

# FOREST HERBICIDES

David J. Moorhead, Extension Forester

HERBICIDE	APPLICATION RATE	REI/PHI (Hours or Days)	REMARKS & PRECAUTIONS
<b>HERBICIDES FOR SITE PREPARATION</b>			
<i>sulfometuron methyl</i> + <i>metsulfuron methyl</i> Oust Extra	Broadcast/A 3-4 oz	4 H/ –	Add 0.25% by volume surfactant for improved control. For loblolly and slash pine only. Use lower rates on coarse textured loamy sands and sandy loam soils; and higher rates on fine textured sandy clay loam and silty clay loam soils. Apply just before or just after weed emergence and when rainfall will activate Oust in the soil. Pines may be transplanted in treated areas in the planting season following application.
<i>sulfometuron methyl</i> Oust XP	Broadcast/A 2-8 oz	4 H/ –	Add 0.25% by volume surfactant for improved control. For loblolly, slash, longleaf, and Virginia pine, use lower rates on coarse textured loamy sands and sandy loam soils, and higher rates on fine textured sandy clay loam and silty clay loam soils. Apply just before or just after weed emergence and when rainfall will activate Oust in the soil. Pines may be transplanted in treated areas in the planting season following application.
<i>glyphosate</i> Rodeo 5.4 lb ai/gal	Broadcast/A 1.5-7.5 qt  Directed/spot spray 0.75-10% by volume	4 H/ –	A nonionic surfactant must be used with Rodeo. For surfactants with more than 50% ai, mix 2 qt surfactant/100 gal of spray solution. For surfactants less than 50% ai mix 4 qt surfactant/100 gal spray solution. Apply to actively growing trees, brush, and weeds after full leaf expansion and before fall color and leaf drop. Aerial broadcast—apply 5-30 gal/A spray volume; ground broadcast – apply 10-60 gal/A spray volume; direct/spot spray—spray to wet foliage.
<i>glyphosate</i> Various trade names 4 lb ai/gal	Broadcast/A 2-10 qt  Directed/spot spray 0.75-10% by volume	4 H/ –	Check specific labels for surfactant requirements and mix rates. Do not use this formulation as an over-the-top pine release treatment as damage to desired conifers will occur. Apply to actively growing trees, brush and weeds after full leaf expansion and before fall color and leaf drop. Aerial broadcast – apply 5-30 gal/A spray volume; ground broadcast – apply 10-60 gal/A spray volume; direct/spot spray – spray to wet foliage.
<b>HERBICIDE TANK MIXES FOR SITE PREPARATION</b>			
<i>sulfometuron methyl</i> Oust XP	Broadcast/A 3 oz	4 H/ –	Applied with glyphosate or imazapyr site preparation treatments in the late summer or fall to provide herbaceous weed control in the following spring growing season. Refer to site preparation labels for appropriate tank mix rates.
<i>triclopyr</i> Garlon 4 + <i>Imazapyr</i> Arsenal AC, Polaris AC Imazapyr 4 SL	Broadcast/A 2-4 qt + 16-24 oz	12 H/ –	Conifers planted sooner than 1 month after treatment may be injured. See this URL for rate, treatment and planting date recommendations: <a href="http://www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf">http://www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf</a>
<i>imazapyr</i> + <i>glyphosate</i> OneStep	Broadcast/A 1 gal	12 H/ –	Premixed blend of 0.625 lb ae imazapyr and 2 lb ai glyphosate (equivalent to 40 oz of Chopper herbicide or 20 oz of Arsenal AC Applicators Concentrate herbicide and 2 qt of glyphosate). Apply June 15 through October (prior to leaf drop) for hardwood, grass and briar control. See this URL for rate, treatment and planting date recommendations: <a href="http://www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf">http://www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf</a>
<i>picloram</i> + 2, 4-D Tordon 101M* + <i>glyphosate</i>	Broadcast/A 6 + 10 qt  3 + 5 qt	48 H/ –	Allow at least 6 months after treatment before planting pines.  * Restricted use pesticide

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<b>HERBICIDE TANK MIXES FOR SITE PREPARATION (continued)</b>			
<i>picloram</i> + 2,4-D Tordon 101M* + <i>imazapyr</i> Arsenal AC, Polaris AC Imazapyr 4 SL	Broadcast/A  6-10 qt + 16-24 oz	48 H/ –	Allow at least 6 months after treatment before planting pines.  * Restricted use pesticide
<i>fosamine</i> Kernite UT 4 lb ai/gal + <i>imazapyr</i> Arsenal AC, Polaris AC Imazapyr 4 SL	Broadcast/A 2-6 qt  + 8-20 oz	12 H/ –	Special Local Need 24(c) labeling for pine plantations in the state of Georgia. For control of residual loblolly pine seedlings and hardwoods during site preparation. Controls ash, blackberry, blackgum, black locust, boxelder, cherry, dogwood, elms, oaks, red maple, sassafras, and sourwood. Apply as a foliar spray from mid- to late-summer before leaf color occurs. See this URL for rate, treatment and planting date recommendations <a href="http://www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf">www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf</a>
<i>saflufenacil</i> Detail	2-6 fl oz/A	12 H –	For control of wilding pines in site preparation. For best wilding pine control apply Detail herbicide with a glyphosate herbicide + surfactant (MSO at 1% v/v). Treat during active pine growth in late spring to early fall. Apply at least 15 GPA by aerial application and 25 GPA by ground to ensure thorough spray coverage. DO NOT plant tree seedlings within 2 months after herbicide application.
<i>aminopyralid</i> Milestone 2 lb ae/gal	7 oz/A	48 H/ –	For control of residual pine seedlings, add a nonionic surfactant. Tank mix with other forest herbicides to provide control of woody brush not susceptible to Milestone.
<i>triclopyr</i> Garlon 4 & generics + <i>picloram</i> + 2,4-D Tordon 101M*	Broadcast/A 2-4 qt + 6-8 qt	48 H/ –	Allow at least 6 months after treatment before planting pines.  * Restricted use pesticide
<i>triclopyr</i> Garlon 4 & generics + <i>picloram</i> Tordon K*	Broadcast/A 2-4 qt + 2-2.5 qt	48 H/ –	Allow at least 6 months after treatment before planting pines.  * Restricted use pesticide
<i>glyphosate</i> Various trade names 4 lb ai/gal + <i>picloram</i> Tordon K*	Broadcast/A 3-5 qt  + 2 qt/A	48 H/ –	Woody brush, trees, and herbaceous weeds, mix 2 or more quarts of a nonionic surfactant per 100 gal of spray solutions. Apply tank mix solution at 10-50 gal/A with ground application, or 5-30 gal/A by aerial (helicopter only) application. Allow 6 months after treatment before planting pine seedlings.  * Restricted use pesticide
<i>glyphosate</i> various trade names 4 lb ai/gal + <i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A 3-6 qt  + 2-16 oz	12 H/ –	Use lower rates for herbaceous weed control. Higher rates for dense stands or hard to control brush and trees. Use a nonionic surfactant, mix 2 or more quart nonionic surfactant per 100 gal spray solution. Ground application-spray 10-60 gal of tank mix per acre; aerial (helicopter) application-spray 5-30 gal tank mix/A. Apply after full leaf expansion until start of fall color. See this URL for rate, treatment and planting date recommendations: <a href="http://www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf">www.bugwood.org/Imazapyr_Site_Prep_6-2012.pdf</a>

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<b>HERBICIDE TANK MIXES FOR SITE PREPARATION (continued)</b>			
<i>glyphosate</i> various trade names 4 lb ai/gal + <i>sulfometuron methyl</i> Oust Extra	Broadcast/A 2-5 qt  + 4-8 oz	4 H/ –	Mix 2 or more quarts nonionic surfactant per 100 gal. of spray solution. Ground application – apply 10-60 gal/A. tank mix; aerial (helicopter) application – apply 5-15 gal/A tank mix. Treat after full leaf expansion until start of fall color. Loblolly and slash pine only. Provides herbaceous control in following spring.
<i>sulfometuron methyl</i> Oust Extra + <i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A 4-8 oz  + 5-12 oz	12 H/ –	This controls cherry, dogwood, elms, oaks (red and water), persimmon, sassafras, sweetgum, and suppresses hickory. Loblolly and slash pines may be transplanted in treated areas in the planting season following application. Provides herbaceous control the following spring.
<i>hexazinone</i> Velpar L + <i>metsulfuron methyl</i> + <i>sulfometuron methyl</i> Oust Extra	Broadcast/A 1-3 gal  + 4-8 oz	48 H/ –	Apply in late spring to early summer to point of full leaf expansion. Loblolly and slash pines may be transplanted in treated areas in the planting season following application. Velpar rates are dependent on soil texture. Follow label for specific rates on treatment area.
<i>metsulfuron methyl</i> + <i>sulfometuron methyl</i> Oust Extra	Broadcast/A 2-4 oz	4 H/ –	For release of loblolly and slash pine from hardwood, grass, and broadleaf weeds. For loblolly pine only: 4 oz of Oust Extra + 8-16 oz of Arsenal AC may be used for hardwood release.
<i>metsulfuron methyl</i> Escort XP + <i>imazapyr</i> Arsenal AC Polaris AC, Imazapyr 4 SL	Broadcast/A 1-2 oz  + 10-24 oz	12 H/ –	Controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, persimmon, oaks (red, white and water), sassafras, sweetgum, and Vacciniums. Suppresses blackberry, dogwood, elms, hickory, and red maple. Loblolly and slash pines may be transplanted in treated areas in the planting season following application.
<i>glyphosate</i> various trade names 4 lb ai/gal + <i>triclopyr</i> Garlon 4 & other trade names	Broadcast/A 3-5 qt  + 1-2 qt	12 H/ –	Mix 2 or more quarts of nonionic surfactant per 100 gal of tank mix. Apply 10-60 gal of tank mix/A by ground application or 5-30 gal/A by helicopter. Treat in late spring through early summer.
<i>hexazinone</i> Velpar L + <i>picloram + 2,4-D</i> Tordon 101M)	Broadcast/A 1-3 gal  + 1-2 gal	48 H/ –	Provides increased control of blackgum, pine sassafras, sourwood, and Prunus spp. Apply in late spring to early summer to point of full leaf expansion. When oak, elm, sweetgum, blackberry and Prunus are predominant, use 1.5-3 gal Velpar + 1 gal Tordon 101M. For blackgum, dogwood, sourwood and red maple control, use 1-3 gal Velpar + 1.5-2 gal Tordon 101M.

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<b>HERBICIDES FOR INJECTION, DIRECTED &amp; SPOT SPRAY TREATMENTS</b>			
2,4-D Various trade names	Basal spray	12 H/ –	Spray the lower 18-24" of plant stem with undiluted spray.
	Stump treatment	12 H/ –	Spray the bark and root collar area of the stump thoroughly with undiluted spray.
glyphosate Various trade names	Post directed spray 0.5-10% solution	4 H/ –	May be applied as a shielded or directed spray to the base of the trees. DO NOT apply over-the-top of desirable seedlings. Severe injury to trees will occur if the spray contacts the foliage. Use a 0.5% solution for control of annual weeds less than 6" tall (add a nonionic surfactant). A 1-2% solution will control perennial weeds. Use 5% solution for annual and perennial weed control if spray coverage is not complete. Use a 5-10% solution for woody brush and trees. Refer to the label for rates and surfactant recommendations for specific perennial weeds.
hexazinone Velpar L	Basal Soil treatment 2-4 ml/inch DBH	48 H/ –	Apply to root zone of undesirable hardwoods with a handgun application. Use 2-4 ml/inch of tree diameter at breast height on trees to be controlled. Place spots within 3 ft of root collar of trees to be controlled.
hexazinone Velpar L	Injection	48 H/ –	Inject 1 ml of undiluted Velpar L through bark of undesirable trees. Injections should be made at 4" intervals around stem. Treat in summer. Controls black cherry, oaks, red maple, and sweetgum.
imazapyr Various trade names. Arsenal AC, Chopper, Polaris AC, Polaris SP, Imazapyr 4SL, Rotary 2SL	Cut stump treatment	12 H/ –	Use a diluted solution of 6 oz Arsenal AC or 8-6 oz Chopper + 1 gal water and spray or brush onto cambium area inside the bark of freshly cut stump. Check specific herbicide labels for recommended rates.
	Injection	12 H/ –	Apply 1 ml of diluted solution (see above) at 1" interval cuts through the bark around the tree. Do not allow herbicide to be applied to soil as non-target vegetation can be injured.
	Hack and Squirt or Wide-spaced injection	12 H/ –	Spray or brush a diluted Arsenal AC solution into cuts placed at 2" intervals around the tree. If the concentrated solution (25% Arsenal AC or 50% Chopper) is used make one cut into the stem for each 3" of tree diameter and spray or brush the concentrated Arsenal AC solution into each cut. For example a 3" diameter stem will receive 1 cut while a 6" diameter stem will receive 2 cuts.
	Basal Bark	12 H/ –	8-12 oz of Chopper, Polaris SP, or Rotary 2SL in 1 gallon of diesel oil, basal oil or vegetable oil. Controls stems up to 4" in diameter. Apply to wet lower 12-18" of stem and do not allow to drip or puddle on soil.
picloram + 2,4-D Pathway Tordon 101R	Tree injection	48 H/ –	Apply 1 ml of undiluted Pathway through the bark completely around stem at 2-3" intervals. Treatment can be made any season. Do not treat maple during spring sap flow. Dogwood and hickory may require application to continuous overlapping cuts around the stem.
	Stump treatment	48 H/ –	Treat the cambium layer just inside of the bark of freshly cut stumps with undiluted Pathway.
picloram + 2,4-D Tordon 101M*	Tree injection	48 H/ –	Inject 1/2 ml of undiluted Tordon 101M or 1 ml of diluted (1:1 ratio in water) through the bark of undesirable trees at 3" intervals around the stem.
	Stump treatment	48 H/ –	Spray the cambium area inside the bark of freshly cut stump with undiluted or diluted (1:1) Tordon 101M.
triclopyr Garlon XRT Garlon 4 Element 4 & various trade names + Oil	Thinline or streamline	12 H/ –	Tank mix 20-30% Garlon 4 + 70-80% oil. Apply with a small orifice solid-stream nozzle. Make two streaks across the lower stem of smooth bark hardwoods smaller than 3" in diameter. Application can be made in any season. Generally most effective from 6 weeks prior to leaf expansion until 2 months after.
triclopyr Garlon 3A	Tree injection Hack & squirt	48 H/ –	Inject or spray 1/2 ml of undiluted or 1 ml of diluted (1:1 in water) through bark at 3-4" intervals around the stem.
	Stump treatment	48 H/ –	Spray the cambium area inside the bark of freshly cut stumps with undiluted Garlon 3A.

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<b>HERBICIDES FOR INJECTION, DIRECTED &amp; SPOT SPRAY TREATMENTS (continued)</b>						
<i>triclopyr</i> Pathfinder II 0.75 lb ai/gal	Basal Bark Treatment	12 H/ –	Apply undiluted product in low-pressure spray to stems less than 6" in basal diameter, wetting the lower 12-15" of stems including root collar. Do not spray to the point of runoff. Applications may be made year-round.			
	Stump Treatment	12 H/ –	Apply undiluted product to the cambium area of freshly cut stumps. Also wet sides of stump to root collar, but not to point of runoff. Apply year-round.			
<i>aminopyralid</i> Milestone 2 lb ae/gal	10% v/v in water	48 H/ –	Control of woody species: Cut-stump treatment – apply 10%v/v in water to freshly cut stump; Hack-n-squirt and Frill or Girdle – make cuts overlapping the circumference of the stem and apply 1 ml of a 10% v/v in water into each cut; Basal stem – mix 1-5% Milestone in a basal oil and apply as a 12-15" wide band from above the root collar. (24(c) SLN label for GA).			
<b>HERBICIDES FOR PINE RELEASE FROM HARDWOODS</b>						
<i>triclopyr</i> Garlon 4 Forestry Garlon 4 Garlon XRT	Directed spray	12 H/ –	To release conifers from red maple, sweetgum, oaks and hickory, mix 1-5 gal Garlon 4 in water to make 100 gal of mix. Direct spray to foliage of hardwoods using a backpack sprayer with flat fan nozzle. Hardwoods less than 6 ft tall are most effectively treated. Treatment can occur any time after hardwoods reach full leaf and before onset of fall color. Direct spray away from desirable conifer foliage.			
	2-4 qt/A	12 H/ –	Broadcast application for mid-rotation understory brush control in flatwoods pine stands. For control of gallberry and wax myrtle apply 2-4 qt of Forestry Garlon 4 to cover the foliage of understory competition, but DO NOT spray onto pines. Make applications from late summer (August) to fall (before leaf fall). Apply 30 gal/water/A. Forestry Garlon 4 may be tank mixed with Arsenal AC or Escort to increase control of palmetto, titi, fetterbush etc.			
<i>hexazinone</i> Velpar L	Broadcast/A Spot Grid Treatment 2-8 qt	48 H/ –	For control of hardwoods in loblolly, longleaf, slash, shortleaf and Virginia pines. Apply undiluted Velpar L in a grid pattern to transplants 1 year old or 4 years and older. Injury may occur if pines are 2-3 years old. Rate is dependent on soil texture			
			<b>Soil Texture</b>	<b>Milliliters/Spot</b>	<b>Grid (Feet)</b>	<b>Quarts/Acre</b>
			Coarse	0.05 1.2 2.1	3 x 4 3 x 6 4 x 6	2* 3 4
			Medium/Fine	1.2 3.3 1.6 3.1	3 x 3 3 x 6 3 x 3 3 x 6	6 6 8 8
			*Use on deep sand with pine 4 or more years of age.			
	Broadcast/A 2-6 qt	48 H/ –	For control of hardwoods in loblolly, longleaf, slash, shortleaf and Virginia pines at ages 4+ years old on coarse textured soils, or 3+ years old on medium textured soils. Apply when loblolly pine is between flushes or growth spurts and from early spring to early summer when hardwoods are in half leaf to point of full leaf growth. Do not use a surfactant. Some pine mortality may occur, and some pines may show discolored foliage. 1-2 inches of rain are needed for soil activation.			
			<b>Soil Texture</b>		<b>Quarts/Acres</b>	
			Loamy sand, sandy loam		2-3	
			Loam, silt loam, sandy clay loam		2-4	
	Silty clay loam, clay loam, sandy clay, silty clay, clay		4.5-6			
<i>metsulfuron methyl</i> Escort XP	Broadcast/A 1-4 oz	4 H/ –	Release of loblolly and slash pine from hardwoods and brush. Apply over the top of established trees.			

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<b>HERBICIDES FOR PINE RELEASE FROM HARDWOODS (continued)</b>			
<i>metsulfuron methyl</i> Escort XP + <i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A 1-2 oz + 8-16 oz	12 H/ –	In 2-year-old loblolly pine plantations controls blackberry, blackgum, elm, cherry and broadleaf weeds. Apply with 1 qt surfactant in 100 gal in late summer, early fall.
<i>metsulfuron methyl</i> (Escort XP) + <i>sulfometuron methyl</i> Oust XP	Broadcast/A 0.5-1.5 oz + 2-3 oz	4 H/ –	Release of loblolly and slash pine from hardwoods and brush. Treat when pines are at least 3 years old on fine textured soils, 4 years and older on coarse textured soils. Apply from full leaf to just before leaf tissue hardens in the fall.
<i>sulfometuron methyl</i> + <i>metsulfuron methyl</i> Oust Extra	Broadcast/A 2-4 oz	4 H/ –	For release of loblolly and slash pine from hardwood, grass, and broadleaf weeds. For loblolly pine only, 4 oz of Oust Extra + 8-16 oz of Arsenal AC may be used for hardwood release.
<i>metsulfuron methyl</i> Escort XP + <i>hexazinone</i> Velpar L	Broadcast/A 1-2 oz + 1.5-6 qt	48 H/ –	Brush and herbaceous weed control in loblolly and slash pine plantations. Do not use a surfactant. Treat when pines are at least 3 years old on fine textured soils, 4 years and older on coarse textured soils.
<i>glyphosate</i> Rodeo + <i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A 0.75-1.5 qt + 2-16 oz	12 H/ –	Apply after final resting buds have formed on conifers in the fall. Actively growing conifers will be damaged. Follow Accord label recommendation for surfactant use. Will control woody brush, trees and herbaceous weeds.
<i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A 12-20 oz	12 H/ –	Release loblolly pine in first growing season following planting or for one year old natural loblolly pine regeneration. Apply after July 15.
	Directed spray 0.5-5% solution	12 H/ –	Apply to foliage and buds of undesirable hardwoods competing with pines with a low-volume directed spray. Avoid application to foliage of desirable pines. Use a nonionic surfactant at 0.25% by volume.
	Broadcast/A 12-16 oz	12 H/ –	For slash and longleaf pine, broadcast-release treatments over the top of pines to control hardwoods must be made after August 15 and ONLY in stands 2-5 years old. DO NOT use a surfactant and use the lower rate on sandy soils. For slash pine older than 5 years, apply 12-14 oz/A after September 15. DO NOT use a surfactant and use the lower rate on sandy soils.

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<b>HERBICIDES FOR HERBACEOUS WEED CONTROL IN PINE PLANTATIONS</b>			
<i>triclopyr</i> Garlon 3A	Directed spray 1-5%	48 H/ –	To release conifers from red maple, sweetgum, oaks, ash and hickory, mix 1-5 gal of Garlon 3A in 100 gal water + a nonionic surfactant. Apply as a directed spray to the foliage of weed trees with a backpack sprayer. Treat after hardwoods have leafed out and before fall coloration. Hardwoods less than 6 feet tall are most economically and safely treated. Direct spray away from foliage of desired pines.
<i>triclopyr</i> Pathfinder II 0.75 lb ai/gal	Streamline Basal Bark Treatment	12 H/ –	Apply undiluted product in a directed straight-stream spray to one side of stems less than 3” in basal diameter to treat a 6” wide zone on the stem 1-2 ft above ground. On stems 3-4” in basal diameter, treat both sides of the stems. Apply in spring 6 weeks prior to hardwood leaf expansion until 2 months after leaf expansion is completed.
<i>atrazine</i> AAtrex Nine-O & other trade names* or AAtrex 4L & other trade names*	Broadcast/A 2.2-4.4 lb Nine/O or 4-8 pt 4L	12 H/ –	For annual broadleaf and grass weed control in loblolly and slash pine plantations. Apply to established trees between fall and early spring. For new transplants apply during or soon after transplanting.  * Restricted use pesticide
<i>fluzifop-p-butyl</i> 2 lb ai/gal 24.5% Fusilade DX	Broadcast/A 16-24 oz	12 H/ –	Grass control. Apply to actively growing nonstressed grasses 2-8” tall. Perennial grasses such as bermudagrass may require second application to regrowth. Add 1% crop oil concentrate (2 pt/25 gal) or 0.25% (0.5 pt/25 gal) nonionic surfactant to all applications. Avoid contact with conifer foliage by directing spray.
<i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A 4-10 oz	12 H/ –	For herbaceous weed control in loblolly and Virginia pine plantations use 6-10 oz/A Arsenal AC. In slash pine use 4-8 oz/A and in longleaf pine use 4-6 oz/A without adding a surfactant. Apply as a broadcast or directed spray. For loblolly pine, a nonionic surfactant may be added at a 0.25% by volume rate. Some pine growth inhibition may occur if treatment is made during active periods of pine growth. Best control is achieved by application to newly emerged weeds.
<i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL + <i>sulfometuron methyl</i> Oust XP	Broadcast/A  4-6 oz + 2 oz	12 H/ –	To control many broadleaf weeds, blackberry and suppression of hardwood sprouts in loblolly pine.
<i>metsulfuron methyl</i> Escort XP	Broadcast/A 0.5-1.5 oz	4 H/ –	For blackberry and annual broadleaf weed control in loblolly and slash pine plantations. Do not use a surfactant on trees 1 year old or less. In older trees add 1 qt surfactant/100 gal water. Treat when weeds have reached point of full leaf and before tissue hardens off.
<i>sulfometuron methyl</i> + <i>metsulfuron methyl</i> Oust Extra + <i>imazapyr</i> Arsenal AC Polaris AC Imazapyr 4 SL	Broadcast/A  2-4 oz + 4 oz	12 H/ –	Control of herbaceous weeds (ragweed, dogfennel, panic grass) and suppression of perennial grasses such as bermudagrass & johnsongrass.  Loblolly pine: 2-4 oz Oust Extra + 4-6 oz imazapyr/A. Slash pine: 2 oz Oust Extra + 4 oz imazapyr (do not add a surfactant).
<i>aminopyralid</i> Milestone 2 lb ae/gal	7 oz/A	48 H/ –	Control of briars, vines and broadleaf weeds in LONGLEAF PINE ONLY (24(c) SLN label for GA). Apply over-the-top of newly planted longleaf or those in the grass stage (some injury to seedlings with active bud/shoot growth). Do not use a surfactant. Can tank mix with up to 5 oz of Arsenal AC (or equivalent product without surfactant) per acre. Applications in late spring to early summer provide best weed control. Later season applications have not been evaluated but are not restricted by the label.

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<b>HERBICIDES FOR HERBACEOUS WEED CONTROL IN PINE PLANTATIONS (continued)</b>			
<i>clethodim</i> Envoy Plus 0.94 lb ai/gal 12.6%	Broadcast/A 9-16 oz Annual grasses 12-32 oz Perennial grasses	24 H/ –	Apply over the top control of pine seedlings for postemergence control of annual and perennial grasses. This product will not control broadleaves or sedges. Use a crop oil concentrate containing at least 15% emulsifier at 1% v/v (not less than 1 pt/A).
<i>clethodim</i> Arrow 2 EC 2 lb ai/gal 26.4%	6-8 oz/A for annual grasses 8-16 oz/A for perennial grasses	24 H/ –	Post-emergent treatment of grasses. Can be applied over-the-top of pines. Add crop oil concentrate which contains at least 15% emulsifier at 1% v/v (1 qt/25 gal spray solution, but no less than 1 pt/A) or non-ionic surfactant at 0.25% v/v (1 qt/100 gal).
<i>clethodim</i> Envoy Plus 0.94 lb ai/gal 12.6%	Broadcast/A 9-16 oz Annual grasses 12-32 oz Perennial grasses	24 H/ –	Apply over the top control of pine seedlings for postemergence control of annual and perennial grasses. This product will not control broadleaves or sedges. Use a crop oil concentrate containing at least 15% emulsifier at 1% v/v (not less than 1 pt/A).
<i>clethodim</i> Arrow 2 EC 2 lb ai/gal 26.4%	6-8 oz/A for annual grasses 8-16 oz/A for perennial grasses	24 H/ –	Post-emergent treatment of grasses. Can be applied over-the-top of pines. Add crop oil concentrate which contains at least 15% emulsifier at 1% volume/volume (1 qt/25 gal spray solution, but no less than 1 pt/A) or non-ionic surfactant at 0.25% v/v (1 qt/00 gal).
<i>pendimethalin</i> Pendulum 3.3 EC	Broadcast/A 2.4-4.8 qt	24 H/ –	Use low rates for short-term weed control (2-4 months) and higher rates for long-term weed control (6-8 months). Apply over-the-top after planting slits have sufficiently closed to prevent contact of Pendulum with roots. Pendulum must be applied to weed-free soil to provide pre-emergent weed control and will not control weeds already germinated.
<i>sulfometuron methyl</i> Oust XP	Broadcast/A 2-8 oz	4 H/ –	Controls herbaceous weeds in loblolly, slash, longleaf and Virginia pine. Do not use a surfactant. Use broadcast or band application before or just after weed emergence. Check soil pH before application. Reduce rate or do not apply if pH is 6.5 or above.
<i>sulfometuron methyl</i> Oust XP + <i>atrazine</i> Various trade names Nine-O* or 4L*	Broadcast/A 2-4 oz + 2.2-4.4 lb Nine O or 4-8 pts 4L	12 H/ –	Controls annual broadleaf weeds and grasses in loblolly and slash pine plantations. Use higher rate on medium to fine textured soils when organic matter exceeds 2%. Use a minimum of 20 gal of spray mix/A by ground application only as preemergence or early post-emergence spray. Check soil pH and soil organic matter before application. Reduce rate or do not apply Oust if pH is 6.5 or above.  * Restricted use pesticide
<i>sulfometuron methyl</i> Oust XP + <i>hexazinone</i> Velpar L	Broadcast/A 2-4 oz + 2-3 pt	48 H/ –	For use in loblolly, slash and longleaf pine plantations. Controls grasses and broadleaf weeds. Do not use a surfactant with this tank mix. Make broadcast, band or spot application from late winter to late spring. Do not apply when pines are under stress. Check soil pH and soil organic matter before application. Reduce rate or do not apply Oust if pH is 6.5 or above. If soil organic matter is less than 2% apply only 21 oz of Velpar.
<i>sulfometuron methyl</i> Oust XP + <i>metsulfuron methyl</i> Escort XP	Broadcast/A 2-3 oz + 0.5-1.5 oz	4 H/ –	For control of blackberry and herbaceous weeds in loblolly and slash pine plantations. Apply from late winter through spring after soil has settled after planting. Do not use a surfactant.

**FOREST HERBICIDES**

HERBICIDE	APPLICATION RATE	REI/PHI (Hours or Days)	REMARKS & PRECAUTIONS		
<b>HERBICIDES FOR HERBACEOUS WEED CONTROL IN PINE PLANTATIONS (continued)</b>					
<i>sulfometuron methyl</i> + <i>hexazinone</i> Oustar	Broadcast/A Rates vary by soil texture and seedling age	48 H/ –	Check soil pH and soil organic matter before application. If pH is 6.3 or above, or soil organic matter is less than 2% apply only 10 oz of Oustar.		
			<b>Soil Texture</b>	<b>1<sup>st</sup> Year Weed Control</b>	<b>2<sup>nd</sup> Year Weed Control</b>
			Coarse Textured <i>Loamy sand</i> <i>Sandy loam</i> <i>Sand</i>	10-12 oz/A	12-16 oz/A
			Medium Texture <i>Laom</i> <i>Sandy clay loam</i> <i>Silt loam</i>	12-16 oz/A	16-19 oz/A
			Fine Texture <i>Clay loam</i> <i>Sandy loam</i> <i>Silty clay loam</i> <i>Silty clay</i>	16-19 oz/A	18-24 oz/A
			Fine Textured <i>Clay</i>	Not recommended	Not recommended
<i>sulfometuron methyl</i> Oust XP + <i>metsulfuron methyl</i> Escort XP	Broadcast/A 2-3 oz + 0.5-1.5 oz	4 H/ –	For control of blackberry and herbaceous weeds in loblolly and slash pine plantations. Apply from late winter through spring after soil has settled after planting. Do not use a surfactant.		
<i>sulfometuron methyl</i> + <i>metsulfuron methyl</i> Oust Extra	2.66-4 oz/A for loblolly pine 2.66-3 oz/A for slash pine	4 H/ –	For control of blackberry and herbaceous weeds, and suppression of bermudagrass and johnsongrass. Do not use a surfactant.		
<i>clopyralid</i> Transline, Clean Slate 3 lb ai/gal 40.9%	0.25-1.33 pt/A	12 H/ –	Post-emergence control of herbaceous weeds, including cocklebur, coffeeweed, horseweed, kudzu, nightshade, ragweed, sicklepod, thistle, and vetch in pine plantations applied as an over-the-top spray. Addition of surfactants can enhance activity – follow label directions for specifics.		

\* Restricted use pesticide

## FOREST VEGETATION MANAGEMENT TERMINOLOGY

The elimination of the undesirable vegetation in pine plantations requires that the applicator be familiar with certain herbicide systems and terminology as related to forestry.

1. Band treatment – Applied to a continuous restricted area such as on or along a crop row rather than over the entire field area.
2. Basal treatment – Applied to encircle the stem of a plant at and above the ground level. It is usually applied with a backpack sprayer.
3. Brush control – Control of woody plants such as sprout clumps, shrubs, small undesirable trees and vines.
4. Cambium – Tissue lying just under the bark that produces new wood and bark in the tree.
5. Concentration – The amount of active ingredient or herbicide equivalent in a quantity of carrier (such as water, oil, or dust) expressed as percent, lb/gal, ml/l, etc.
6. DBH (diameter/breast/height) – Diameter of trees at a point 4.5 ft above ground level.
7. Directed application – Precise application to a specific area of plant organ; such as to a row or bed, or to the lower leaves and stems of plants.
8. Dormant spray – A chemical applied during the dormant season.
9. Foliar application – Application of a herbicide to the leaves or foliage of plants.
10. Frill – Series of overlapping cuts into the sapwood completely around the circumference of tree. Chips are not removed, but left to hold the herbicide in cuts. Herbicide can be applied with a brush, squirt/bottle or sprayer.
11. Girdling – Complete removal of a band of bark from around a woody stem.
12. Hardened off – Term denoting stage of plant development when terminal buds have formed and stem and root tissues have ceased growth. Dormant stage of pine seedlings is often denoted by purplish or bronze/colored needles.
13. Herbaceous – Plants with non-woody stems that normally die back to the ground in the winter.