



Professional Applicator's Guide to Herbicides for Melaleuca Control¹

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Introduction

Herbicides are used for integrated management of melaleuca (*Melaleuca quinquenervia*) trees to kill existing trees. Products with the herbicide active ingredients glyphosate, imazapyr, triclopyr, and hexazinone are used depending on the application method and other factors, including presence of non-target vegetation in the application area. Four application methods, foliar, frill-and-girdle, cut stump, and basal (applied to the soil) are used depending on extent of the population and other factors. Helicopter, truck, or all terrain vehicle (atv)-mounted sprayers, backpack sprayers, and hand-held spray bottles, and dropper bottles are used for application of herbicide. Various adjuvants may be added to the spray mixture to aid or modify the action of the herbicide or the physical characteristics of the mixture. A marker dye is often added to the spray solution to help visualize where herbicide is applied.

All herbicides used for melaleuca control have very low toxicity to wildlife and low risk to humans. Because of the potential for repeated exposure, applicators are required to wear personal protective equipment, which is described on the herbicide manufacturer's label when mixing, loading, or applying herbicides. Glyphosate, imazapyr, triclopyr, and hexazinone differ in their chemical characteristics and impact on non-target vegetation, which will influence the choice of herbicide for each application site. Another consideration when choosing the appropriate herbicide is the presence or absence of standing water on a site when the herbicide is applied because some herbicide products are registered for application over water while some are not. Additional information on herbicide characteristics and application techniques can be found in IFAS publication SP 295, "Natural Area Weed Management", which can be ordered by calling the IFAS Extension Bookstore at 800/226-1764 or at <http://ifasbooks.ufl.edu>.

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Herbicides

Glyphosate is a broad-spectrum, water-soluble herbicide whose mode of action is inhibition of amino acid synthesis. Because of its solubility characteristics, glyphosate requires addition of a surfactant in the spray mixture to aid in foliar uptake. Some glyphosate-containing products (Roundup Pro, Accord XRT, Glyphosate Herbicide VMF, Touchdown Pro, Roundup Weed & Grass Killer Super Concentrate) contain a surfactant that is added by the manufacturer, while a surfactant must be added to other products (Rodeo, Aquamaster, Aquaneat, Aquapro, Accord Concentrate) according to label instructions by the user. Roundup Pro, Accord XRT, Glyphosate Herbicide VMF, Roundup Weed & Grass Killer Super Concentrate are labeled only for application to dry sites, whereas Rodeo, Aquamaster, Aquaneat, Aquapro, Accord Concentrate, and Touchdown Pro are labeled for sites where there is standing water.

When applied as a foliar treatment or directly into the plants (as in cut surface applications), glyphosate translocates throughout the plant. Glyphosate is not absorbed by plant roots because it is adsorbed strongly upon contact with the soil. Therefore, damage to non-target vegetation as a result of root uptake is minimal. Caution must be taken to avoid contact of the herbicide spray with the leaves and green stems of non-target plants.

Imazapyr (Arsenal - labeled for dry sites, Habitat - labeled for aquatic sites) is a broad-spectrum, water-soluble herbicide whose mode of action is inhibition of amino acid synthesis. It differs with glyphosate in that it is taken up more rapidly and readily by plant leaves and is also readily absorbed from the soil by plant roots. It also remains active in the soil for up to three years when applied to dry ground. Application of imazapyr can cause damage to non-target plants if it contacts foliage or enters the soil and comes into contact with their roots in sufficient quantity.

Triclopyr affects many woody plant species and broadleaf herbaceous species but grass species are relatively tolerant to it. It controls plants by disrupting tissue development and other

physiological processes. It is absorbed primarily through foliage and to some extent by plant roots. Damage to non-target vegetation as a result of root uptake is more likely in porous, low organic matter-containing soils.

Triclopyr is manufactured as amine salt (Garlon 3A, Renovate 3 - labeled for aquatic sites) or ester (Garlon 4, Pathfinder II). The amine salt is water soluble and the ester is oil soluble. The ester-containing product, Garlon 4 contains emulsifiers so that it can be mixed with water in low concentrations. Both formulations are absorbed through leaf tissues but a surfactant is necessary to aid uptake of the amine.

Hexazinone is a broad spectrum, water soluble herbicide whose mode of action is photosynthesis inhibition. It is predominantly absorbed by plant roots with negligible uptake by leaves. It is manufactured as a liquid (Velpar L), dry flowable (Velpar DF) and ultra-low-weight granule (Velpar ULW). Like imazapyr, it can kill or cause injury to sensitive non-target woody vegetation if it comes in contact with their roots. Cypress (*Taxodium* spp.) and pine (*Pinus* spp.) are tolerant. Hexazinone has a typical half life in soils of 90 days but disappears from porous soils more rapidly through leaching. Shallow rooted herbaceous species, particularly grasses, will recover in treated sites. Hexazinone is labeled only for application on dry sites.

Application Methods

Foliar applications for melaleuca control are mainly used for treating sapling trees (less than four feet tall) that cannot be hand-pulled and for large-area applications to mature trees where little non-target vegetation exists. Saplings are treated with herbicide diluted in water as a low volume application, using a backpack or hand-held equipment, with one of the following: 1) Glyphosate solution equivalent to 5% product that contains 3-4 lb per gallon glyphosate acid and 1% imazapyr product that contains 2 lb imazapyr acid per gallon, or 2) 3% glyphosate product solution plus 3% imazapyr product solution. Surfactant must be added to the spray mixture if it is not already contained in the products used. Solution containing 5% glyphosate product and surfactant

alone can be used, but some re-sprouting may occur that will require follow-up treatment. Surfactant products that contain methylated seed oil are most effective.

For broadcast applications to control large areas of mature trees, 3 lb glyphosate acid per acre plus 1.5 lb imazapyr acid per acre (e.g. 6 pints Rodeo + 6 pints Habitat), plus methylated seed oil surfactant are applied by helicopter. For complete coverage, the application is made in at least two overlapped passes in opposite directions with 20 gallons per acre (GPA) total volume (10 GPA each pass). Nozzles with small orifices (0.020-0.030) are recommended for best coverage.

Frill and girdle applications are used for outlier trees or for large stands where aerial application is not desirable. It is much more labor intensive than aerial application but non-target damage is minimal compared to aerial application. A machete is used to cut through the bark deep enough to expose the living tissue just inside the bark (cambium layer) (Figure 1). Cuts are made in a downward direction so that the severed bark is left to contain the herbicide mixture. Herbicide solution (diluted in water) of 25% product that contains 3-4 lb per gallon glyphosate acid and 25% imazapyr product that contains 2 lb imazapyr acid per gallon (Habitat or Arsenal) is applied to the girdle in sufficient quantity to thoroughly wet the tissue. A hand-held spray bottle is usually used to apply the herbicide (Figure 2). Damage to non-target vegetation can occur if the imazapyr is washed from the girdle to the soil. A solution of 50-100% glyphosate product alone can be used but tree mortality may be consistent. A solution of 10% imazapyr-containing product and 50% glyphosate-containing product can also be used to reduce non-target damage.

Cut stump application is the most labor intensive application method and is only used when it is not desirable, for reasons of safety or aesthetics, to leave dead trees standing. Trees, depending on size, are felled with a brush lopper, hand-saw, or chain saw as close to the ground as possible and as level as possible. Herbicide will tend to run off of slanting cuts made with a machete, and mortality will be less consistent. Sawdust, which can adsorb herbicide and



Figure 1. Frill and girdle application: A machete is used to cut through the bark deep enough to expose the living tissue just inside the bark



Figure 2. Frill and girdle application: A hand-held spray bottle is usually used to apply the herbicide.

prevent it from entering the stump, should be brushed from the cut surface before applying herbicide. Herbicide solution should be concentrated just inside the bark, where the living tissue of the tree is located. A 10-25% solution of product that contains 2 lb imazapyr acid per gallon (Habitat or Arsenal) is most often used. A 50% solution or 100% of product that contains 3-4 lb per gallon glyphosate acid is also effective and can be used to minimize potential of non-target damage. Herbicide solution should be applied as soon as possible after cutting. Hand-held spray bottles or dropper bottles (Figure 3) can be used to apply the herbicide solution. Dropper bottles are very effective for concentrating the herbicide solution to the cambium area. If stumps are not cut close to the ground, re-sprouting is more likely to occur, especially following glyphosate applications.

Triclopyr products are less consistent than those that contain glyphosate or imazapyr and are only recommended as an alternative to homeowners with a small number of trees, because these products are available in retail garden supplies in small quantities.



Figure 3. Dropper bottle.

Basal (soil) applications of 4 lb hexazinone active ingredient per acre are applied for melaleuca control. Liquid (Velpar L) and dry flowable (Velpar DF) products are applied by helicopter for large area treatments. These applications could be considered as foliar applications because the herbicide is applied over the tree canopy and foliage but is described here because herbicidal activity probably occurs after the herbicide reaches the soil and is taken up by roots. Granular hexazinone (Velpar ULW) is applied with ground equipment using a specialized blower.