	Crossbow (DowElanco)	Mix 5.1 oz. of Crossbow with enough oil to make a gallon of spray mix and thoroughly wet the cut surface and bark of the stump. Spray runoff should visibly wet the ground surface at the base of the stump.
2,4-D + 2,4- DP Ester	Weedone CB (Rhone- Poulenc)	Apply undiluted Weedone CB to the cut surface, the bark, and the root collar of the remaining stump.
	Weedone 170 (Rhone- Poulenc)	Thoroughly drench the entire stump, including the cut surface, the bark, and the exposed roots, with a mixture of 3.8 to 5.1 oz. of Weedone 170 or Brush Killer 2D + 2DP in 1 gallon of oil. Small stumps, 3 inches or less in diameter, can be treated with undiluted Weedone 170 or Brush Killer 2D + 2DP.
	Brush Killer 2D + 2DP (Riverdale)	
2,4-D + 2,4- DP Ester + Dicamba	Acme Super Brush Killer, BK 800 (pbi/Gordon)	Thoroughly spray (drench) the entire stump including the cut surface, bark, and exposed roots with a mixture equivalent to 2.6 to 5.2 oz. of Super Brush Killer or BK 800 in 1 gallon of oil. For painting freshly cut stumps, mix 2 quarts of Super Brush Killer or BK 800 with 1 gallon of basal oil and thoroughly paint all surfaces of the stump.

This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time

you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author and Ohio State University Extension assume no liability resulting from the use of these recommendations.