

Herbicides Registered for Pine Management in Florida – 2014¹

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Estimates from the 2011 Forest Inventory and Analysis (Brown and Nowak 2013) indicate that Florida's forests cover about half of the state's land area, about 17.61 million acres. Of the forested area, about 45% percent is comprised of southern pines, with slash, loblolly, longleaf, sand, and shortleaf pines being most common. Between 2007 and 2011, the area in slash pine declined and non-stocked area increased by a similar amount, which could reflect fewer acres being replanted following harvests of this most important commercial species.

Vegetation management is an integral part of successful pine plantation establishment and management. Following the development and registration of many new forestry herbicides during the 1980s, herbicide use for forest vegetation management increased dramatically. This trend continues because of the introduction of lower-cost generic herbicides, and because the costs of mechanical treatment alternatives are increasing, driven up, for the most part, by increased fuel costs. Herbicides are used to enhance crop tree survival and growth rates, allowing producers to improve return on investment with minimal site disturbance. Their application facilitates many forestry operations, such as pine straw harvest, logging, and plantation

reestablishment. They can also be used to reduce the risk of destructive wildfires and improve wildlife habitat, aesthetics, and recreation opportunities. Herbicides are an effective tool in controlling invasive plants and restoring native ecosystems. They can be applied at different stages during pine plantation rotation for:

- Site preparation before planting
- Herbaceous weed control during establishment
- Release of established pines from competing vegetation

Efficient, safe and environmentally sound herbicide use requires an up-to-date knowledge of weed control technology. Landowners must stay aware of developments because new herbicides are constantly being developed and registered for use in Florida, and, just as crucially, some of the older herbicides are discontinued, or their registration in the state of Florida terminated.

This publication provides general information about the herbicides currently registered for use in Florida pine plantations, not specific herbicide prescriptions. All herbicide active ingredients important in pine management in Florida with examples of commercial products are listed

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The use of trade names in this publication is solely for the purpose of providing 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 suitable products. The products included in tables 1 and 2 were listed as registered in Florida for 2014 in NPRIS® (National Information Retrieval System) as of October 3, 2013. NPRIS contains current herbicide registration data provided by FDACS Division of Agricultural Environmental Services. FDACS is the sole authority on the herbicides registered in Florida.

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in Table 1, and their use characterized in Table 2. Other active ingredients that are registered in Florida but are not commonly used for pine plantations, like 2,4-D, atrazine, dicamba, paraquat, and simazine, are also included. Since an increasing number of private and public owners manage their forestlands for non-commodity purposes, herbicides that are intended mostly for turf and/or landscape maintenance, but also labeled for conifer plantations (e.g., pendimethalin), have been included as well.

Most of the herbicide active ingredients are available in different formulations from different manufacturers and/or distributors under a variety of trade names. It is beyond the scope of this publication to mention all of the silvicultural herbicide products available on the market. It has to be emphasized that there might be considerable differences even among herbicides with the same concentration of the same active ingredient(s) resulting, for example, from differences in adjuvants or solvents. Therefore, before making any herbicide substitutions, one has to be sure that the selected product is appropriate for the intended application, and one must read and follow all label recommendations. Inclusion of a product trade name or a company name in this publication does not constitute an endorsement of a product or a company, as other products manufactured by different companies might be equally suited for the intended herbicide use.

The examples of herbicides registered for pine management in Florida are listed alphabetically, according to the active ingredient (common name) (Table 1). Within each active ingredient herbicides are ordered by increasing ai concentration. For active ingredients that can be formulated as amine salts or as esters, amine products have been listed first, followed by esters. Products with the same Environmental Protection Agency (EPA) registration number are grouped together. Herbicides containing more than one active ingredient are placed according to the active ingredient that most determines their use.

Table 2 provides information on basic weed control characteristics and silvicultural applications for listed herbicides. Herbicides can be used for a variety of applications in managing pine forests to control or alter undesirable vegetation. **Site preparation (S)** is one use where the current vegetation can be controlled by herbicides prior to planting pine seedlings. After planting, **herbaceous weed control (H)** with herbicides can aid the survival and growth of the young pine seedlings during the establishment phase. Subsequently, herbicides can be applied to **release (R)** established pine trees from competing woody vegetation, including early and mid-rotation release, as well as timber

stand improvement later in the rotation. Some truly selective herbicides may be broadcast over pines at recommended rates and timing without significant adverse effects to pines. Directed spray [(d)] and understory broadcast [(u)] are two release techniques that can be used to obtain selectivity by herbicide placement, minimizing contact with crop trees. **Individual stems (I)** of undesirable vegetation can be treated with herbicides throughout the pine rotation, from site preparation to harvest. Soil-active herbicides can be used for basal soil treatment [(bs)] in the immediate vicinity of the individual stems. Some herbicides are labeled for applications in wetlands (W) or aquatic (A) areas in the forests.

Besides **herbicide activity** and **application timing** in relation to weed growth stage, Table 2 includes a column with **herbicide group**, which represents the **mechanism of action (MOA)** of an active ingredient according to the Weed Science Society of America (WSSA). A logo with the herbicide group number is prominently displayed near the top of most newly revised labels. When products contain more than one active ingredient, numbers representing all components are listed. This information is provided to facilitate development of herbicide programs that reduce the likelihood of selecting herbicide-resistant weeds, mainly by alternating or combining herbicides with different modes of action.

Basic terms used in this and other herbicide publications can be defined as follows:

Active ingredient (ai) is the chemical substance in the herbicide that does the work: the ai changes plant metabolism and is designed to control the undesirable vegetation. The active ingredient has the greatest influence on the properties and behavior of the herbicide and is the primary reason a given herbicide will be selected for a particular application. The exact **chemical name** of the active ingredient is useful to chemists to ensure precise communication. The **common name** is a simplified, less technical name of an active ingredient, most often used in herbicide recommendations and technical literature. Common names are used in Tables 1 and 2 of this publication. For example, imazapyr is a common name for 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid, the chemical name.

Formulation is the commercial preparation of the herbicide product, including one or more active ingredients, usually a solvent (for liquid products), and, possibly, adjuvant(s), such as wetting agents (surfactants). Each formulation is registered and marketed under a separate

product name. Frequently the same formulation or formulations containing the same concentration of the same form of an active ingredient may be marketed under several trade names by different companies or even the same manufacturer or distributor, which may be quite confusing. Such is the case with Dow's Element™ 4, Garlon® 4, and Forestry Garlon® 4; all three contain the same ester of triclopyr (61.6 % of the butoxyethyl ester) and are registered under the same **EPA registration number**. While new forestry herbicide active ingredients are not frequently introduced, new formulations, which are often more effective and safer, are rapidly being developed. Several new herbicide formulations have higher content of active ingredients and are often available in large, returnable, refillable containers, which reduce the need for container disposal. A growing number of products contain two or more active ingredients, eliminating the need for mixing. New adjuvants (additives) tend to improve efficacy and the ease of use, often reducing the treatment cost at the same time.

Herbicide product names may include numbers and/or letters to further identify the product. The number immediately after the trade name refers to the concentration of active ingredient. For example, Imazapyr 4 SL contains "4" lb/gal active ingredient as an "SL" soluble liquid. The amount of active ingredient in a herbicide may also be expressed as a percentage of volume or mass of the commercial product. For example, MSM 60 contains 60%, by weight, of the active ingredient metsulfuron methyl. Labels may additionally provide an **acid equivalent (ae)**, which is especially useful when comparing herbicides containing different chemical forms of the same active ingredient, such as an amine versus an ester. For example, Garlon® 3A contains "3" lb ae/gal triclopyr in the amine form ("A"). The front of the label states that it contains 44.4% triethylamine salt of triclopyr (ai), which equals 31.8% -3 lb/gal triclopyr acid equivalent (ae). Garlon® 4 contains "4" lb ae/gal triclopyr in the ester form. The front of the label states that it contains 61.6% butoxyethyl ester of triclopyr (ai), which equals 44.3% -4 lb/gal triclopyr acid equivalent (ae). It is the free acid portion of the triclopyr amine or ester formulation which is herbicidal, which is why the "acid equivalent" (ae) is important.

Letters following the trade name indicate the product formulation type. Not all companies use the same abbreviations, so it may be necessary to refer to the full label text. Also, acronyms found in labeling often differ from the standard two-letter international (CIPAC) formulation codes. Some of the more common acronyms are:

DF dry flowable
DG dispersible granule
E or EC emulsifiable concentrate
F or FL flowable or flowable liquid
G granular
L liquid
LV low volume concentrate
P or PS pellet
RTU ready to use
S, SL, WS water soluble concentrate
SP soluble powder
ULV ultra low volume concentrate
ULW ultra light weight
W or WP wettable powder
WDG water dispersible granule (similar to dry flowable)
WSP water soluble powder
XP extruded pellet

Labeling associated with each herbicide includes one or more product labels, a **Material Safety Data Sheet (MSDS)**, and possibly additional publications. These documents are the primary method of communication between a herbicide manufacturer or distributor and a herbicide user. They contain detailed information about use of the herbicide product, safety precautions, environmental hazards, directions for handling and storage, first aid for exposure and other important information. Information and instructions contained in the labeling must be strictly followed when purchasing, transporting, storing, mixing, applying, or disposing of herbicides. It is a violation of federal law to use any herbicide in a manner inconsistent with its labeling.

Product labels provide directions for use and information about application methods and safety precautions. Besides the product label on the container, various printed or on-line **Specimen Labels**, **Supplemental Labels**, and **Special Local Need (SLN) Labels** may be associated with herbicide registrations for different states or use sites. Supplemental labels are approved by the U.S. EPA to address a specific herbicide use not included on the full label (e.g. Milestone® VM Plus). SLN labels are issued by states to allow use of a herbicide outside its labeled uses to address a particular vegetation management problem (e.g., Milestone® and Milestone® VM) and have an expiration date within five years of registration in most states. Supplemental labels, especially state SLN labels, usually pertain to specific

geographic areas. However, a specimen label may also not be applicable across the United States, sometimes excluding certain states or smaller geographic areas (e.g. Aatrex® 4L). It is necessary to read the label attached to the herbicide container before use, because this is the legally binding document.

MSDS focuses on chemical and physical properties of the herbicide and personal and environmental safety. Because the MSDSs include emergency medical information and information physicians need to deal with accidental exposure to herbicide products, the MSDS for each herbicide used should be available on site wherever herbicides are used (and wherever they are stored or transported). Full text labels and MSDSs for most herbicides are accessible through manufacturers' or distributors' websites and dedicated databases such as those of **Crop Data Management Systems, Inc. (CDMS)** or **Greenbook Data Solutions**. Both databases also provide extracted important product information in abbreviated format. CDMS allows simple search by herbicide brand (product, trade) name at <http://www.cdms.net/LabelsMsds/LMDefault.aspx> without registration. After completing a free registration at <http://premier.cdms.net/webapls/formsloginRef.asp?/webapls> users can perform advanced searches by product (trade) name, common name (ai), crop/site, weed species, manufacturer, and state. Any search at Greenbook requires registration, which can be made free of charge at their home page <http://www.greenbook.net/>. The database is searchable by product (trade) name, active ingredient (common name), crop/site, weed species, company (manufacturer), and state. In addition, Greenbook provides a rate finder, side-by-side comparisons of up to three products, and product E-Alerts. **Greenbook Mobil** at <http://m.greenbook.net/> provides multi-parameter search by product (trade) name, crop/site, and state for mobile devices. One has to keep in mind that, while these and other databases are very useful tools, they cannot be expected to be always completely up-to-date, because of the very rapidly changing herbicide market. Selection of herbicides registered for use in pine management differs from state to state. Only products registered by the **Florida Department of Agriculture and Consumer Services (FDACS)** can be legally purchased in the state of Florida. The general public can search the **National Pesticide Information Retrieval System (NPIRS)** at <http://state.ceris.purdue.edu/> for active Florida registrations. For most states NPRIS can be searched by one of the following criteria: EPA registration number, product (trade) name, registering company name, and active ingredient (common name).

It has to be emphasized that the effectiveness and safety of use of a particular herbicide in a given situation greatly depends on several factors including formulation, pine species, age and stage of growth, weeds to be controlled, and timing, technique and conditions during application. Therefore, one has to refer to the manufacturer's product label for details and consult other literature and qualified professionals regarding the appropriate approach and best products to use. Several publications related to herbicides can be found on the **EDIS** website (Electronic Data Information Source - UF/IFAS Extension). Another good source of herbicide-related information (including relevant links) is the **Pesticide Information Office (PIO)** at the University of Florida, IFAS, accessible through <http://pested.ifas.ufl.edu>. The PIO has the responsibility for assembling, maintaining and disseminating current pesticide information in the state of Florida. County Extension Agents can be contacted at County Extension Offices located throughout the state of Florida (<http://solutionsforyourlife.ufl.edu/map/index.html>).

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Table 1. Herbicides registered for use in pine plantations in Florida - 2014.

Active ingredient (ai) (Common name)	Product name	ai concentration	ai or acid equivalent (ae) lb/gal (ae/ai)	Formulation ¹	Registrant	EPA Registration No.
2,4-D, dimethylamine salt	DMA® 4 IVM	46.30%	3.80 ae	SL	Dow AgroSciences LLC	62719-3
2,4-D, dimethylamine salt	Alligare 2,4-D Amine	46.80%	3.80 ae	SL	Alligare, LLC	81927-38
2,4-D, dimethylamine salt	Weedar® 64	46.80%	3.80 ae	SL	Nufarm, Inc.	71368-1
2,4-D, dimethylamine salt	Weedestroy® AM-40	46.80%	3.80 ae	SL	Nufarm Americas, Inc.	228-145
2,4-D, 2-ethylhexyl ester	Weedone® LV4 Solventless	62.60%	3.80 ae	EC	Nufarm, Inc.	71368-14
2,4-D, 2-ethylhexyl ester	Weedone® LV4 EC	67.20%	3.84 ae	EC	Nufarm, Inc.	228-139-71368
2,4-D, 2-ethylhexyl ester	Barrage® HF	78.10%	4.70 ae	EC	Helena Chemical Company	5905-529
Aminopyralid	Milestone® ²	40.60%	2.00 ae	SL	Dow AgroSciences LLC	62719-519
Aminopyralid	Milestone® VM ²	40.60%	2.00 ae	SL	Dow AgroSciences LLC	62719-537
Aminopyralid + Triclopyr, triethylamine salt	Capstone™	2.22%	0.10 ae	SL	Dow AgroSciences LLC	62719-572
Aminopyralid + Triclopyr, triethylamine salt	Milestone® VM Plus ³	16.22%	1.00 ae	SL	Dow AgroSciences LLC	62719-572
Atrazine	Agrisolutions Atrazine 4L ⁴	42.12%	4.00 ai	L	Winfield Solutions, LLC	1381-158
Atrazine	AAtrex® 4L ⁴	42.60%	4.00 ai	L	Syngenta Crop Protection, LLC	100-497
Atrazine	Atrazine 4L ⁴	42.60%	4.00 ai	L	Loveland Products, Inc.	34704-69
Atrazine	Agrisolutions Atrazine 90DF ⁴	88.00%		DF	Winfield Solutions, LLC	9779-253
Atrazine	AAtrex® Nine-O ⁴	88.20%		WDG	Syngenta Crop Protection, LLC	100-585
Atrazine	Atrazine 90WDG ⁴	88.20%		WDG	Loveland Products, Inc.	34704-622
Clethodim	Envoy Plus™	12.60%	0.97 ai	EC	Valent U.S.A. Corporation	59639-132
Clopyralid	Clean Slate™	40.90%	3.00 ae	EC	Nufarm Americas, Inc.	228-491
Clopyralid	Alligare Clopyralid 3	40.90%	3.00 ae	EC	Alligare, LLC	81927-14
Clopyralid	Transline®	40.90%	3.00 ae	EC	Dow AgroSciences LLC	62719-259
Dicamba, diglycolamine salt	Riverdale Vanquish®	56.80%	4.00 ae	SL	Nufarm Americas, Inc.	228-397
Dicamba, diglycolamine salt	Vanquish®	56.80%	4.00 ae	SL	Syngenta Crop Protection, LLC	100-884
Fluazifop-P-butyl	Fusilade® DX	24.50%	2.00 ai	EC	Syngenta Crop Protection, LLC	100-1070

Active ingredient (ai) (Common name)	Product name	ai concentration	ai or acid equivalent (ae) lb/gal (ae/ai)	Formulation ¹	Registrant	EPA Registration No.
Flumioxazin	SureGuard®	51.00%		WDG	Valent U.S.A. Corporation	59639-120
Fluroxypyr	Vista®	26.20%	1.50 ae	EC	Dow AgroSciences LLC	62719-308
Fluroxypyr	Alligare Fluroxypyr	45.50%	2.80 ae	EC	Alligare, LLC	663300-385-81927
Fluroxypyr	Vista® XRT	45.52%	2.80 ae	EC	Dow AgroSciences LLC	62719-586
Fosamine	Krenite® S	41.50%	4.00 ai	SL	DuPont*	352-395
Glyphosate	Touchdown® Pro	28.30%	3.00 ai	SL	Syngenta Crop Protection, LLC	100-1121
Glyphosate	Alligare Glyphosate 4 plus	41.00%	4.00 ai	SL	Alligare, LLC	81927-9
Glyphosate	Razor® Pro	41.00%	4.00 ai	SL	Nufarm Americas, Inc.	228-366
Glyphosate	Accord® XRT II	50.20%	5.07 ai	SL	Dow AgroSciences LLC	62719-556
Glyphosate	Accord® Concentrate	53.80%	5.40 ai	SL	Dow AgroSciences LLC	62719-324
Glyphosate	Rodeo®	53.80%	5.40 ai	SL	Dow AgroSciences LLC	62719-324
Glyphosate	Alligare Glyphosate 5.4	53.80%	5.40 ai	SL	Alligare, LLC	81927-8
Glyphosate	Aqua Neat®	53.80%	5.40 ai	SL	Nufarm Americas, Inc.	228-365
Hexazinone	Velpar® L	25.00%	2.00 ai	SL	DuPont*	352-392
Hexazinone	Pronone® Power Pellet	75.00%		P	Pro-Serve, Inc.	33560-41
Hexazinone	Velpar® DF	75.00%		DF	DuPont*	352-581
Hexazinone	Velpar® ULW ⁵	75.00%		ULW	DuPont*	352-450
Hexazinone + Sulfometuron methyl	Oustar®	63.20%		WDG	DuPont*	352-603
Imazapic	Plateau®	23.60%	2.00 ae	SL	BASF Corporation	241-365
Imazapyr	Chopper® Gen2™	26.70%	2.00 ae	SL	BASF Corporation	241-430
Imazapyr	Chopper®	27.60%	2.00 ae	SL	BASF Corporation	241-296
Imazapyr	Polaris® SP	27.60%	2.00 ae	SL	Nufarm Americas, Inc.	228-536
Imazapyr	Alligare Rotary 2SL	27.80%	2.00 ae	SL	Alligare, LLC	81927-6
Imazapyr	Alligare Imazapyr 4SL	52.60%	4.00 ae	SL	Alligare, LLC	81927-24
Imazapyr	Arsenal® AC	53.10%	4.00 ae	SL	BASF Corporation	241-299
Imazapyr	Polaris® AC	53.10%	4.00 ae	SL	Nufarm Americas, Inc.	228-480
Imazapyr	Polaris® AC Complete	53.10%	4.00 ae	SL	Nufarm Americas, Inc.	228-570

Active ingredient (ai) (Common name)	Product name	ai concentration	ai or acid equivalent (ae) lb/gal (ae/ai)	Formulation ¹	Registrant	EPA Registration No.
Imazapyr + Glyphosate	OneStep®	8.36%	0.637 ae	SL	BASF Corporation	241-414
		22.13%	1.531 ae			
Imazapyr + Glyphosate	Prep-It®	8.36%	0.637 ae	SL	Loveland Products, Inc.	34704-989
		22.13%	1.531 ae			
Imazapyr + Metsulfuron methyl	Lineage® Clearstand™	63.20%		WDG	DuPont*	352-766
		9.50%				
Metsulfuron methyl	Escort® XP	60.00%		XP	DuPont*	352-439
	MSM 60	60.00%		WDG	Alligare, LLC	81927-7
Oryzalin	Surflan® A.S.	40.40%	4.00 ai	EC	United Phosphorus, Inc.	70506-43
Paraquat	Gramoxone Inteon®	30.10%	2.76 ai	EC	Syngenta Crop Protection, LLC	100-1217
	Parazone® 35L	43.80%	4.14 ai	SL	MANA**	66222-130
Pendimethalin	Pendulum® 2G	2.00%		G	BASF Corporation	241-375
	Pendulum® 3.3 EC	37.40%	3.30 ai	EC	BASF Corporation	241-341
	Pendulum® AquaCap	38.70%	3.80 ai	SL	BASF Corporation	241-416
Simazine	Sim-Trol® 90DF	90.00%		DF	Sipcam Agro USA, Inc.	35915-12-60063
Sulfometuron methyl	Alligare SFM 75	75.00%		WDG	Alligare, LLC	81927-26
	Oust® XP	75.00%		XP	DuPont*	352-601
	Spyder™	75.00%		WDG	Nufarm Americas, Inc.	228-408
	Oust® Extra	56.25%		DG	DuPont*	352-622
		15.00%				
Sulfometuron methyl + Metsulfuron methyl	SFM Extra	56.25%		WDG	Alligare, LLC	81927-5
		15.00%				
Sulfometuron methyl + Metsulfuron methyl	Spyder® Extra	56.25%		WDG	Nufarm Americas, Inc.	228-690
		15.00%				
Triclopyr, triethylamine salt	Alligare Triclopyr 3	44.40%	3.00 ae	SL	Alligare, LLC	81927-13
	Element® 3A	44.40%	3.00 ae	SL	Dow AgroSciences LLC	62719-37
	Garlon® 3A	44.40%	3.00 ae	SL	Dow AgroSciences LLC	62719-37

Active ingredient (ai) (Common name)	Product name	ai concentration	ai or acid equivalent (ae) lb/gal (ae/ai)	Formulation ¹	Registrant	EPA Registration No.
Triclopyr, triethyamine salt	Tahoe® 3A	44.40%	3.00 ae	SL	Nufarm Americas, Inc.	228-520
Triclopyr, butoxyethyl ester	Pathfinder® II	13.60%	0.75 ae	RTU	Dow AgroSciences LLC	62719-176
Triclopyr, butoxyethyl ester	Garlon® 4 Ultra	60.45%	4.00 ae	EC	Dow AgroSciences LLC	62719-527
Triclopyr, butoxyethyl ester	Alligare Triclopyr 4	61.60%	4.00 ae	EC	Alligare, LLC	81927-11
Triclopyr, butoxyethyl ester	Element™ 4	61.60%	4.00 ae	EC	Dow AgroSciences LLC	62719-40
Triclopyr, butoxyethyl ester	Forestry Garlon® 4	61.60%	4.00 ae	EC	Dow AgroSciences LLC	62719-40
Triclopyr, butoxyethyl ester	Garlon® 4	61.60%	4.00 ae	EC	Dow AgroSciences LLC	62719-40
Triclopyr, butoxyethyl ester	Relegate® Selective Herbicide	61.60%	4.00 ae	EC	Nufarm Americas, Inc.	228-521
Triclopyr, butoxyethyl ester	Forestry Garlon® XRT	83.90%	6.30 ae	EC	Dow AgroSciences LLC	62719-553

*DuPont = E. I. du Pont de Nemours and Company Crop Protection

**MANA = Makhteshim Agan of North America, Inc.

¹ See text

² Special Local Need (SLN) label for distribution and use only in FL

³ Supplemental labeling for forestry use

⁴ Restricted use pesticide in FL (ground and surface water concerns)

⁵ Registered in FL for 2014, but not in production

Table 2. Forestry herbicide applications

Active ingredient (ai) (Common name)	Product name	Labeled for application ¹	Labeled for controlling	Application timing Pre/post-emergence	Herbicide activity	Herbicide Group ²
2,4-D, dimethylamine salt	DMA [®] 4 IVM	S, H (d), R (d, u), I, A	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
2,4-D, dimethylamine salt	Alligare 2,4-D Amine	S, H (dorm), R (dorm), I, A	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
2,4-D, dimethylamine salt	Weedar [®] 64	I	Woody plants	Post	Foliar	4
2,4-D, dimethylamine salt	Weedestroy [®] AM-40	S, H, R (dorm), I, A	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
2,4-D, 2-ethylhexyl ester	Weedone [®] LV4 Solventless	S, H (d), R	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
2,4-D, 2-ethylhexyl ester	Weedone [®] LV4 EC	S, H (d), R, I	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
2,4-D, 2-ethylhexyl ester	Barrage [®] HF	S, H (d), R (d, u), I	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
Aminopyralid	Milestone [®] 3	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Pre- & post	Foliar & some soil	4
Aminopyralid	Milestone [®] VM ³	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Pre- & post	Foliar & some soil	4
Aminopyralid + Triclopyr, triethylamine salt	Capstone [™]	S, R (d), I	Woody plants; annual & perennial broadleaf weeds	Pre- & post	Foliar & some soil	4 + 4
Aminopyralid + Triclopyr, triethylamine salt	Milestone [®] VM Plus ⁴	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Pre- & post	Foliar & some soil	4 + 4
Atrazine	Agrisolutions Atrazine 4L ⁵	S, H	Annual broadleaf weeds & grasses	Pre- & early post	Soil	5
Atrazine	AAtrex [®] 4L ⁵	S, H	Annual broadleaf weeds & grasses	Pre- & early post	Soil	5
Atrazine	Atrazine 4L ⁵	S, H	Annual broadleaf weeds & grasses	Pre- & early post	Soil	5
Atrazine	Agrisolutions Atrazine 90DF ⁵	S, H	Annual broadleaf weeds & grasses	Pre- & early post	Soil	5
Atrazine	AAtrex [®] Nine-O ⁵	S, H	Annual broadleaf weeds & grasses	Pre- & early post	Soil	5
Atrazine	Atrazine 90WDG ⁵	S, H	Annual broadleaf weeds & grasses	Pre- & early post	Soil	5
Clethodim	Envoy Plus ^{™6}	H	Annual & perennial grasses	Post	Foliar	1
Clopyralid	Clean Slate [™]	S, H, R (d)	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4

Active ingredient (ai) (Common name)	Product name	Labeled for application ¹	Labeled for controlling	Application timing Pre/post-emergence	Herbicide activity	Herbicide Group ²
Clpyralid	Clpyralid 3	S, H, R (d)	Annual & perennial broadleaf weeds; woody plants & vines	Post	Foliar	4
Clpyralid	Transline®	S, H, R (d)	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
Dicamba, diglycolamine salt	Riverdale Vanquish®	S, I	Annual & perennial broadleaf weeds; woody plants & vines	Pre- & post	Foliar & soil	4
Dicamba, diglycolamine salt	Vanquish®	S, I	Annual & perennial broadleaf weeds; woody plants & vines	Pre- & post	Foliar & soil	4
Fluazifop-P-butyl	Fusilade® DX	H	Annual & perennial grasses	Post	Foliar	1
Flumioxazin	SureGuard®	H	Broadleaf weeds & annual grasses	Pre- & early post	Soil & foliar	14
Fluroxypyr	Vista®	S, R (d), I	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
Fluroxypyr	Alligare Fluroxypyr	S, R (d, dorm), I	Annual & perennial broadleaf weeds	Post	Foliar	4
Fluroxypyr	Vista® XRT	S, R (d), I	Annual & perennial broadleaf weeds; woody plants	Post	Foliar	4
Fosamine	Krenite® S	S	Woody plants (including conifers) & vines	Post	Foliar	27
Glyphosate	Touchdown® Pro	S, R (d, dorm), I, A, W	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Alligare Glyphosate 4 plus	S, I	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Razor® Pro	S, H, R (d, u), I	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Accord® XRT II	S, R (d, u), I	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Accord® Concentrate	S, H, R (d, u), I, A	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Rodeo®	S, H, R (d, u), I, A	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Alligare Glyphosate 5.4	S, R (d), I, A	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9
Glyphosate	Aqua Neat®	S, R (dorm), I, A	Annual & perennial broadleaf weeds & grasses; woody plants	Post	Foliar	9

Active ingredient (ai) (Common name)	Product name	Labeled for application ¹	Labeled for controlling	Application timing Pre/post-emergence	Herbicide activity	Herbicide Group ²
Hexazinone	Velpar® L	S, H, R, I, I (bs)	Woody plants; annual & perennial broadleaf weeds & grasses	Pre- & post	Soil & some foliar	5
Hexazinone	Pronone® Power Pellet	S, R	Woody plants	Pre- & post	Soil	5
Hexazinone	Velpar® DF	S, H, R, I (bs)	Woody plants; annual & perennial broadleaf weeds & grasses	Pre- & post	Soil & some foliar	5
Hexazinone	Velpar® ULW ⁷	S, R, H	Woody plants; annual & perennial broadleaf weeds & grasses	Pre- & post	Soil	5
Hexazinone + Sulfometuron methyl	Oustar®	S, H	Annual & perennial broadleaf weeds & grasses	Pre- & post	Soil & foliar	5 + 2
Imazapic	Plateau® ⁶	S	Annual & perennial broadleaf weeds & grasses; vines	Pre- & post	Foliar & soil	2
Imazapyr	Chopper® Gen2™	S, R (d, u)	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Chopper®	S, I, R (d, u)	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Polaris® SP	S, R (d, u), I	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Rotary 2SL	S, I, R (d, u)	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Alligare Imazapyr 4SL	S, H, R, I, A	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Arsenal® AC	S, H, R, I	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Polaris® AC	S, H, R, I	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr	Polaris® AC Complete	S, H, R, I, A	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2
Imazapyr + Glyphosate	OneStep®	S	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Post	Foliar & soil	2 + 9
Imazapyr + Glyphosate	Prep-it®	S	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Post	Foliar & soil	2 + 9
Imazapyr + Metsulfuron methyl	Lineage® Clearstand™	S, H, R, I	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Mainly post	Foliar & soil	2 + 2

Active ingredient (ai) (Common name)	Product name	Labeled for application ¹	Labeled for controlling	Application timing Pre/post-emergence	Herbicide activity	Herbicide Group ²
Metsulfuron methyl	Escort® XP	S, H, R	Annual & perennial broadleaf weeds & grasses; woody plants	Mainly post	Foliar & soil	2
Metsulfuron methyl	MSM 60	S, H, R	Annual & perennial broadleaf weeds & grasses; woody plants	Mainly post	Foliar & soil	2
Oryzalin	Surflan® A.S.	H	Annual grasses & certain broadleaf weeds	Pre	Soil	3
Paraquat	Gramoxone Inteon®	S	Annual broadleaf weeds & grasses	Post	Foliar	22
Paraquat	Parazone® 3SL	S	Annual broadleaf weeds & grasses	Post	Foliar	22
Pendimethalin	Pendulum® 2G	S, H	Annual grasses & certain broadleaf weeds	Pre	Soil	3
Pendimethalin	Pendulum® 3.3 EC	S, H	Annual grasses & certain broadleaf weeds	Pre	Soil	3
Pendimethalin	Pendulum® AquaCap	S, H	Annual grasses & certain broadleaf weeds	Pre	Soil	3
Simazine	Sim-Trol® 90DF	S, H	Annual broadleaf weeds & grasses	Pre	Soil	5
Sulfometuron methyl	Alligare SFM 75	S, H	Annual & perennial broadleaf weeds & grasses	Pre- & early post	Soil & foliar	2
Sulfometuron methyl	Oust® XP	S, H	Annual & perennial broadleaf weeds & grasses	Pre- & early post	Soil & foliar	2
Sulfometuron methyl	Spyder™	S, H	Annual & perennial broadleaf weeds & grasses	Pre- & early post	Soil & foliar	2
Sulfometuron methyl + Metsulfuron methyl	Oust® Extra	S, H, R	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Pre- & post	Soil & foliar	2 + 2
Sulfometuron methyl + Metsulfuron methyl	SFM Extra	S, H, R	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Pre- & post	Soil & foliar	2 + 2
Sulfometuron methyl + Metsulfuron methyl	Spyder® Extra	S, H, R	Annual & perennial broadleaf weeds & grasses; woody plants, vines	Pre- & post	Soil & foliar	2 + 2
Triclopyr, triethylamine salt	Alligare Triclopyr 3	S, R (d), I, W, A	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, triethylamine salt	Element® 3A	S, R (d), I, W, A	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, triethylamine salt	Garlon® 3A	S, R (d), I, W, A	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, triethylamine salt	Tahoe® 3A	S, R (d), I, W, A	Woody plants & vines; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, butoxyethyl ester	Pathfinder® II	R (d), I	Woody plants	Post	Foliar	4
Triclopyr, butoxyethyl ester	Garlon® 4 Ultra	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4

Active ingredient (ai) (Common name)	Product name	Labeled for application ¹	Labeled for controlling	Application timing Pre/post-emergence	Herbicide activity	Herbicide Group ²
Triclopyr, butoxyethyl ester	Alligare Triclopyr 4	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, butoxyethyl ester	Element™ 4	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, butoxyethyl ester	Forestry Garlon® 4	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, butoxyethyl ester	Garlon® 4	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4
Triclopyr, butoxyethyl ester	Relegate® Selective Herbicide	R (d), I	Woody plants	Post	Foliar	4
Triclopyr, butoxyethyl ester	Forestry Garlon® XRT	S, R (d, u), I	Woody plants; annual & perennial broadleaf weeds	Post	Foliar	4

¹ S=site preparation; H=herbaceous weed control; R=conifer release, (d) directed spray, (u) understory broadcast, (dorm) during dormancy; I=individual stems, (bs) basal soil; W=wetlands; A=aquatic areas

² According to WSSA

³ Special Local Need (SLN) Label for distribution and use only in FL

⁴ Supplemental labeling for forestry use

⁵ Restricted-use pesticide in FL (ground and surface water concerns)

⁶ In conifer plantations, but not in forests

⁷ Registered in FL for 2014, but not in production