

List of Pesticides Approved for Forestry Use

Read and follow all pesticide labels.

Product Name	Active Ingredient(s)	ESRA?	Approved?	EPA Reg. #	CAS Reg. #	Restricted entry interval (hours)	Target Pest Examples (common name)	Comments
Accord XRT II	Glyphosate (5 lb/gal)	Yes	Yes	62719-556	1071-83-6	4	Native and nonnative woody, grass, and broadleaf plant species; reed canary grass, nonnative Phragmites, Japanese hops, cattail	May be used on upland and seasonally dry wetlands; do not apply to surface water; surfactant is included
Arsenal AC	Isopropylamine salt of imazapyr (4 lb/gal)	Yes	Yes	241-299	81510-83-0	48	Woody and herbaceous weeds as well as annual and perennial grasses	
Captan 50WP	Trichloromethylio	No	No	66330-234	133-06-2	48	Control of fungal diseases of shrubs and trees and a soil treatment for seed rots	Fungicide
Cellu-Treat	Boron sodium oxide, tetrahydrate	No	No	64405-8	12280-03-4	N/A	Heterobasidion annosum root rot	
Chopper	Isopropylamine salt of imazapyr (2 lb/gal)	Yes	Yes	241-296	81510-83-0	48	Native and nonnative woody, grass, and broadleaf plant species	Can be used for site prep and conifer release; do not plant seedlings of spruce within 3 months or red pine within 6 months on sites that have been site prepped with a broadcast treatment of Chopper
Cornerstone	Glyphosate (4 lb/gal)	Yes	Yes	1381-191	38641-94-0	4	Annual and perennial broadleaf weeds and grasses	
Crossbow	2,4-D (2 lb/gal) & triclopyr (1 lb/gal)	No/Yes	No	62719-260	93-76-5	until sprays have dried	Crown and cow vetch, birdsfoot trefoil, tansy, burdock, woody species	
DMA 4 IVM	2,4-D-dimethylammonium (3.8 lb/gal)	No	No	62719-3	2008-39-1	48	Native and nonnative woody and broadleaf plant species	
Envoy Plus	Clethodim (1 lb/gal)	No	No	59639-132	99129-21-2	24	Annual and perennial grasses	
Escort XP	Metsulfuron-methyl	Yes	Yes	432-1549	74223-64-6	4	Broadleaf weeds - common tansy, sweet clover, thistles, garlic mustard, wild parsnip, teasel, etc.	Can be mixed with other herbicides (glyphosate, imazapyr); most effective prior to flower development; mowing and spraying regrowth can be very effective; early and late-season application to garlic mustard rosettes reduces damage to non-target species
Freelexx	2,4-D choline salt (3.8 lb 2,4-D/gal)	No	No	62719-634	1048373-72-3	48	Native and nonnative woody and broadleaf plant species	
Garlon 3A	Triclopyr trimethylamine salt (3 lb triclopyr/gal)	Yes	Yes	62719-037	57213-69-1	48	Native and nonnative woody and broadleaf plant species; thistles, garlic mustard, hawkweed, poison ivy	Stump, foliar, and other label-listed methods; may be used in and around standing water; use a non-ionic surfactant (e.g., Activator 90)
Garlon 4 Ultra	Triclopyr ester (4 lb triclopyr/gal)	Yes	Yes	62719-527	64700-56-7	12	Native and nonnative woody and broadleaf plant species (including buckthorn, Caragana, bush honeysuckles, poison ivy)	Cut stump, basal bark, injection, girdle, and frill applications; also foliar treatment when mixed with water
Garlon XRT / Forestry Garlon XRT	Triclopyr ester (6.3 lb triclopyr/gal)	Yes	Yes	62719-553	64700-56-7	12	Native and nonnative woody and broadleaf plant species; broadleaf plant control (no effect on grasses at labeled rates)	Cut stump, basal bark, and foliar applications; do not apply to surface water; usually add a surfactant (Activator 90 @ 0.5% total spray volume)
Intensity One	Clethodim (1 lb/gal)	No	No	34704-864	99129-21-2	24	Annual and perennial grass, including quackgrass	
Method 240SL	Potassium salt of aminocyclopyrachlor (2lb/gal)	Yes	Yes	432-1565	858956-35-1	until sprays have dried	Leafy spurge	Recommended for bare ground (e.g., gravel pit) application to control leafy spurge; stay away from water and trees (soil residual activity)
Milestone	Aminopyralid (2 lb/gal)	Yes	Yes	62719-519	150114-71-9	48	Vetches, birdsfoot trefoil, thistles, common tansy, large-leaved lupine, teasel, knapweeds, hawkweed, oxeye daisy, burdock; native and nonnative woody and broadleaf plant species	Treatments of annual, biennial, and perennial nonnative broadleaf plants; most effective on early growth stages; mowing and spraying regrowth can be effective; foliar and cut stump applications; avoid contact with desirable vegetation; NOT recommended for leafy spurge control
OpenSight	Aminopyralid (0.62 lb/lb) & Metsulfuron-methyl (0.0945 lb/lb)	Yes	Yes	62719-597	150114-71-9 + 74223-64-6	48	Loosestrife, tansy, knapweeds, vetches, burdock, garlic mustard, thistles, wild parsnip; native and nonnative woody and broadleaf plant species	Used alone on woody species or in mixture with other approved herbicides; this is a combination of Milestone + Escort; most effective on thistles at the rosette stage or before bud development
Oust XP	Sulfometuron-methyl	Yes	Yes	432-1552	74222-97-2	4	Annual and perennial grasses and broadleaf weeds	Controls weeds by both preemergence and postemergence activity; may use a surfactant but don't need one; soils test not required
Oxidate 2.0	Hydrogen Dioxide & Peroxyacetic Acid	No	No	70299-12	7722-84-1 + 79-21-0	1	Used to treat and control plant pathogens	Bactericide and fungicide
Pathfinder II	Triclopyr ester (0.75 lb/gal)	Yes	Yes	61719-176	64700-56-7	12	Native and nonnative woody and broadleaf plant species	Cut stump, basal bark, injection, girdle, and frill applications; Ready-to-Use formula requires no mixing -- great for using in Buckthorn Blasters; also can be used as foliar treatment when mixed with water
Pathway	Picloram & 2,4-D	No	No	62719-31	8067-55-8	48	Native and nonnative woody plant species	Ready-to-use product for cut-stump applications
Perm-Up 3.2EC	Permethrin (3.2 lb/gal)	No	No	70506-9	52645-53-1	12		Insecticide
Plantskydd	Dried blood (porcine and/or bovine)	No	No	N/A	N/A	N/A	Deer, rabbits	Animal repellent

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Plateau	Imazapic ammonium salt (2 lb/gal)	Yes	Yes	241-365	115136-53-3	12	Leafy spurge	Recommended for control of leafy spurge in grassy areas or near trees (as opposed to Method 240SL for bareground application); late summer or fall application recommended
Razor Pro	Glyphosate (4 lb/gal)	Yes	Yes	228-366	38641-94-0	4	Native and nonnative woody and broadleaf plant species	Includes surfactant, so no need to add surfactant
Rodeo	Glyphosate (5.4 lb/gal)	Yes	Yes	62719-324	38641-94-0	4	Native and nonnative woody, grass, and broadleaf plant species; reed canary grass, nonnative Phragmites, Japanese hops, cattail	Non-selective (will control both broadleaf and grasses); may be used in and around water and wetlands; do not apply to open bodies of water where woody brush, trees and herbaceous weeds do not exist; requires use of a non-ionic surfactant; NOT recommended for leafy spurge control
Roundup Pro	Glyphosate (4 lb/gal)	Yes	Yes	524-529	38641-94-0	4	Native and nonnative woody, grass, and broadleaf plant species	Broad spectrum herbicide; broadcast from spray gun or boom sprayer allowed; no aerial spraying allowed; late- and early-season rosette treatment; foliar or leaf spraying applications may be appropriate if non-target plants are not a concern during growing season; NOT recommended for leafy spurge control
Transline	Clopyralid (3 lb/gal)	Yes	Yes	62719-259	1702-17-6	12	Knapweeds, thistles, vetches, birdsfoot trefoil, clovers; Caragana, black locust, Russian olive; native and nonnative woody and broadleaf plant species	For annual and biennial broadleaf species, it is best to treat before seed set; for woody species, year-round treatment is an option; more selective than Milestone
Vastlan	Triclopyr choline (4 lb triclopyr/gal)	Yes	Yes	62719-687		24	Native and nonnative woody and broadleaf plant species	
Velpar L and DF	Hexazinone (2 lb/gal)	No	No	61842-48	51235-04-2	48	Pre-emergent and post-emergent control of herbaceous and woody species	Can be used for site prep and release; application rate varies with soil texture (see label); soil active so be careful around trees; soil test for % organic matter required before use
Adjuvants:								
Activator 90								Non-ionic surfactant; can be used if aquatic label needed; will damage jack pine
Bark Oil Blue								For basal bark and stump treatments with plant herbicides that are labeled for mixing with oil
Choice								Water conditioner for use @ 0.25% with all glyphosate formulations
Liberate								Non-ionic surfactant; very good site prep surfactant; do not use for release
Penetron								Non-ionic surfactant; preferred surfactant for release; not for aquatic use

To propose additional product(s) to be added to this list, contact Mike Reinikainen (mike.reinikainen@state.mn.us)

Pesticide Application Methods

Read and follow all pesticide labels.

Pesticide Application Method	Recommended Uses	Comments (application method, season, etc.)
Aerial spraying from helicopter	Used for site preparation and release of conifers from vegetative competition.	See Aerial Pesticide Aviation Plan for details, including restrictions and requirements.
Boom sprayer from skidder, tractor, ATV, or truck Low and high volume	Used for site preparation and release of conifers from competing vegetation. Also used to control nonnative plant infestations over large areas and along roads and right-of-ways.	Success with low volume treatments is dependent on precision application of an effective product mixture. Spray equipment must be properly calibrated . See Appendix XX for pesticide recommendations.
Combination mowing and herbicide application	Used with narrow spectrum herbicides for control of nonnative plants over large areas, such as leafy spurge, spotted knapweed, and buckthorn.	This is done using a specialized brush saw or mower that applies herbicide along the cutting surface.
Back pack or hand spraying Low volume	Used for spot treatments on foliage, basal bark treatments, or cut surface treatment methods (including cut stump and hack-and-squirt).	Success with low volume treatments is dependent on precision application of an effective product mixture. Spray equipment must be properly calibrated . See Appendix XX for pesticide recommendations.
Wicking tools	Used for spot treatments on foliage.	Can be applied using handheld applicators or mounting wick applicators to ATV or tractor. Wipes pesticide directly onto vegetation to reduce potential of drift. Examples include the Smucker weed
Daubers	Used for cut stump or basal bark treatments.	Example tools are the Buckthorn Blaster and PVC "Kill stick"

Pesticide Recommendations for Invasive Species Treatment Projects

Read and follow all pesticide labels.

Pesticide	Canada thistle	Common tansy	Garlic mustard	Knapweeds	Leafy spurge	Musk & plumeless thistles	Non-native Phragmites	Reed canary grass	Teasels	Wild Parsnip	Woody plant - basal/cut stump	Woody plants - foliar
Escort		1 oz	1 oz						1 oz	1 oz		1-2 oz
Garlon 4 Ultra											25%	3-6 qt
Garlon XRT												2-4 qt
Method 240SL^					6 oz							
Milestone	7 oz			5 oz		5 oz						
Opensight*	3.3 oz	3.3 oz		2.5 oz		2.5 oz			3.3 oz	3.3 oz		
Pathfinder II											RTU	
Plateau^					8 oz							
Rodeo							2-4 qt	2-4 qt				1.5-2.25 qt
Transline	16 oz			12 oz		12 oz						

RTU = ready to use

Many pesticides must be mixed with a surfactant such as Penetron, Activator 90 or Liberate.

Choice is a water conditioner recommended for use with all glyphosate mixes.

Bark oil blue should usually be used when conducting basal or cut stump treatments.

Rates are in volume per acre or percent. Rates are based on single pesticide applications, not tank mixes.

For tank mixes, see label guidelines.

*Opensight is a combination of Milestone and Escort. 3.3oz Opensight contains the equivalent of 7 oz Milestone and 0.54 oz Escort XP.

Pesticide Tank Mixes Recommended for Forestry Site Preparation Projects

Read and follow all pesticide labels.

Pesticide or Surfactant	Used alone	Labeled tank mixes <i>Be sure the species to be planted are on BOTH labels</i>	Other tank mixes
Accord XRT Contains surfactant	<i>All species: 1.5-8 qt/ac</i>	Labeled tank mixes on Accord label: Chopper, Escort, Garlon 3A, Garlon 4, Oust Species on Accord label: <i>All species</i> Species on Garlon labels: <i>All species</i> Species on Oust label: <i>Black Spruce, Tamarack</i> Tank mix rate on Accord label: 1-4 oz Oust + 1.5-8 qt Accord/ac	<i>White Spruce: up to 1 oz/ac Oust + Accord, wait 3 months before planting</i> <i>Red Pine: 0.5-1.25 oz/ac Oust + Accord, wait 3 months before planting</i>
Rodeo Requires non-ionic surfactant	<i>All species: 1.5-8 qt/ac</i>	Labeled tank mixes on Rodeo label: Garlon 3A, Garlon 4, Oust Species on Rodeo label: <i>All species</i> Species on Garlon labels: <i>All species</i> Species on Oust label: <i>Black Spruce, Tamarack</i> Tank mix rate on Rodeo label: 1-4 oz Oust + 0.75-7.5 qt Rodeo/ac	<i>White Spruce: up to 1 oz/ac Oust + Rodeo, wait 3 months before planting</i> <i>Red Pine: 0.5-1.25 oz/ac Oust + Rodeo, wait 3 months before planting</i>
Forestry Garlon XRT Usually add Activator 90	<i>All species: 2-4 qt/ac</i>	Garlon plus Accord tank mix is on the Accord label. Species on Accord label: <i>All species</i> Species on Garlon label: <i>All species</i>	<i>White Spruce: Oust 1 oz/ac + Garlon, wait 3 months before planting</i>
Garlon 3A Add Activator 90	<i>All species: up to 8 qt/ac</i>	Garlon plus Accord tank mix is on the Accord label. Species on Accord label: <i>All species</i> Species on Garlon label: <i>All species</i>	
Oust XP	<i>Black Spruce: 2-4 oz/ac, wait 13 months to plant</i> <i>Tamarack: 2.5-4 oz/ac, wait 8 months to plant</i> <i>Red Pine: 1-2oz/ac</i>	Labeled tank mix on Oust label: None Oust + Accord tank mix is on Accord label: 1-4 oz Oust + 1.5-8 qt Accord Species on Oust label: <i>Black Spruce, Tamarack</i> Species on Accord label: <i>All species</i>	<i>Red Pine: Oust at rates of either 0.5 oz/ac on coarse texture soil or 1.25 oz/ac on fine texture soil with Accord, wait 3 months before planting</i> <i>White Spruce: Oust alone 1 oz/ac or 1/oz Oust with Garlon 4 or 1 oz Oust with Accord. Wait 3 months before planting</i>
Activator 90 non-ionic surfactant	Use 0.5% Activator, which is the same as 0.5 gal/100 gal of spray mix or 2 qt/100 gal spray mix		

Pesticide Tank Mixes Recommended for Forestry Site Preparation Projects

Read and follow all pesticide labels.

Pesticide or Surfactant	Used alone	Labeled tank mixes <i>Be sure the species to be planted are on BOTH labels</i>	Other tank mixes
Liberate non-ionic surfactant	Use 0.25% Liberate, which is the same as 1 qt/100 gal of spray mix	Very good site prep surfactant. Do not use for release.	
Choice water conditioner	Water conditioner for use at 0.25% with all glyphosate formulations		

Additional products recommended for site preparation projects include:

Accord XRT II
 Arsenal AC
 Chopper
 Escort XP
 Garlon 3A
 Garlon 4 Ultra
 Garlon XRT/Forestry Garlon XRT
 Oust XP
 Rodeo
 Vastlan
 Velpar DF or L

Pesticide Tank Mixes Recommended for Forestry Release Projects

Read and follow all pesticide labels.

Pesticide or Surfactant	Used alone	Labeled tank mixes <i>Be sure the species to be planted are on BOTH labels</i>	Other tank mixes
Rodeo Add Penetron	After conifers have been established for 1 growing season. <i>All species: 0.75-1.5 qt/ac</i>	Labeled tank mixes on Rodeo label: Oust Species on Rodeo label for tank mix with Oust: <i>Jack Pine, White Spruce: 0.75-1.5 qt Rodeo + 1-3 oz Oust</i> <i>White Pine: 0.75 - 1.5 qt Rodeo + 1-1.5 oz Oust</i>	<i>Red Pine</i> : 0.5-1.25 oz/ac Oust + Rodeo, must be 3 or more months after planting
Forestry Garlon XRT Usually add Activator 90	<i>Spruce, Balsam Fir, Red Pine: 1-2 qt/ac.</i> Apply only after buds harden off. 2 qt and up may cause some <i>Red Pine</i> damage. Over the top application on pine species may result in mortality.	Labeled tank mixes on Garlon label: None	Do not use to release <i>Jack Pine</i> . Good tank mix partner with Accord/Rodeo to control <i>Maple/Oak</i> .
Garlon 3A Add Activator 90	<i>Spruce, Balsam Fir, Red Pine: 2-4 qt/ac</i>	None	When tank mixing with Rodeo, see Rodeo label for mixing instructions.
Oust XP	Use only after rainfall has settled soil around planting slit. Label says do not use a surfactant, however when using a tank mix with glyphosate add a surfactant. Do not use on Christmas trees or hardwood or conifer ornamentals. <i>Red Pine: 1.5-2 oz/ac</i> <i>Jack Pine: 2-8 oz/ac</i> <i>White Pine: 1-1.5 oz/ac</i> <i>White Spruce: 1.5-3 oz/ac</i>	Labeled tank mix on Oust label: None Oust + Rodeo tank mix is on Rodeo label. Species and rates on Rodeo label: <i>Jack Pine, White Spruce : 1-3 oz/ac Oust</i> <i>White Pine: 1-1.5 oz/ac Oust</i>	<i>Red Pine</i> : Oust at rates of either 0.5 oz/ac on coarse texture soil or 1.25 oz/ac on fine texture soil with Rodeo. Wait 3 months after planting.
Activator 90 non-ionic surfactant	Use 0.5% Activator, which is the same as 0.5 gal/100 gal of spray mix or 2 qt/100 gal spray mix	Do not use to release <i>Jack Pine</i> .	
Penetron non-ionic surfactant	With Rodeo, use 1% Penetron in total spray mix. When applying 10 gallons of spray/ac, use 12.8 oz Penetron/ac, which is the same as 1 gal Penetron/100 gal of spray mix.	Preferred surfactant for release.	

Pesticide Tank Mixes Recommended for Forestry Release Projects

Read and follow all pesticide labels.

Pesticide or Surfactant	Used alone	Labeled tank mixes <i>Be sure the species to be planted are on BOTH labels</i>	Other tank mixes
Choice water conditioner	Water conditioner for use at 0.25% with all glyphosate formulations		

Additional products recommended for release projects include:

Arsenal AC

Chopper

Garlon 3A

Garlon 4 Ultra

Garlon XRT/Forestry Garlon XRT

Oust XP

Rodeo

Transline

Vastlan

Velpar DF or L