

Herbicides for Weed Control in *Eucalyptus* Culture¹

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Introduction

Eucalyptus is a diverse genus with over 700 species, most of which are native to Australia. Numerous *Eucalyptus* species and hybrid clones have been introduced in temperate climates throughout the world and grown as ornamental trees as well as for fuel and fiber. There is renewed interest in planting this fast-growing tree in the southeastern United States for mulch, pulpwood, and bio-energy.



Figure 1. When grown without weed control, *Eucalyptus urograndis* is approximately two feet tall at five and a half months after planting in a study at Quincy, Florida.

Credits: Anna Osiecka, University of Florida

However, several silvicultural challenges exist, and competing vegetation control is a significant one.

Young *Eucalyptus* trees are very sensitive to the adverse effects of plant competition, especially in the initial months after planting. The photographs below illustrate the effect of weed competition on the growth of *Eucalyptus urograndis* five months after an April planting of six-week-old rooted cuttings in Quincy, Florida.



Figure 2. In the same Quincy study, *E. urograndis* grown with near complete weed control is nine to ten feet tall at the same age.

Credits: Anna Osiecka, University of Florida

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The use of trade names in this publication is solely for the purpose of providing specific information. UF/IFAS does not guarantee or warranty the products named, and references to them in this publication do not signify our approval to the exclusion of other products of suitable composition. All chemicals should be used in accordance with directions on the manufacturer's label.

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Currently, directed applications of the herbicide glyphosate are widely used, but this herbicide is non-selective and requires very careful application and shielding of trees in order to avoid injuring or killing *Eucalyptus* plantings. Because glyphosate does not provide residual weed control, frequent repeated applications are necessary, resulting in significant costs to growers. Development of weed resistance is also an issue with repeated applications of the same herbicide.

This publication provides a list of herbicides with different active ingredients labeled for weed control in *Eucalyptus* plantings for various use sites (plantations, ornamentals, etc.) as described by herbicide labels (Tables 1 and 2). It gives examples of products for each active ingredient, but it is not meant to be all-inclusive. Inclusion of a product trade name in this publication does not constitute an endorsement of a product or a company because other products manufactured by different companies might be equally suited for the intended use. It must be noted, however, that two herbicides with the same active ingredient can have very different labels and use patterns. For example, Alligare SFM 75 is labeled for *Eucalyptus* (supplemental labeling), while DuPont Oust® XP is not, even though both contain 75% sulfometuron methyl active ingredient. It is essential that the herbicide you choose is specifically labeled for *Eucalyptus* culture in Florida (personal communication, Charlie Clarke, Florida Department of Pesticide Registration, November 30, 2009).

Guide Information

This publication is a general guide and is not intended to provide specific treatment recommendations. *The user must always read and follow the label instructions for a specific product being used.* Herbicide labels are accessible at [CDMS](#) (all accessed December 5, 2012). *Failure to follow the directions for use and precautions on the labels may result in poor weed control or tree injury and may be a violation of the law.* The effectiveness and safety of the use of a particular herbicide in a given situation greatly depends on many factors (Osiecka and Minogue, 2011) including the *Eucalyptus* species, stage of growth and weeds to be controlled. If repeated applications are needed, the maximum use rate per year and the minimum interval between applications must be observed.

Table 1. Herbicide Listing by Active Ingredient, Trade Name, and Use

Table 1 lists the active ingredients, trade names and manufacturers for various herbicides labeled for *Eucalyptus*

culture and the ranges of labeled application rates for different uses, including site preparation prior to planting, herbaceous weed control (HWC) as a directed spray (applied directly to target weeds without contacting *Eucalyptus*), or HWC over-the-top (OTT) of *Eucalyptus* using a selective herbicide to which the species is tolerant. The appropriate herbicide application rate depends on crop-tree tolerance to the herbicide and the weed species present, their stage of growth, and density. Soil characteristics such as texture and acidity (pH) are important in determining the appropriate selective herbicide rate for those herbicides absorbed by plants from the soil (soil-active herbicides). It is always advisable to use the lowest rate that will provide an acceptable level of weed control for a specific situation.

All glyphosate products are non-selective and can be applied either for site preparation prior to planting or as a carefully directed spray to weeds after planting. Unlike other products labeled for *Eucalyptus* culture, glyphosate is effective in controlling established weeds, but it provides no residual control. Pre-emergent herbicides such as sulfometuron methyl may be mixed with glyphosate to provide residual weed control. However, herbicides with residual soil activity must be used according to the labeled herbicide rate and application frequency restrictions to avoid *Eucalyptus* injury from root uptake.

Only herbicides with physiological selectivity can be applied over-the-top of *Eucalyptus* trees, and their application must be carefully calibrated to ensure that the precise amount of active ingredient per acre is applied. Healthy trees, free of stress from transplanting or drought are most tolerant to over-the-top herbicides. Generally, it is advisable to wait two weeks after planting seedlings or rooted cuttings so that trees recover from the stress of transplanting before applying herbicides over-the-top. Selectivity is enhanced if the amount of spray contacting the tree foliage is minimized by using drop nozzles or off-center nozzle systems. While label directions for some herbicides, such as oxyfluorfen, state that this herbicide can be applied only to dormant trees, many labels state that applications should not be made over-the-top of *Eucalyptus* during the flush of new growth. Herbicide injury is more detrimental to *Eucalyptus* grown for ornamental purposes than to *Eucalyptus* grown for fiber.

Pre-emergent herbicides are soil-active, and many of these herbicides must be applied before weed emergence because they kill only germinating weeds (e.g., pendimethalin). Other pre-emergent herbicides also provide control when applied post-emergence of weeds (sulfometuron methyl), but generally the best results are obtained when weeds are

small. Since soil-active herbicides are absorbed by plant roots, they should not be applied after *Eucalyptus* transplanting until soil is firmly settled around the roots. Rainfall or hand watering after transplanting will help to settle the soil. In addition, soil-active, pre-emergent herbicides must be made available in the soil solution to “activate” them after application, usually by rain or irrigation. For optimum weed control, some require quick activation (e.g., Snapshot 2.5 TG within 3 days), while others are less sensitive to degradation on the soil surface and allow for a larger window (e.g., 3–4 weeks for GoalTender®). Shallow cultivation (mixing herbicide into the upper 1–2 inches of soil) can also activate some herbicides (e.g., Snapshot® 2.5 TG), while deeper cultivation after application usually reduces effectiveness because the herbicide concentration is reduced.

Post-emergent herbicides may be absorbed by the roots and foliage (e.g., sulfometuron methyl), or only by the foliage (e.g., glyphosate). Complete and uniform spray coverage on weed foliage and the addition of a surfactant may improve absorption and the performance of foliar-active herbicides. Several important selective herbicides used for weed control in *Eucalyptus* (sulfometuron methyl, oxyfluorfen, flumioxazin) have both soil and foliar activity and can be used either pre- or post-emergence, but applications of these herbicides are most effective when made to weeds at a seedling stage and their effectiveness diminishes as the weeds mature.

Weed composition is the first factor to consider when choosing a herbicide. Non-selective herbicides can kill a broad spectrum of weed species when used at an appropriate rate. Some selective herbicides (e.g., oxyfluorfen and sulfometuron methyl) control both grasses and broadleaf weeds at rates tolerated by *Eucalyptus*, while others are effective only against grasses (e.g., fluazifop-P-butyl and sethoxydim) or broadleaves (e.g., clopyralid). The effectiveness of some herbicides is limited to annual weeds, which as a rule are easier to control than the perennials. Perennial vines and woody plants are most difficult to control, and few selective herbicide options are available for *Eucalyptus* culture. These plants should be controlled prior to planting.

Table 2. Herbicide Listing by Labeled *Eucalyptus* Taxa and Sites

Table 2 provides *Eucalyptus* taxa for which the listed herbicides have been labeled. Some labels mention only the genus *Eucalyptus*, while others specify species or even cultivars. It is possible that some herbicides could be applied to other *Eucalyptus* species in addition to the ones

listed in Table 2. However, we have observed that different *Eucalyptus* taxa may exhibit different tolerance to herbicides labeled generally for *Eucalyptus*. It is advisable to first test the herbicide on a small number of plants at a specific site and stage of growth to determine selective herbicide rates for a particular *Eucalyptus* variety.

Since different taxa within the genus *Eucalyptus* can be used for forestry or ornamental objectives, both forestry and horticultural herbicides have been included in this publication. A herbicide cannot be legally used on a site for which it is not labeled. Moreover, it cannot be used in a state for which it has not been registered. While most herbicides are registered country-wide, some have state-wide exclusions (e.g., SFM 75), and others are registered in a specific state (e.g., Assure® II) or even specific counties (e.g., Clopyralid 3). Therefore, it is imperative to carefully read labels before deciding on a herbicide for a specific purpose.

Additional Resources

The following Additional Resources (all accessed December 4, 2012) can be helpful in developing herbicide prescriptions for vegetation management in *Eucalyptus*:

- **Crop Data Management Systems (CDMS)** can be searched for herbicide labels and material safety data sheets (MSDS).
- **Label Search** (a free service of CDMS) allows for a more advanced herbicide search following free registration.
- **National Pesticide Information Retrieval System (CDMS)** includes information about herbicides either currently or previously licensed for distribution and sale in each state.
- **County Extension Agents at Cooperative Extension County Offices** of the University of Florida, Institute of Food and Agricultural Sciences (IFAS) can be contacted with specific questions regarding herbicides.
- **County Foresters** of Florida Forest Service can be contacted for advice and technical assistance.
- **Pesticide Information Office (PIO)** at the University of Florida provides information, educational programs, and materials related to herbicides.

Reference

Osiecka, A. and P. J. Minogue. 2011. Considerations for developing effective herbicide prescriptions for forest vegetation management. University of Florida Cooperative Extension Service Circular FOR 273. 8 p. <http://edis.ifas.ufl.edu/fr335>

Table 1. Herbicides labeled for weed control in *Eucalyptus* culture (products in bold are labeled for *Eucalyptus* plantations)

Active Ingredient (ai) (Common name)	Trade name	Manufacturer ¹	ai		Registered Uses			Activity		Target weeds							
			concentration in product	Site Prep	HWC ² Directed ³	HWC OTT ⁴	PRE-	POST-	Grass	Broadleaf	Vine	Woody					
clopyralid	CleanSlate ⁵	Nufarm	3 lb/gal ae ⁹		1/3-2/3*	1/3-2/3*	Unit	emergent									
clopyralid	Clopyralid 3 ⁶	Alligare	3 lb/gal ae		1/3-2/3*	1/3-2/3*	pint	no	yes	no	yes	yes	yes	yes	yes	yes	yes
clopyralid	Stinger ⁷	Dow	3 lb/gal ae		1/3-2/3*	1/3-2/3*	pint	no	yes	no	yes	yes	yes	yes	yes	yes	yes
clopyralid	Transline ⁸	Dow	3 lb/gal ae		1/3-2/3*	1/3-2/3*	pint	no	yes	no	yes	yes	yes	yes	yes	yes	yes
dithiopyr	Dimension [®] 2EW	Dow	2 lb/gal		1.4-2*	no ¹⁰	pint	yes	no	yes***	yes***	yes***	no	no	no	no	no
flumioxazin	SureGuard [®]	Valent	51%	8-12	8-12*	no	oz	yes	early	yes	yes	yes	yes	yes	yes	no	no
fluzifop-P-butyl	Fusilade [®] II	Syngenta	2 lb/gal	no	1-1.5	1-1.5	pint	no	yes	no	yes	yes	no	no	no	no	no
glyphosate	Accord [®] XRT	Dow	5.4 lb/gal	1.5-8	no	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
glyphosate	Accord [®] XRT II	Dow	5.4 lb/gal	1.5-8	no	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
glyphosate	Buccaneer [®]	Tenkoz	4 lb/gal	0.5-5	0.5-5*	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
glyphosate	Buccaneer Plus [®]	Tenkoz	4 lb/gal	0.5-5	0.5-5*	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
glyphosate	Honcho [®] Plus	Monsanto	4 lb/gal	0.5-5	0.5-5*	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
glyphosate	Roundup PowerMax [®]	Monsanto	5.5 lb/gal	0.3-3.3	0.3-3.3*	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
glyphosate	Roundup WeatherMax [®]	Monsanto	5.5 lb/gal	0.3-3.3	0.3-3.3*	no	qt	no	yes	no	yes	yes	yes	yes	yes	yes	yes
isoxaben	Gallery [®] 75 Dry Flowable	Dow	75%	no	0.66-1.33*	0.66-1.33*	qt	yes	no	yes	no	no	yes	some	some	no	no
isoxaben + trifluralin	Snapshot [®] 2.5 TG	Dow	0.5% 2%	no	100-200*	100-200*	lb	yes	no	yes	no	yes***	yes	some	some	no	no
oryzalin	Oryzalin 4 PRO	Alligare	4 lb/gal		2-4*	2-4*	qt	yes	no	yes	no	yes***	yes***	partly	partly	no	no
oryzalin + benefin	XL 2G	Helena	1% 1%	no	200-300*	200-300*	lb	yes	no	yes	no	yes***	yes	partly	partly	no	no
oxyfluorfen	Galigan[®] 2E	MANA	2 lb/gal	4-6	4-6	4-6**	pint	yes	yes	yes	yes	yes	yes	yes	yes	no	no

Active Ingredient (ai) (Common name)	Trade name	Manufacturer ¹	ai concentration in product	Registered Uses			Activity		Target weeds				
				Site Prep	HWC ² Directed ³	HWC ² OTT ⁴	PRE-	POST-	Grass	Broadleaf	Vine	Woody	
oxyfluorfen	Galigan® H₂O	MANA	4 lb/gal	2-3	2-3	2-3**	emergent	yes	yes	yes	yes	no	no
oxyfluorfen	Goal®2XL	Dow	2 lb/gal	4-6	4-6	4-6**	emergent	yes	yes	yes	yes	no	no
oxyfluorfen	GoalTender®	Dow	4 lb/gal	2-3	2-3	2-3**	emergent	yes	yes	yes	yes	no	no
oxyfluorfen	Oxyflo 2EC	Willwood	2 lb/gal	4-6	4-6	4-6**	emergent	yes	yes	yes	yes	no	no
oxyfluorfen	OxyStar™ 2E	Albaugh	2 lb/gal	4-6	4-6**	4-6**	emergent	yes	yes	yes	yes	no	no
pendimethalin	Pendulum® 2G	BASF	2%	100-200	100-200*	100-200*		yes	no	yes***	yes	no	no
pendimethalin	Pendulum® 3.3 EC	BASF	3.3 lb/gal	2.4-4.8	2.4-4.8*	2.4-4.8*		yes	no	yes***	yes	no	no
pendimethalin	Pendulum® AquaCap™	BASF	3.8 lb/gal	2.1-4.2	2.1-4.2*	2.1-4.2*		yes	no	yes***	yes	no	no
quizalofop P-ethyl	Assure II ¹¹	DuPont	0.88 lb/gal	15-30	15-30	15-30		no	yes	yes	no	no	no
sethoxydim	Sethoxydim SPC	Nufarm	1 lb/gal	no	up to 3.75	up to 3.75		no	yes	yes	no	no	no
simazine	Princep® Liquid	Syngenta	4 lb/gal	no	2-4	2-4		yes	no	yes***	yes***	yes***	no
simazine	Simazine 4L	Winfield	4 lb/gal	no	2-4	2-4		yes	no	yes***	yes***	yes***	no
sulfometuron	SFM 75 ¹²	Alligare	75%	3-5	1-4	1-4**		yes	yes	yes	yes	yes	no

*Established trees; **Dormant trees; ***Annual
¹ Manufacturers' names are abbreviated. For the full name [Check CDMS](#).

² HWC = Herbaceous weed control

³ Directed = Application directed at the target species, without contacting the crop species (directed spray, spot treatment, wiper application)

⁴ OTT = Over-the-top of crop species (do not apply during bud swell, bud break, or at time of the flush of new growth)

⁵ Not registered for *Eucalyptus* tree plantations in Florida; not registered in some counties in New York state

⁶ Restrictions in some states; in Florida can be used only in Bay, Bradford, Calhoun, Escambia, Franklin, Gadsden, Gulf, Hamilton, Jackson, Jefferson, Lafayette, Leon, Liberty, Madison, Okaloosa, Santa Rosa, Suwannee, Taylor, Wakulla, Walton, and Washington Counties.

⁷ Not registered for *Eucalyptus* tree plantations in Florida

⁸ Registered for *Eucalyptus* tree plantations in all states except Florida

⁹ ae = Acid equivalent

¹⁰ no = Not labeled for this use

¹¹ Registered for *Eucalyptus* plantations in Hawaii only

¹² Supplemental labeling; not registered for *Eucalyptus* plantations in California

Table 2. Herbicides labeled for the culture of various *Eucalyptus* species at different registered use sites (products in bold are labeled for *Eucalyptus* plantations)

Common name	Trade name	Labeled species	Labeled use sites
clopyralid	CleanSlate ^{®1}	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> tree plantations ¹
clopyralid	Clopyralid 3 ²	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> tree plantations
clopyralid	Stinger ^{®3}	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> tree plantations ³
clopyralid	Transline ^{®4}	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> tree plantations ⁴
dithiopyr	Dimension [®] 2EW	<i>E.citriodora</i>	Field-grown ornamentals
flumioxazin	SureGuard [®]	<i>Eucalyptus</i> spp.	Field-grown deciduous tree species
fluzifop-P-butyl	Fusilade [®] II	<i>E.microtheca</i> , <i>E.polyanthemos</i> , <i>E.rostrata</i> ⁵ , <i>E.rudis</i> , <i>E.spathulata</i> ; directed spray: <i>E.citriodora</i> , <i>E.nicholii</i>	Field-grown ornamentals
glyphosate	Accord [®] XRT	<i>Eucalyptus</i> spp.	Forestry site preparation
glyphosate	Accord [®] XRT II	<i>Eucalyptus</i> spp.	Forestry site preparation
glyphosate	Buccaneer [®]	<i>Eucalyptus</i> spp.	Non-food tree crops; ornamentals; forestry site prep
glyphosate	Buccaneer Plus [®]	<i>Eucalyptus</i> spp.	Non-food tree crops; ornamentals
glyphosate	Honcho [®] Plus	<i>Eucalyptus</i> spp.	Non-food tree crops
glyphosate	Roundup PowerMax [®]	<i>Eucalyptus</i> spp.	Non-food tree crops
glyphosate	Roundup WeatherMax [®]	<i>Eucalyptus</i> spp.	Non-food tree crops
isoxaben	Gallery [®] 75 Dry Flowable	<i>E.camaldulensis</i> , <i>E.cinerea</i> , <i>E.microtheca</i> , <i>E.sideroxylon</i>	Field-grown ornamentals
isoxaben+trifluralin	Snapshot [®] 2.5 TG	<i>E.camaldulensis</i> , <i>E.cinerea</i> , <i>E.microtheca</i> , <i>E.sideroxylon</i>	Field-grown ornamentals
oryzalin	Oryzalin 4 PRO	<i>E.camaldulensis</i> , <i>E.cinerea</i> , <i>E.nicholii</i> , <i>E.sideroxylon</i>	Field grown ornamentals
oryzalin+benfenin	XL 2G	<i>E.camaldulensis</i> , <i>E.cinerea</i> , <i>E.nicholii</i> , <i>E.sideroxylon</i>	Field-grown ornamentals
oxyfluorfen	Galigan [®] 2E	<i>E.camaldulensis</i> , <i>E.pulverulenta</i> , <i>E.viminalis</i> ,	<i>Eucalyptus</i> plantings
oxyfluorfen	Galigan [®] H ₂ O	<i>E.camaldulensis</i> , <i>E.pulverulenta</i> , <i>E.viminalis</i> ,	<i>Eucalyptus</i> plantings
oxyfluorfen	Goal [®] 2XL	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> plantings
oxyfluorfen	GoalTender [®]	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> plantings
oxyfluorfen	Oxyflo 2EC	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> plantings
oxyfluorfen	OxyStar [™] 2E	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> plantings
pendimethalin	Pendulum [®] 2G	<i>E.sideroxylon</i> 'Rosea'	Ornamentals; tree plantations site prep and maintenance
pendimethalin	Pendulum [®] 3.3 EC	<i>E.sideroxylon</i> 'Rosea'	Ornamentals; tree plantations site prep and maintenance

Common name	Trade name	Labeled species	Labeled use sites
pendimethalin	Pendulum® AquaCapTM	<i>E.cinerea</i> , <i>E.sideroxylon</i> 'Rosea'	Ornamentals; tree plantations; pulpwood and fiber farms
quizalofop P-ethyl	Assure® II ⁶	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> plantations (Hawaii) ⁶
sethoxydim	Sethoxydim SPC	<i>E.citriodora</i> , <i>E.globulus</i> , <i>E.lehmannii</i> , <i>E.polyanthemos</i> , <i>E.robusta</i> , <i>E.sideroxylon</i>	Trees; deciduous tree farms
simazine	Princep® Liquid	<i>Eucalyptus</i> spp.	Shelterbelts
simazine	Simazine 4L	<i>Eucalyptus</i> spp.	Shelterbelts
sulfometuron	SFM 75 ⁷	<i>Eucalyptus</i> spp.	<i>Eucalyptus</i> site preparation and release ⁷

¹ Not registered for *Eucalyptus* tree plantations in Florida; not registered in some counties in New York state

² Restrictions in some states; in Florida can be used only in Bay, Bradford, Calhoun, Escambia, Franklin, Gadsden, Gulf, Hamilton, Jackson, Jefferson, Lafayette, Leon, Liberty, Madison, Okaloosa, Santa Rosa, Suwannee, Taylor, Wakulla, Walton, and Washington Counties.

³ Not registered for *Eucalyptus* tree plantations in Florida

⁴ Registered for *Eucalyptus* tree plantations in all states except Florida

⁵ *E. rostrata* is a synonym for *E. camaldulensis*.

⁶ Registered for *Eucalyptus* plantations in Hawaii only

⁷ Supplemental labeling; not registered for *Eucalyptus* plantings in California