

Recommendations for Directed Spot Spray, Tree Injection, and Basal Bark Treatment

Hand applications of herbicides can be very effective in controlling individual plants or small areas of weeds. The information below lists applications for directed foliage spraying using common herbicide products. Following this is a species specific table with information on foliage sprays, basal applications and cut surface stem treatments. Spot foliage treatments can use larger volumes of spray solution than broadcast sprays. The table assumes volumes applied at 50-100 gallons per acre. Users should always read the label of the products they are using to make sure they don't exceed any per acre maximum listed and adjust the herbicide concentration accordingly. When spraying around conifers or other desirable plants, avoid foliage contact especially during active growth.

Commonly Used Herbicides for Directed Foliage Applications

2,4-D ester (Weedone LV 4 or LV 6 and many others)

Rate 1 to 4 % product v/v in water)

Time Apply when broadleaved weeds are small in the spring for best results. For woody plants treat when they are active from spring through summer. Avoid contact with conifers especially when they are actively growing.

Remarks 2,4-D controls a large spectrum of broadleaved weeds and woody plants including thistles, false dandelion, woodland groundsel, sow thistle, alder, madrone, manzanita species and many others. Amine salt formulations can also be used, but ester products perform better in early spring and on woody species. For best herbaceous control apply in spring while plants are small. Addition of an oil or seed oil surfactant may improve control on evergreen brush species and some broadleaved weeds.

Caution Consult label to avoid exceeding maximum yearly and single application rate. Esters are volatile and vapors can move off target in hot weather potentially damaging conifers and desirable plants.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

clopyralid (Transline and others)

Rate 0.25 to 0.5 oz product per gallon of water to treat 1,000 sq ft (equivalent to 2/3 to 1 1/3 pints per acre)

Time Apply when plants are actively growing, but especially in the spring when susceptible weeds are present and developing.

Remarks Clopyralid controls a select group of herbaceous plants and elderberry on forest sites. For control of bull thistle and small woodland groundsel, use the lower rate early in the growing season. In late spring higher product rates may be needed to control larger plants. Canada thistle is best controlled at bud stage in late spring. Fall applications can be effective on certain species. Additional sensitive weeds include other thistles, clovers, hawkweeds, yellow starthistle, sow thistles, prickly lettuce, some knapweeds and vetches. Red elderberry is effectively controlled during the summer foliage season. Clopyralid can be an effective tank mix herbicide with 2,4-D for broad spectrum control on mixed broadleaved weeds in reforestation sites. Conifers, grasses and many other broadleaved weeds are tolerant.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

glyphosate (Rodeo, Roundup Custom and many others)

Rate 1 to 5 % product v/v in water

Time Apply as a directed spray on foliage of grasses and annual weeds any time they are green and growing. Perennial weeds like bracken fern and deciduous shrubs should be treated from mid-summer through fall before significant leaf fall. Avoid contact with desirable conifers and non-target plants.

Remarks Glyphosate can control a wide variety of deciduous shrubs such as salmonberry, thimbleberry, hazel, oceanspray, vine maple, cherry, elderberry, poison oak, and perennial forbs like bracken fern as a foliage spray.

There are many glyphosate products labeled for forestry use. Users should carefully read the product label they are using and make sure they do not exceed maximum labeled concentrations. Use the lower rates for grasses and weeds and higher concentrations for woody plants. Products that have no surfactant in the formulation may be safer spraying near conifers in case of accidental overspray, although additional surfactant may improve control.

Caution Douglas-fir and other conifers can be injured by glyphosate because of any overspray during directed spraying. They are most sensitive as buds swell and budbreak occurs in the spring through early summer. Apply around dormant seedlings to mitigate risk of injury.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

imazapyr 4 lb ai/gal (Arsenal Applicators Concentrate, Polaris AC Complete and others)

Rate 0.25 to 5 % product v/v in water.

Time Apply when brush plants and hardwoods are fully leafed out from mid-summer through leaf color in the fall avoiding conifer contact and over application near their roots.

Remarks A wide variety of deciduous shrubs and some evergreen plants are sensitive to imazapyr. Maples, hazel, ocean spray, cherries, oaks, cottonwood, willow, poison oak, madrone and chinkapin are sensitive. Recovering bigleaf maple sprout clumps (one to two years from cutting) are effectively controlled with a 2.5% solution from summer into fall. Applications should be made just to cover foliage but not to runoff. Although imazapyr has activity on many grasses and forbs, it is rarely used for those species in forestry in the Northwest.

Some product labels restrict applications for site preparation to sites that will be planted to certain conifer species (Douglas-fir, western hemlock, ponderosa pine, lodgepole pine, sugar pine and white pine) or around certain established conifers (Douglas-fir, lodgepole pine, white pine) for release. Users should carefully read product labels for labeled sites, conifer species and any maximum per acre rates. Some products containing 2 lb ai/gal

are available for forest management and are generally used at twice the rate as 4 lb ai products.

Caution Imazapyr has significant soil activity and high rates or over application can result in mortality or injury to conifers and non-target plants that have root systems extending into treated areas. Do not apply more than 1.5 lb ae per acre per year. Avoid contact with conifer foliage.

Site of action Group 2: acetolactate synthase (ALS) inhibitor

Chemical family Imidazolinone

metsulfuron (Escort XP and others)

Rate 2 to 4 ounces product per 100 gallons of water.

Time Apply when brush plants and hardwoods are fully leafed out from summer through the fall but before leaf coloration. Avoid conifer foliage contact.

Remarks Metsulfuron controls a wide variety of deciduous shrubs and herbaceous plants prior to planting or in established plantations as a directed spray. Rubus species such as blackberries, salmonberry, thimbleberry, and blackcap are especially sensitive to metsulfuron and lower rates effectively control these. Other species controlled include snowberry, cottonwood, cherry, willow, oak, and oceanspray. A number of herbaceous weeds are controlled, but bracken fern and sword fern are the major forestry targets. Consult labels for additional weeds controlled.

Caution Metsulfuron can be damaging to conifers and users should avoid contact with conifer foliage if they are present.

Site of action Group 2: acetolactate synthase (ALS) inhibitor

Chemical family Sulfonylurea

triclopyr ester (Garlon 4 Ultra, Garlon 4, Triclopyr 4)

Rate 1 to 5% product v/v in water.

Time Apply when deciduous brush plants and hardwoods are fully leafed out from summer through the fall but before leaf coloration. Treat evergreen plants from spring into summer. Avoid contact with conifer foliage especially during active growth.

Remarks Triclopyr ester controls a wide variety of deciduous and evergreen shrubs as well as herbaceous plants prior to planting or in established plantations as a directed spray. Species such as blackberries, poison oak, Scotch broom, gorse, snowbrush ceanothus, madrone, tanoak, and myrtle are especially sensitive to triclopyr. For blackberries treat in late summer into late fall for best control at lowest rates (1 %). Scotch broom, gorse and many evergreen brush species can be effectively controlled from spring and early summer applications at a 2% concentration along with oil type surfactants. Other species controlled include cottonwood, alder, cherry, willow, and oak. A number of broadleaved herbaceous weeds are controlled but these uses are not generally used in the Northwest on forest sites. Consult labels for additional weeds controlled.

Caution Avoid contact with conifer foliage, especially ponderosa pine. Triclopyr ester is volatile and vapors can move off site during warm temperatures and damage conifers or other desirable plants. Products containing triclopyr salts are less volatile and have less risk of off-site movement but control of some species may be reduced.

Site of action Group 4 synthetic auxin

Chemical family Pyridine

Herbicide Recommendations for Control of Listed Species

Species	Herbicide ¹	Active ingredient per 50-100 gal of solution	Carrier	Expected control	Application and remarks
Alder, red <i>Alnus rubra</i>	2,4-D	3 lb	Water	Excellent	Foliage spray. See label for release timing.
	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Excellent	Foliage spray. Site prep only.
	2,4-D amine	Undiluted	None	Good	Injection, 3 inches between centers, 1-2 ml/injection.
	picloram + 2,4-D	Undiluted	None	Good	Injection, 3 inches between centers.
	triclopyr ester	3 lb	Water	Good	Midsummer directed foliage spray.
	triclopyr salt	50%	Water	Excellent	Injection, 3-4 inches between centers. Use full strength in maple and tanoak.
	triclopyr ester	2 to 15% product in oil	Oil	Excellent	Low-volume basal treatment.
	glyphosate	3 lb ae	Water	Good to excellent	Foliage spray. Summer.
	imazapyr	25-50%	Water	Excellent	Trunk injections, 6 inches between centers.
		10 lb (2.5%)	Water	Excellent	Low-volume sprays June-Aug. on sprout clumps.
Ash, Oregon <i>Fraxinus latifolia</i>	triclopyr salt	3 lb	Water	Excellent	Foliage spray.
	triclopyr ester	3 lb	Water	Excellent	Directed foliage spray.
Birch <i>Betula</i> spp.	glyphosate	3 lb ae	Water	Good	Directed foliage spray; summer to fall. Adding imazapyr may improve control.

Species	Herbicide ¹	Active ingredient per 50-100 gal of solution	Carrier	Expected control	Application and remarks	
Blackberry	glyphosate	3 lb ae	Water	Good	Sept.-Oct., as long as most foliage is still green.	
	metsulfuron	2 oz	Water	Excellent	Spring, summer, fall site prep.	
Himalayan <i>Rubus procerus</i>	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Good	Foliage spray. Aug.-Sept. Site prep only.	
	triclopyr ester	3 lb	Water	Excellent	Directed foliage spray; midsummer to fall. Use directed spray around pines.	
Evergreen <i>R. laciniatus</i>	triclopyr salt	2 to 3 lb	Water	Excellent	Foliage spray; midsummer to fall. Use directed spray around pines.	
Trailing <i>R. vitifolius</i>	aminopyralid + triclopyr amine (Capstone)	0.075 to 0.11 + 0.75 to 1.12 lb (6 to 9 pints product/a)	Water	Good to excellent	Midsummer to fall foliage spray	
All <i>Rubus</i> spp.	metsulfuron	2 oz	Water	Excellent	June–Sept. Kills conifers.	
Broom, Scotch <i>Cytisus scoparius</i>	2,4-D	2 lb	Water-oil emulsion	Excellent	March. See label for release timing.	
	triclopyr ester	2 to 15% product in oil	Oil	Excellent	Basal spray Feb. to Oct.	
	triclopyr ester	2 to 4 lb	Water	Excellent	Foliage spray Feb. to Oct. Oil or oil surfactants may improve control.	
	aminopyralid + triclopyr amine (Capstone)	0.075 to 0.11 + 0.75 to 1.12 lb (6-9 pints product/a)	Water	Good to excellent	Foliage spray. Optimum at bud to bloom.	
Cascara, buckthorn <i>Rhamnus purshiana</i>	glyphosate	3 to 4 lb ae	Water	Good	Midsummer to late summer.	
<i>Ceanothus</i> spp.*	triclopyr ester	3 lb	Water	Good to excellent	Midsummer directed foliage spray.	
Mountain whitehorn <i>C. cordulatus</i>	imazapyr	1 lb	Water	Good to excellent	Midsummer directed foliage spray.	
Blue blossom <i>C. thyriflorus</i>	2,4-D	2 lb	Water	Excellent	Foliage spray. See label for release timing.	
	glyphosate	3 lb ae	Water	Excellent	Sept., foliage spray. Deerbrush or Redstem only.	
Snowbrush <i>C. velutinus</i>	aminopyralid + triclopyr amine (Capstone)	0.075 to 0.11 + 0.75 to 1.12 lb (6-9 pints product/a)	Water	Good	Foliage spray.	
Deerbrush <i>C. integerrimus</i>						
Redstem <i>C. sanguineus</i>						
Cherry, bitter <i>Prunus emarginata</i>	picloram + 2,4-D	1 gal (0.54 to 2 lb ae)	Water	Good to excellent	Foliage spray. Site prep only.	
	glyphosate	3 lb ae	Water	Excellent	Summer foliage spray. Imazapyr additions may improve control	
	triclopyr ester	2 to 15% product in oil	Oil	Excellent	Basal spray.	
	Chokecherry <i>P. virginiana</i>	triclopyr ester	undiluted	None	Excellent	Thin-line basal bark treatment.
		metsulfuron	2 oz	Water	Excellent	June foliage spray.
		2,4-D amine	undiluted	None	Excellent	Injection, stump treatment, or frill June–Aug.
		imazapyr	25-50%	Water	Excellent	Injection or frill June- December
Chinquapin <i>Castanopsis</i> spp.	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Good	Foliage spray. Site prep only.	
	2,4-D amine	undiluted	None	Good	Frill treatment.	
	triclopyr ester	4 lb	Water	Excellent	Foliage spray. Directed spray.	
		2 to 15% product in oil	Oil	Excellent	Basal spray.	
	imazapyr	25-50%	Water	Excellent	Injection or frill June-December	
Coffeeberry <i>Rhamnus californica</i>	2,4-D	4 lb	Water**	Poor	Directed foliage spray or site prep	
	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Good	Foliage spray. Site prep only.	

Species	Herbicide ¹	Active ingredient per 50-100 gal of solution	Carrier	Expected control	Application and remarks
Cottonwood <i>Populus trichocarpa</i>	2,4-D amine	undiluted	None	Good	Frill treatment or injection.
	triclopyr ester	2 to 15% product in oil	Oil	Excellent	Basal spray.
	glyphosate	3 lb ae	Water	Excellent	Foliage spray, July–Aug. Not recommended in Idaho.
	metsulfuron	2 oz	Water	Excellent	Full foliar.
Currant and Gooseberry <i>Ribes</i> spp.	2,4-D + picloram	1 gal	Water	Good	Summer.
	glyphosate	3 lb ae	Water	Poor	Summer–fall.
Douglas-fir <i>Pseudotsuga menziesii</i>	picloram + 2,4-D	2 gal (1.08 + 4 lb ae)	Water	Good	Roadside spray.
	glyphosate	50%	Water	Excellent	injection or frill, summer to winter.
	picloram + 2,4-D	undiluted	None	Excellent	Injection (thinning) fall-winter.
	metsulfuron	2.4 oz	Water	Poor to excellent	Full foliage spray, spring to summer.
Elderberry, red <i>Sambucus callicarpa</i>	clopyralid	6 oz	Water	Excellent	Foliage spray, summer-fall
	glyphosate	3 lb ae	Water	Excellent	July–Sept.
	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Excellent	Foliage spray, summer.
	triclopyr ester	3 lb	Water	Excellent	June–July.
Gorse <i>Ulex europaeus</i>	picloram + 2,4-D	1 gal (0.54 + 2 lb)	Water	Excellent	Foliage spray. Best on younger plants. Site prep only.
	triclopyr ester	4 to 8 lb ae	Water	Excellent	Spring.
	metsulfuron	2 oz + surfactant	Water	Excellent	Spring.
Hazel <i>Corylus cornuta</i> var. <i>californica</i>	glyphosate	3 lb ae	Water	Excellent	Late summer foliage spray. Adding imazapyr may improve control.
	triclopyr ester	2 to 15% product in oil	Oil	Excellent	Basal spray.
Madrone <i>Arbutus menziesii</i>	2,4-D ester	4 lb	Water	Good	Directed foliage spray/site prep, spring/summer.
	2,4-D amine	undiluted	None	Excellent	Injection, 1–2 ml/inch of diameter
	triclopyr ester	2 to 3 lb	Water	Fair	Midsummer directed foliage spray.
		2 to 15% product in oil	Oil	Excellent	Basal spray.
	imazapyr	25% strength	Water	Excellent	Injection, 6–9 inches between centers.
	glyphosate	50% to full strength	Water	Excellent	Cut stump/injection.
Manzanita spp.* Hairy <i>Arctostaphylos columbiana</i>	triclopyr ester	2 to 3 lb	Water	Poor to fair	Midsummer directed foliage spray. Not recommended in Idaho.
		2 to 15% product in oil	Oil	Excellent	Basal spray
Hoary <i>A. canescens</i>	2,4-D	2 lb	Water	Good	Foliage spray. See label for release timing.
Pine <i>A. parryana</i>					
Whiteleaf <i>A. viscida</i>					
Greenleaf <i>A. patula</i>					
Howell's <i>A. hispidula</i>					

Species	Herbicide ¹	Active ingredient per 50-100 gal of solution	Carrier	Expected control	Application and remarks
Maple* Bigleaf <i>Acer macrophyllum</i> Vine <i>A. circinatum</i> Rocky Mountain <i>A. glabrum</i>	imazapyr (4 lb/gal)	25% to 50%	Water	Excellent	Injection summer-fall.
		10 lb (2.5%)	Water	Excellent	Foliage spray on sprout clumps. Very low volume.
	triclopyr salt	undiluted to 50%	Water	Excellent	Injection, half-strength for trees less than 12 inches or for stump treatment.
	triclopyr ester	4 lb	Water	Fair	Foliage spray of sprout clumps. Not for conifer release.
	triclopyr ester	2 to 15% product in oil	Oil	Good to excellent	Basal treatment.
		undiluted to 50%	None/Oil	Good to excellent	Thin-line basal bark treatment.
	30% strength	Oil	Good to excellent	Low-volume basal bark treatment.	
	picloram + 2,4-D	undiluted	None	Excellent	Frill, injection, or stump.
glyphosate	3 lb ae	Water	Good	Foliage spray, late summer.	
picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Good	Foliage spray. Site prep only.	
Ninebark <i>Physocarpus</i> spp.	glyphosate	3 lb ae	Water	Excellent	Summer and fall foliage spray
Oak Oregon <i>Quercus garryana</i> California black <i>Q. kelloggii</i> Canyon live <i>Q. chrysolepis</i>	glyphosate	3 lb ae	Water	Excellent	Foliage spray.
	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Excellent	Foliage spray. Site prep only.
	2,4-D amine or glyphosate	undiluted	None	Excellent	Frill; good on all oaks.
	triclopyr ester	2 to 3 lb	Water	Good	Directed foliage spray. Good on all oaks.
		2 to 15%	Oil	Excellent	Basal treatment. Good on all oaks.
	imazapyr	25% strength	Water	Excellent	Cut surface or injection, 6 inches between centers.
	metsulfuron	2 oz	Water	Excellent	Full foliar.
2,4-D	24 lb	Water**	Good	Directed foliage spray or site prep, May-July. May be necessary to re-treat.	
Ocean spray <i>Holodiscus discolor</i>	glyphosate	3 lb ae	Water	Good	Fall foliage spray. Adding imazapyr may improve control.
Pine Lodgepole <i>Pinus contorta</i> Ponderosa <i>P. ponderosa</i>	triclopyr salt	3 lb-	None	Good	Injection; one cut per 3-inch circumference. May-Sept.
	metsulfuron	0.6 oz + silicon surfactant	Water	Good	Spring, after budbreak.
	triclopyr ester or 2,4-D ester	4 lb	Water/ Oil	Excellent	Foliage spray April-June.
Poison-oak <i>Toxicodendron diversilobum</i>	triclopyr ester	2 to 3 lb	Water	Good to excellent	Directed foliage spray. Spring application best.
	glyphosate	6 lb ae	Water	Excellent	Foliage spray July-Aug. (before color).
	2,4-D	4 lb	Water	Fair to poor	Directed foliage spray or site prep. Re-treat sprouts.
	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Fair	Foliage spray. Site prep only.
	imazapyr	4 lb	Water	Excellent	Directed spray in summer. Over application can injure nearby trees and plants through root uptake.
	aminopyralid + triclopyr amine (Capstone)	0.075 to 0.11 + 0.75 to 1.12 lb (6 to 9 pints product/a)	Water	Good	Foliage spray. Spring application best.
Rhododendron <i>Rhododendron macrophyllum</i>	imazapyr	10 lb (2.5%)	water	good	Directed Summer foliage spray
	triclopyr ester	4 lb	Water/ Oil	Fair to good	Spring foliage spray.

Species	Herbicide ¹	Active ingredient per 50-100 gal of solution	Carrier	Expected control	Application and remarks
Salal <i>Gaultheria shallon</i>	triclopyr ester	4 lb	Water	Fair to good	Summer foliage spray. Site prep only.
	picloram	2 lb	Water	Good	Summer foliage spray. Site prep only.
	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Fair	Foliage spray. Site prep only.
	imazapyr	10 lb (2.5%)	Water	Good	Low volume.
Salmonberry <i>Rubus spectabilis</i>	glyphosate	3 lb ae	Water	Excellent	July–Sept.; Sept. only for release.
	metsulfuron	1 oz	Water	Excellent	June–July. Injures conifers.
	sulfometuron	1.5 to 3 oz	Water	Good	April–May.
Serviceberry <i>Amelanchier</i> spp.	2,4-D	2 lb	Water**	Poor to fair	Foliage spray. Several treatments required. See label for release timing.
	glyphosate	3 lb ae	Water	Good	Summer–fall.
	triclopyr ester	2 to 3 lb	Water	Good	Directed foliage spray.
Snowberry <i>Symphoricarpos albus</i>	glyphosate	4 lb ae	Water	Good	Foliage spray July–Sept. Not recommended in Idaho.
	metsulfuron	2 oz	Water	Excellent	Full foliar.
	triclopyr ester	2 to 3 lb	Water	Fair	Foliage spray.
Sweetbriar rose <i>Rosa eglanteria</i>	picloram + 2,4-D	1 gal (0.5 + 2 lb ae)	Water	Good	Good initial kill, some re-treatment on sprouts. Site prep only.
	triclopyr ester	2 to 3 lb	Water	Good	Directed foliage spray.
	glyphosate	3 lb ae	Water	Good	Directed foliage spray.
Tanoak* <i>Lithocarpus densiflora</i>	2,4-D	4 lb		Poor	Directed foliage spray. Several treatments needed.
	imazapyr	50%	Water	excellent	Injection or frill, 6 inches between centers.
	triclopyr salt	Undiluted	—	Excellent	Injection any season, 4 in between centers.
	triclopyr ester	8 to 12 lb	Water	Good	Directed foliage spray
	triclopyr ester	2 to 15% product in oil	Oil	Good to excellent	Basal treatment. Best to treat third-year sprouts.
Thimbleberry <i>Rubus parviflorus</i>	picloram + 2,4-D	1 gal (0.54 + 2 lb ae)	Water	Good	Foliage spray. Re-treatment may be required. Site prep only.
	glyphosate	3 lb ae	Water	Excellent	Foliage spray, July–Sept.
	metsulfuron	2 oz	Water	Excellent	Full foliar.
Willow <i>Salix</i> spp. Note Oregon's many species of willow vary in susceptibility. These are starting recommendations.	2,4-D	2 lb	Water	Good	Foliage spray. May need to retreat sprouts. See label for release timing.
	triclopyr ester	2 to 3 lb	Water	Good	Directed foliage spray.
	triclopyr ester	2-15% product in oil	Oil	Good	Basal treatment.
	glyphosate	3 lb ae	Water	Fair to good	Foliage spray July–Sept.
	metsulfuron	2 oz	Water	Excellent	Full foliar.
	imazapyr + glyphosate	0.5 lb ae + 3 lb ae	Water	Good to excellent	Foliage spray July–Sept.

*Based on results in southwestern Oregon.

**Adding 2 to 5% oil as an emulsion gives best results.

¹ Herbicides listed in these recommendations generally have broadly inclusive labels, in terms of effectiveness at concentrations given. New regulations regarding use and current label coverage should be consulted before using a particular product.