



Woody Plant Control for the Home, Pasture, and Forest

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Mechanical means of woody plant control (chopping, grubbing) require hard labor and persistence to achieve permanent control. Most brush species are capable of resprouting from the stump; many can resprout from stem and root fragments left behind. Woody plants have to be attacked again and again before they will succumb to mechanical control. Moreover, working with the tools and equipment needed for mechanical control is exceedingly dangerous. According to U.S. Department of Labor statistics, farming is one of the most dangerous professions in the United States, not because of pesticides but because of tools and equipment.

Herbicides

Compared to mechanical control, herbicidal control is a far more efficient way to manage woody weed problems, although some labor, persistence, and strategy still are necessary. Table 1 (p. 4) lists the herbicides available in Hawaii that are useful for woody plant control. Although the active ingredient in different brands may be the same, the allowed use in terms of site and method of application may differ. This is especially true for products registered for residential use. Check with the dealer or the Cooperative Extension Service for the appropriate product for specific needs. Because labels are subject to change, read the label before purchase and use.

Selective herbicides suppress certain types of plants but not others, e.g. broadleaf plants (dicots) but not grasses. Selectivity is not absolute, and overdosing typically injures usually tolerant plants. *Nonselective herbicides* are those that kill or injure any plant treated.

Application

Herbicides can be applied—label permitting—as foliar sprays, to the stem in cut surfaces or to its basal bark, or to the soil. Each method has its advantages and disadvantages. The effectiveness of an herbicide depends on the weed species and on the method of application.

Foliar spray

The easiest way to apply herbicides is to spray the diluted herbicide on the foliage. Unfortunately, most woody weeds have a strong ability to resprout and survive a single foliar herbicide treatment, especially if they have been fertilized regularly. Retreatments are almost always necessary except on young plants and species very sensitive to the herbicide.

The following rules for spraying should be observed—label permitting—to gain maximum effect from an herbicide application:

- Use a surfactant (spreader-sticker) with foliar applications.
- Spray weeds when they are actively growing.
- Spray the entire plant canopy, but do not drench the plant to the point where spray runs off.
- Spray when rain is unlikely; rain will wash the herbicide off the leaves. A rain-free period of six hours should be adequate for even the most slowly absorbed herbicides.
- Follow all label directions. Exceeding the label rates is not only illegal but may be ineffective and wasteful. Too high a dose can poison the transport system (phloem) in the plant too quickly, and not enough herbicide will get down to the stem and roots. Although overdosing may cause impressive short-term “burning” and defoliation, the recovery rate will be high.

Most woody plants are difficult to kill with a single foliar spray. Retreatment should be made when the plant begins to recover and develops a few fully expanded leaves; this usually is 6–18 months after the initial spray. An effective alternative method is to cut down woody plants and spray the regrowth when the first few new leaves are fully expanded.

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Figure 1. Cut-surface herbicide application (notching). Notches are cut at intervals around the base of the target plant. Herbicide concentrate is brushed or squirted into each wound.

Spraying creates the hazard of spray drift, which can kill or injure sensitive desirable and perhaps valuable plants. The drift hazard can be reduced considerably by spraying when the air is calm, using low pressure (15 psi), and using a nozzle with a large orifice for a coarse spray.

Stem treatments

Stem treatments are either to cut surfaces or the basal bark. These treatments are usually more effective than foliar sprays, and there is virtually no hazard of nontarget plant injury. Cut-surface treatments involve mechanical penetration of the bark to apply the herbicide directly to the sapwood (xylem). Basal-bark treatments rely on oil mixed with an appropriate oil-soluble herbicide to penetrate the bark.

Cut-surface (notching). With an ax or machete, notches are cut in the base of the woody plant, one notch per 4–6 inches around the trunk circumference. For trees that fork close to the ground, notches should also be made inside the crotch. For somewhat resistant species,



Figure 2. Cut-stump treatment. Concentrated herbicide is applied to the outer part of the cut surface of the stump (the sapwood).

notches can be made end to end (frilling) to increase the dosage. The notches should be cut an inch or so deep, at a 45° angle, to form a pocket for the herbicide. Prying the bark away from the trunk will expose more sapwood surface area to the herbicide. The herbicide is applied to each wound, enough to wet the cut surface (Fig. 1). The herbicide can be brushed into the wound or squirted in with a garden squirt bottle. Check the label for appropriate concentrations.

Cut-surface (drilling). For larger trees, with trunks of at least 9 inches in diameter, notching or frilling may not work. Drilling holes into the trunk, ½ inch in diameter x 3 inches deep, at 1-foot intervals around the base of the tree, and applying ⅓–½ fluid ounce of herbicide to each hole provides a more effective kill of larger trees. Holes should be drilled at a 45° angle so they will hold the herbicide.

Cut-stump. In this method the woody plant is cut down and the herbicide, at a concentration prescribed by the label, is brushed or sprayed onto the exposed sapwood (Fig. 2). Application should be made immediately after cutting. A delay of even a few minutes will result in an “air-lock” when air is drawn into the sapwood as the sap recedes. This method is most effective during



Figure 3. Basal bark treatment. An oil-herbicide solution is sprayed on the base of an intact plant from the soil line to 18 inches high, completely around the trunk.



Figure 4. Basal stump bark treatment. An oil-herbicide solution is sprayed on the bark completely around the stump. This is usually the most effective method of woody plant control.

the dry season when the sap in the sapwood is under tension. In the rainy season, the sap may ooze out of the sapwood and flush away the herbicide. Thus this method may be completely ineffective in the rainy season.

Basal bark and stump bark treatments. Oil-soluble formulations of 2,4-D, triclopyr, and imazapyr can be diluted in diesel or crop oil, according to label directions, and applied to the bark of small trees and shrubs or the bark of their stumps (Figs. 3 and 4). The oil-herbicide solution will penetrate the bark, kill the cambium, enter the sapwood and phloem, and—in intact trees—be translocated throughout the plant. The bark of intact plants should be sprayed from ground level to 18 inches high, completely around the trunk. Stumps should also be sprayed completely around the circumference. In both cases, the spray should be allowed to run down the trunk and wet the soil to ensure that the herbicide contacts the bud zone just below the soil surface.

Soil application

Some herbicides are applied to the soil and absorbed by the target shrub or tree through its roots. Granular tebuthiuron selectively controls dicots. It may be broadcast in pastures and used to maintain wildlife openings

in forests. It may also be applied to the soil beneath individual plants. Overdosing may injure grasses. Hexazinone is a nonselective herbicide that may be applied to small spots beneath the target plant or to spots in a 3-foot grid for larger infestations. Any grass at those spots will be killed, but overall damage to the grass is minimized by the spot application.

Safety

Most herbicides are of low animal toxicity. Their toxicity is about that of aspirin and table salt. There are exceptions, but toxic herbicides are restricted and therefore available only to certified applicators. (High toxicity is not the only reason for classifying an herbicide “restricted use.” Economic hazard to nontarget plants and the potential for contamination of some other component of the ecosystem are also criteria.) There is no evidence of long-term health effects in humans resulting from the normal use of herbicides. Still, the excellent safety record of herbicides should not be taken for granted. Pesticides, like medicines, bleach, lye, gasoline, and other household poisons, should be used, handled, and stored with caution commensurate with the hazard. In that way, the user can ensure safety and avoid liability.

Table 1. Herbicides for woody plant control.

Generic herbicide ¹	Possible sites of use ¹	Application methods ¹	Comments
2,4-D amine	Home, Forest, Pasture	Foliar, Cut-surface, Cut-stump	Selective against dicots (dicotyledonous, broadleaf plants); restricted in quantities greater than 1 qt.
2,4-D ester	Home, Forest, Pasture	Foliar, Cut-surface, Basal bark, Stump bark	Selective against dicots; restricted in quantities greater than 1 qt.
Dicamba	Home, Forest, Pasture	Foliar, Cut-surface, Cut-stump	Selective against dicots; unrestricted.
Glyphosate	Home, Forest, Pasture	Foliar, Cut-surface, Cut-stump	Nonselective; no soil activity; unrestricted.
Hexazinone	Forest, Pasture	Foliar, Soil	Nonselective; long soil activity; unrestricted.
Imazapyr	Forest	Foliar, Cut-surface, Cut-stump, Basal bark, Stump bark	Nonselective; unrestricted.
MCPA	Home, Forest, Pasture	Foliar, Cut-surface, Cut-stump	Selective against dicots; unrestricted.
Picloram	Pasture	Foliar, Cut-surface	Selective against dicots; restricted.
Tebuthiuron	Forest, Pasture	Soil	Selective against dicots; unrestricted.
Triclopyr amine	Home, Forest, Pasture	Foliar, Cut-surface, Cut-stump	Selective against dicots; unrestricted.
Triclopyr ester	Forest, Pasture	Foliar, Cut-surface, Cut-stump, Basal bark, Stump bark	Selective against dicots; unrestricted.

¹Herbicide registrations are specific to the product brand and not to the generic herbicide. Sites and application methods allowed depend not on the active ingredient but on the product brand, of which there may be several or many for each generic herbicide given in this table. Check with the agrichemical dealer or the Cooperative Extension Service to find out the brands of herbicide suited for your use that are licensed for sale in Hawaii. Read the label before purchasing and using the product to ensure that the intended use is allowed. For tips on herbicide use, see the CTAHR publication, *Before you buy or apply an herbicide*.

Caution: Pesticide use is governed by state and federal regulations. Read the pesticide label to ensure that the intended use is included on it, and follow all label directions.